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Studies on U.S. External Imbalances

This Quarterly Review *is published by the Research and Statistics Group of the Federal Reserve Bank of New York. An introduction to the collection of studies on U.S. external imbalances begins on page 1. Among the members of the staff who contributed to this issue are* CHARLES PIGOTT *(on economic consequences of continued U.S. external deficits, page 4);* JANET CEGLOWSKI *and* BRUCE KASMAN *(on external adjustment and U.S. macroeconomic performance, page 16);* JUANN HUNG, CHARLES PIGOTT, *and* ANTHONY RODRIGUES *(on financial implications of the U.S. external deficit, page 33);* R. SPENCE HILTON *(on capacity constraints and the prospects for external adjustment and economic growth: 1989-90, page 52); and* JAMES ORR *(on the performance of the U.S. capital goods industry: implications for trade adjustment, page 69).*

A report on monetary policy and open market operations during 1988 begins on page 83.

A quarterly report on Treasury and Federal Reserve foreign exchange operations for the period November 1988 through January 1989 begins on page 103.

Introduction and Summary

Even after a considerable improvement during 1988, U.S. international trade and payments deficits remain remarkably large by historical standards. Some further reduction of our external deficits may occur over the next year or so, but without significant policy initiatives or major economic shocks, these deficits will continue to be much too high for the long-term economic health of the U.S. and the world economy. The five articles in this issue are designed to assess the economic implications and problems of continuing large external deficits and the adjustments that will be required to restore equilibrium to the external accounts.

In recent years, much has been written about the issues raised by the U.S. external deficits. Research reported here is intended to add further to our general understanding of these issues. Its special focus, however, is on the medium-term economic and financial implications of alternative paths for the external deficits and on the macroeconomic performance trade-offs involved in the adjustment process. These analyses, of course, cannot provide a numerically precise blueprint of the consequences of the alternatives they examine. Nevertheless, the articles make clear the tangible and serious risks posed by continued large U.S. external deficits, and collectively they underscore the need for timely policy measures to reduce the external deficits substantially over the next several years.

The first three articles address two broad issues that have been at the core of the debate over the U.S. external deficit: the medium- and long-term consequences of continued large deficits and the problems they may create, and the macroeconomic adjustments in the U.S. economy that are likely to be required to restore long-term equilibrium to the external accounts. The remaining two studies focus on more specific implications of the external adjustment problem. One examines the extent to which trade deficit reduction can be achieved in the near term without placing undue strains on U.S. manufacturing capacity that would fuel inflationary pressures; the other considers the effects of recent changes in competitiveness and macroeconomic forces on U.S. trade in capital goods, a large U.S. industry and a major factor in the overall trade picture.

Both history and common sense suggest that persistent large external deficits eventually lead to serious economic difficulties. Yet with the U.S. economy in the seventh year of the present economic expansion, skeptics increasingly question whether this country's current account deficit is necessarily harmful or in need of policy remedies. The first study, by Charles Pigott, provides a perspective on this controversy by giving an overview of the economic consequences and problems resulting from continued large U.S. current account deficits. Pigott argues that the present external imbalance is not manageable in a fundamental and practical sense. In the first place, the financing of ongoing deficits of anywhere near their present size, even if technically possible, may well lead to upward pressures on domestic real interest rates, downward pressure on the dollar, and perhaps other serious financial strains as foreigners become increasingly reluctant to bear the risk of holding additional dollar assets. These pressures are likely to increase the longer substantial external deficits persist and ultimately could have significant adverse consequences for the U.S. economy.

Moreover, as U.S. debt service payments rise with accumulating foreign debt, the international deficit excluding net payments on indebtedness will have to move back toward balance and the corresponding gap between national spending and output will have to close. In these circumstances, a significant decline in investment, with adverse consequences for future growth and living standards, is almost inevitable unless private consumption and government spending can be restrained. Restoring trade balance will also require other macroeconomic adjustments, including a substantial slowing of aggregate spending and changes in its composition, and a significant reallocation of resources among major sectors of the economy. These adjustments, Pigott argues, are likely to be protracted and difficult under the best of circumstances, and may very well increase in severity the longer deficit reduction is delayed.

The question, therefore, is not whether a current account adjustment is needed but how and when it will occur and at what cost. In the second article, Janet Ceglowski and Bruce Kasman attempt to quantify the macroeconomic trade-offs involved in restoring the current account to long-term equilibrium. Using an empirical framework incorporating key macroeconomic relations between the external sector and the U.S. economy, the authors explore ways in which the current account deficit could be reduced to 1 percent of GNP over the next five years — that is, by the end of 1993. Feasible paths to this equilibrium are shown to be limited by several key features of the present economic situation, particularly the relatively high level of resource utilization and the need to maintain, or even increase, current rates of capital formation in order to ensure adequate growth in future productive capacity. The results imply that achieving the deficit reduction under these circumstances will require a slowing of domestic demand growth over the next five years to no more than half its average pace over 1983-88 — and a still greater slowdown in private consumption and government spending. Collectively, the simulations strongly suggest that the options for reducing the current account deficit in a manner consistent with other economic goals are fairly limited. Monetary policy actions alone, and/or further declines in the dollar without changes in the macroeconomic forces underlying the external imbalance, cannot provide a lasting improvement but could delay the more fundamental adjustments needed for long-term equilibrium. The authors conclude that an appropriate combination of fiscal and monetary policies — which includes, among other things, a large reduction in the government budget deficit to raise national saving — appears to be the best option for achieving a substantial reduction in the external deficit while maintaining full employment, avoiding upward pressures on inflation, and preserving long-term growth prospects.

The potential financial market consequences of the failure to reduce the external deficit in coming years are analyzed in the third study by Juann Hung, Charles Pigott, and Anthony Rodrigues. The large current account deficits have led to substantial growth in U.S. indebtedness to foreigners, raising concerns about the possible financial strains that may arise if the deficits continue. To examine this issue, the article first identifies key aspects of the financing of the current account deficit over the last several years and then combines that information with other evidence to assess the likely future path of U.S. external debt and its impact on interest rates and exchange rates. The authors note that the financing of the external deficit has come primarily from private foreign sources, except during 1987, and generally has been accomplished more smoothly than many observers thought possible. Foreign demand for U.S. assets has been boosted by a number of favorable developments, including increased international financial integration and the strong preference by investors in Japan for high-yielding, longer term dollar instruments. Financial developments in coming years may not be as favorable, however, particularly because foreign investors are likely to face increasing incentives to diversify into other currencies as their dollar holdings grow.

In assessing possible future financial strains, the authors acknowledge that the numerous forces affecting the deficit financing cannot be predicted at all adequately. They attempt instead to provide a qualitative indication of the strains that may arise under two scenarios: in the first, the deficit remains at its current level in relation to GNP, while in the second, the deficit falls steadily over the next five years. The analysis suggests that a deficit that declined substantially in coming years could be financed with only modest, and possibly even negligible, upward pressures on domestic real interest rates or downward pressures on the dollar. In contrast, these financial pressures could turn out to be economically significant and quite problematic if large external deficits continued, since U.S. external dollar debt would almost certainly rise markedly in relation to foreign wealth.

The fourth article by Spence Hilton concerns a near-term issue that has been much discussed recently, whether the U.S. manufacturing sector will have enough capacity to accommodate a significant reduction in the trade deficit over the next two years or so. Hilton points out that manufacturing capacity utilization rates are already close to past cyclical peak levels in many, although not all, industries. Distinguishing

between primary and advanced processing sectors, and using relations estimated from past historical experience and survey data on planned corporate investments, he estimates that manufacturing potential output is likely to rise slightly faster during 1988-90 than its average over 1984-87. Hilton then assesses the total demands on this capacity that are likely to arise under plausible paths for trade deficit reduction and domestic demand growth. His calculations suggest that if the growth of domestic demand can be slowed to about 2 percent annually from its 1988 pace of 3¼ percent, the trade deficit could fall by as much as $40 billion over the next two years without undue strains on manufacturing capacity. In the absence of a major slowdown in the pace of domestic demand, however, reducing the trade deficit significantly over the near term will create inflationary bottlenecks in the manufacturing sector. One obvious implication of these results is that the capacity of the U.S. economy to achieve continued trade deficit reduction depends critically upon our ability to restrain the growth of domestic demand.

In the last study, James Orr discusses the U.S. trade performance in capital goods. The capital goods industry was the strongest U.S. export sector and enjoyed mounting trade surpluses during much of the 1970s, but its performance has deteriorated sharply since 1981. Orr shows that the trade surplus in capital goods trade would have fallen considerably during the 1980s even if the growth rates of imports and exports had remained at their 1975-81 average. Still, actual recent performance has been markedly worse than the projected trend. Using historical estimates of income and price elasticities with respect to international trade in capital goods, Orr attributes a considerable part of this difference to possible delay in the adjustment to the depreciation of the dollar in recent years. Even after full adjustment of capital goods trade to the lagged exchange rate effects, however, U.S. trade performance in capital goods is likely to remain weaker than in the early 1980s because of structural changes in the capital goods industry, especially the emergence of Taiwan, South Korea, and other newly industrialized Asian economies as important producers of capital goods.

Overall, our research on the external adjustment problem indicates the need for significant policy actions to reduce U.S. external deficits, although it does not provide precise details of the policies or their consequences. Collectively, the five studies in this issue suggest at least three important policy implications. First, continued large U.S. external deficits pose substantial risks that are likely to increase over time and may jeopardize important long-term economic goals. Second, the present excess of national spending over output that underlies the external deficit cannot be sustained indefinitely, and restoring external equilibrium will require protracted and substantial macroeconomic changes that may well become more severe the longer the adjustment is postponed. Third, without fundamental policy actions to restrain domestic noninvestment spending and to raise national saving, the necessary external adjustment can be achieved only by sacrificing other key economic goals—price stability, high employment, and adequate long-term growth in the economy's productive capacity. These broad conclusions underscore the need for timely economic policy initiatives to continue and reinforce the process of bringing the external accounts back toward balance over the next several years.

Economic Consequences of Continued U.S. External Deficits

The U.S. external deficit is commonly viewed as one of this country's most serious economic problems — and indeed a problem for the rest of the world as well. This judgment is based upon the widespread presumption that ongoing external deficits are harmful and ultimately unsustainable, a view that seems amply supported by the inflation and other economic disruptions that have often afflicted deficit nations in the past. Many observers have warned that intensified pressures on the dollar, reductions in future living standards, and other serious consequences are almost unavoidable unless fundamental policy actions are taken to bring the imbalance down; they warn further that these problems will become increasingly severe the longer the current account deficit persists.

Not all observers, however, agree that the U.S. deficit is necessarily harmful. Although a few even contend that the deficit is beneficial, the main thrust of the skeptics' argument is that the problems of financing and adjusting to the external imbalance have been misstated and exaggerated.[1] Some proponents of this view maintain that the deficit is sustainable, at least in principle, and that market forces will make any adjustments needed to restore equilibrium to the external accounts. Others contend that the preeminent position of the United States and the dollar in the international economy enable this country to run persistent deficits while avoiding the problems afflicting deficit nations in the past. Pointing to the continued robust performance of the U.S. economy, these analysts in effect ask: Is the current account deficit really a serious problem, and are major policy steps to reduce the deficit necessary or desirable?

This article evaluates the economic consequences likely to follow from continued large U.S. external, or current account, deficits. The basic conclusion is that such deficits do represent a serious economic problem. Continued large U.S. deficits are likely to lead to longer term problems in large part associated with the financing of the deficits, and to impose adjustment costs arising from the macroeconomic changes in spending, exchange rates, and other variables needed to restore equilibrium. Moreover, the costs will probably increase, as will the potential risks to the economy's financial and macroeconomic stability, the longer the deficits persist. The skeptics admittedly have raised some legitimate questions about the exact nature of these problems and about the adjustments needed to restore equilibrium to the external sector. Their arguments do not, however, make a plausible case for benign neglect of the current account deficit.

The first section of the article, a review of the issues under debate, explains that there is general agreement on the basic nature of the deficit: the external deficit is a reflection of macroeconomic imbalances between domestic spending and national income and between national saving and investment. Controversy about the deficits has largely centered on their sustainability and the long-term implications of U.S. external indebtedness, the need for policy actions to achieve external adjustment to equilibrium, and the extent to which the

[1] Herbert Stein, for example, has expressed doubts about the alleged problem of the external deficit and the need for government action to remedy it. See "A Primer on the Other Deficit," *AEI Economist*, March 1987, and the related argument in "The World Economy Doesn't Hang in the Balance," *Wall Street Journal*, December 30, 1987.

required changes are likely to become more severe the longer the adjustment is postponed.

The second section argues that the external deficit is theoretically sustainable, but primarily in a technical sense. In practice, the accumulation of U.S. external debt from continued large deficits may well lead to significant increases in domestic real interest rates and other financial strains. These problems are likely to intensify with further growth in the debt relative to foreign wealth. Moreover, the imbalances now making up most of the external deficit—between merchandise imports and exports and between aggregate spending and national output—cannot be sustained. Eventually, the supply of foreign savings that now finances these gaps will abate as our foreign borrowing increasingly goes to debt service. The United States will then be faced with the choice of restraining private consumption and government spending or suffering a decline in capital formation and consequent erosion of future productivity and living standards.

The question, therefore, is not whether substantial adjustments must be made to restore external equilibrium, but how and when they will be made and at what cost. The macroeconomic changes needed for the adjustment, described in the last section, will inevitably entail a significant slowdown in real spending from recent trends and potentially increase the problems and risks faced by policy makers in maintaining full employment and price stability. Like the financial consequences of U.S. foreign debt, these adjustment costs are likely to become increasingly serious the longer large external deficits persist. Moreover, the adjustment to long-term equilibrium is likely to occur only very slowly, and indeed may not continue, unless policy actions beyond those already enacted are taken. For these reasons, at least, benign neglect toward the U.S. external balance is apt to prove an increasingly problematic and risky course.

Terms of the debate

The debate over the U.S. current account deficit is not about fundamental economic concepts. Virtually all analysts, regardless of their views, agree on the basic nature of the external imbalance and the general forces underlying it. The disagreements center on the specifics of the U.S. deficit, namely its precise causes and its particular economic consequences.

By definition, the current account (external) balance is the difference between a nation's sales (exports) of goods and services to foreigners and its purchases (imports) from foreigners of similar goods and services. The services include factor payments—interest, dividends, and remittances—for the services of capital and labor. For the present discussion, the trade balance can be viewed as the current account balance excluding net payments on the nation's foreign indebtedness.[2]

The current account is essentially a macroeconomic balance between national savings and investment or, equivalently, between national income and spending. That is, to the extent that a nation exports more goods and services than it imports, it must lend the difference by acquiring an equal amount of (net) claims on foreigners. Net lending to foreign nations represents the difference between national income, Y, and national spending, A, which is also the same as the gap between national saving and investment, I. National saving refers to the total of private and public saving, that is, the difference between private saving, S, and the public sector budget deficit, D.

From this perspective, the present U.S. current account deficit, CA, reflects the excess of private and public spending relative to this nation's income and an equal shortage of private domestic savings relative to the domestic demands for that saving from private investment and the general government deficit; these gaps are being financed by net borrowing from abroad, which can be viewed as a net import of foreign saving:

$$1)\quad CA = A - Y$$
$$= I + D - S.$$

The trade deficit as defined above can be described in similar macroeconomic terms as the gap between national spending and output.[3]

Table 1 illustrates how last year's current account deficit of about 2.7 percent of GNP is accounted for on this basis. In 1981, the last year the United States recorded a surplus, national saving and investment were higher in relation to GNP (and the government deficit lower) than now, but the gap between them was virtually negligible. The present deficit reflects a substantial decline in the national savings rate (from both public and private sources) that has more than offset a modest drop in the (gross) investment rate.

This macroeconomic view does not, of course, mean that trade barriers, productivity, quality, and other determinants of national competitiveness have no role in overall U.S. trade performance. In many cases,

[2]By this definition, the trade balance includes certain nonfactor service items, such as travel and transportation, which can be ignored in most of the discussion. The balance of trade in goods only will be referred to as the merchandise balance.

[3]This follows from the fact that, ignoring transfer payments and labor remittances, GNP is equal to national output (gross domestic product or GDP) less net investment payments to other countries. Thus the trade deficit is only approximately equal to the gap between GDP and aggregate spending, although the discrepancy is fairly small.

these factors will affect national savings and investment and hence influence the external balance; moreover, such factors will, at the least, help determine the configuration of exchange rates and other proximate economic conditions consistent with any given balance.

More generally, neither the above identities nor the figures in Table 1 themselves reveal the ultimate causes of the U.S. external deficit, and indeed the relations are compatible with a wide range of alternative explanations. Moreover, the deficit is clearly the (endogenous) result of the basic exogenous factors determining national saving, investment, income, and spending. In this sense, any problems or other consequences associated with the deficit are fundamentally attributable to the macroeconomic forces underlying it.

Disputed issues

Ultimately at issue in the debate over the external deficit are the net overall benefits of measures to reduce the imbalance compared with those of alternative courses — including benign neglect. This most basic question cannot be resolved, however, without first determining the precise consequences of the deficit and evaluating whether and to what extent they are likely to be problematic.

Despite fierce debate over the issue, the question of what to do about the deficit does not depend exclusively or even mainly on its origins. Some proponents of supply-side economic policies have maintained that the external deficit is largely attributable to an improvement in the U.S. investment climate relative to that of other nations. This improvement stemmed in part from business tax deductions enacted in 1982 and allegedly had the effect of attracting foreign capital to this country. The balance of evidence, however, favors the more conventional view that the external deficit is mainly the result of a decline in national savings due to the federal budget deficit and the drop in household saving, reinforced by weakness in demand abroad.[4] Nonetheless, the first view, even if correct, does not necessarily imply that policy makers can safely ignore the external imbalance; measures to reduce the deficit still may be needed if problems arising from its financing and other consequences are sufficiently great. More generally, policies toward the deficit need to be based on current and likely future economic circumstances and not simply on past developments: reversing all the individual historical forces that caused the deficit may not be desirable or even feasible.[5]

Much of the controversy about the implications of continued U.S. deficits concerns their financing. By official estimates, the book value of U.S. net indebtedness to foreign private and public entities, in the form of bank loans and deposits, bonds and other securities, and direct investment claims, is now nearly $500 billion and rising rapidly.[6] Servicing this debt entails a continuing stream of interest and dividend payments to foreign countries; these payments (a debit item in the current account) will almost surely increase as the indebtedness accumulates.

To many observers, continued financing of large U.S. external deficits is inherently unsustainable. Those viewing the deficit as a major problem worry especially about limitations on foreigners' ability and willingness

Table 1

Sources of the U.S. External Deficit

(Percent of GNP)

	1973-79 (average)	1981	1986	1988
Gross national saving	17.1	17.1	12.6	13.2
Private household	5.6	5.2	3.1	3.0
Private business	12.4	12.8	13.0	12.0
Government surplus†	−0.9	−1.0	−3.5	−1.8
Gross domestic investment	16.8	16.9	15.8	15.8
Memo:				
Current account balance/GNP†	0.1	0.2	−3.3	−2.7

Notes: The difference between national saving and investment does not exactly equal the current account balance because of a small statistical discrepancy.
†(−)indicates a deficit.

[4]In particular, both national and household savings rates have been significantly lower over the last several years than in the 1970s and 1960s. In contrast, gross investment as a share of GNP has been about equal to its pre-1982 average, while net investment has been noticeably lower.

[5]Many economists believe that it would be highly desirable to raise private saving. There is little evidence, however, that policy can affect the private savings rate appreciably. If so, a significant increase in national saving is likely to be achievable only if the public sector's deficit is reduced.

[6]The true market value of the U.S. international investment position may differ considerably from its book value as reported by the U.S. Department of Commerce. Several studies indicate that the market value of U.S. net direct investment claims are substantially understated by the book value figures. For example, see Lois Stekler, "Adequacy of International Transactions and Position Data for Policy Coordination," Board of Governors of the Federal Reserve System, International Finance Discussion Papers, no. 337, November 1988. There is also considerable evidence, however, that a significant portion of the errors and omissions in the U.S. balance of payments data over the last six years reflect borrowing from foreigners that is not recorded in reported capital inflows or the net investment position. In any case, it is the increase of at least $600 billion in U.S. net obligations to other countries over the last six years that is of primary significance here.

to continue to lend to the United States and the risks of a crisis should those limits be approached. For example, Steven Marris in a 1985 monograph predicted a "dollar crash" leading to U.S. inflation and recession on this basis.[7] Apart from the sustainability of the external debt growth, there is considerable concern about its ongoing consequences, in particular the burden imposed on future generations' living standards by the servicing of the indebtedness as well as the potential financial strains arising from large and growing foreign holdings of U.S. assets.

In contrast, those taking a more benign view of the deficit argue that it is sustainable, at least in principle, and that market forces will be sufficient to ensure that necessary financing will be available without undue strain.[8] The implication is that explicit policy actions are not necessary to restore equilibrium to the current account. Others argue that foreigners have no choice but to lend their excess savings to the United States, or that this country, by virtue of its size and the dollar's role in the world economy, is uniquely able to borrow from abroad indefinitely. We will see in the next section, however, that while the problems of financing the U.S. deficit may be different from those encountered by other countries in the past, they are not necessarily any less problematic.

The financial consequences of the deficit can be thought of as ongoing in the sense that they are the legacy of the stock of debt accumulated by past deficits and hence need not disappear (at least at first) if the current account is brought back to balance. A second set of concerns is focused on the adjustments in macroeconomic variables associated with the creation of the deficit and its subsequent evolution. That is, a current account deficit is the result in a proximate sense of changes in domestic demand, prices, interest rates, exchange rates, and other economic conditions that constitute the linkages between the underlying macroeconomic imbalances and the external accounts.

For example, most observers would agree that the rapid growth of U.S. domestic demand relative to foreign demand after 1982 and the sharp rise in the real value of the dollar were major proximate contributors to the development of the trade and current account deficit.[9] Likewise, the creation of the deficit also involved an effective contraction of activity in traded-goods (mainly manufacturing) sectors relative to nontraded-goods industries such as housing and services. Any future reduction of the U.S. external deficit is apt to entail at least a partial reversal of many of these changes, the consequences of which are apt to be partly beneficial and partly problematic. Among the chief concerns about these adjustments are the implied reduction in the growth of domestic spending and living standards, and the potential deterioration in trade-offs between price stability and real growth that may arise from the required macroeconomic changes.

A key contention of those viewing the deficit as a pressing problem is that the ongoing and adjustment costs are closely related and likely to become increasingly severe the longer the imbalances continue. These points are especially evident from several recent analyses that assume (on the presumption that an ongoing deficit is unsustainable) that the current account must ultimately return to balance.[10] Because of the debt accumulation, achieving such balance is likely to become progressively more difficult the longer the deficit persists: the larger the external debt, the greater the trade surplus needed to meet the debt service payments. A hysteresis thus may arise from continued deficits, in the sense that the adjustments in the dollar and other macroecomic variables needed to restore equilibrium to the current account become more severe the longer they are postponed. In the following two sections, which discuss these ongoing and adjustment implications of the deficit in more detail, we will see that a hysteresis may well occur even if a current account deficit can be sustained.

Ongoing financing problems of the deficit

At present borrowing rates, the U.S. could add more than $500 billion to its foreign indebtedness over the next five years. An external debt of this magnitude would be historically unprecedented, both in size and in relation to foreign wealth; servicing the debt could eventually absorb 1 percent or more of this country's GNP. Thus it is not surprising that the financing of the U.S. current account deficit has led to much concern

[7] See Steven Marris, *Deficits and the Dollar: the World Economy at Risk*, Institute for International Economics, Monograph no. 15, December 1985.

[8] Stein ("The World Economy") admits the possibility of a "dollar crash" scenario involving sharp domestic interest rate increases but argues that its deflationary effects can be offset by monetary policy. This seems somewhat optimistic in view of the lags in private economic behavior and policy makers' perceptions and actions.

[9] Analysts differ more on the relative importance of the various proximate factors, such as the contribution of interest rates to the dollar's rise.

[10] A good example is Jeffrey Sachs' analysis of the sacrifice ratio of output gains to inflation in the creation of the deficit and its subsequent reversal. See Jeffrey Sachs, "The Dollar and the Policy Mix," *Brookings Papers on Economic Activity*, 1:1985. Similar reasoning underlies John Williamson's calculations of equilibrium dollar exchange rates (*The Exchange Rate System*, Institute for International Economics, Monograph no. 5, September 1983).

and controversy.

Three basic and closely related issues are raised by this financing. The first concerns whether continued U.S. deficits are sustainable. The answer to this question largely determines whether the current account must necessarily return to balance or not. A second issue, less often mentioned but in a sense more fundamental, is the ongoing financial consequences for U.S. interest rates and financial market conditions of increasing levels of U.S. indebtedness. The third issue concerns the long-term implications of the debt for future U.S. wealth and living standards.

The sustainability question

The view that the U.S. external imbalance is inherently unsustainable is very widespread, although not, as we have seen, undisputed. Claims are often heard that foreigners will eventually run out of funds to finance the current account deficit or will become saturated with U.S. debt. These assertions are oversimplified: the current account deficit is sustainable in a technical sense. Of more practical significance, however, is that the present trade deficit and the imbalance between spending and national output underlying it are not sustainable even in theory.

Technically, there is no reason why the United States or any other nation could not run a current account deficit indefinitely. Assertions that foreigners will run out of funds to purchase U.S. assets ignore the fact that the world economy is growing so that the resources available for lending are continuously increasing. In such an environment, a current account deficit is theoretically sustainable as long as the resulting debt to foreigners eventually stabilizes relative to income and wealth. The technical requirements for this stability are explained in the accompanying Box. A current account deficit that remains constant relative to GNP will eventually lead to a stable debt-GNP ratio, a point illustrated in Table 2.[11]

In another important respect, though, the present U.S. current account position is unsustainable. Because servicing payments will rise as the external debt accumulates, maintaining the current account deficit at a constant ratio of GNP will require a decline in the trade portion of the deficit, that is, the deficit excluding net interest payments. The Box shows in fact that if the interest rate paid on foreign indebtedness just equals the nominal growth rate of the economy, the trade account will ultimately have to be balanced for the current account to be sustainable. In this case, the current account eventually just equals the debt service payments, with the debtor nation in effect borrowing the net interest due. If the interest rate exceeds the growth rate, then the trade account must be in surplus to help pay the servicing costs.[12]

These technical observations have some important practical implications. First, as just noted, the U.S. current account need not necessarily return to balance to restore equilibrium to the U.S. external sector.[13] Indeed, the longer the present current account imbalance persists, the higher the debt and debt service payments will become, and the greater the likelihood that the U.S. will become a persistent deficit nation.

Even more important, however, is that most of the adjustments deemed necessary to balance the current account will have to be made even if the current account remains in deficit. The 1988 U.S. trade deficit was about $135 billion, virtually the same as the overall current account deficit. Bringing this large trade deficit back to balance will require substantial adjustments in trade flows, in U.S. and foreign incomes, and in other macroeconomic variables. Moreover, the present situation, in which borrowing from abroad is effectively financing an aggregate spending level nearly 3 percent greater than output, must also cease eventually. As this borrowing is increasingly devoted to servicing the external debt rather than financing domestic spending, this country will be faced with a choice between restraining private consumption and government spending or allowing a decline in the rate of domestic capital formation. Clearly, therefore, the meaningful question is not whether substantial adjustments in the external accounts should be undertaken, but when, how rapidly, and under what circumstances they are to occur.

[11]Of course, a current account deficit cannot absorb more than all available foreign funds (or, more practically, the bulk), nor can the external debt exceed total foreign wealth. Even the most pessimistic projections of the U.S. external deficit and debt are well below such technical limits, however.

[12]The measured return on the book value of U.S. investments abroad has typically been significantly greater than that on foreign investments here. Last year, the gap in the two returns was so great that U.S. net service payments were virtually zero despite an officially estimated debt of well over $400 billion. It is possible, although by no means certain, that this country's rate of return on its assets will continue to exceed that paid on foreign liabilities (although not nearly to the degree recorded in 1988). If so, the effective interest rate on U.S. net external debt could remain below the economy's growth rate, making an ongoing trade deficit a technical possibility; this deficit is likely to be fairly small in relation to GNP, however (see Box).

[13]Will the present imbalances between national saving and investment and between spending and income stabilize or rise relative to GNP? We can be reasonably assured, based on past experience, that the gap between *private* saving and investment, which is generally small, will remain stable. Whether the public sector budget deficit will fall (as it has in the last two years) or resume increasing relative to GNP will depend upon policy choices. Stability in the deficit-GNP ratio is not automatic and indeed involves essentially the same technical conditions as apply to the external imbalance (that is, balance or near-balance in the budget excluding interest payments on national debt).

Box: Technical Aspects of Current Account Sustainability

This box explains in more detail the technical aspects of current account sustainability and related implications summarized in the text. For the most part, the conclusions are directly analogous to more often discussed observations concerning the sustainability of public sector budget deficits.

A current account deficit can be sustainable only if it leads eventually to a stable ratio of external debt, D, to domestic GNP, Y, and foreign wealth, which for simplicity will be assumed to grow at the same rate. (The basic conclusions are easily generalized when the growth rates differ.) This means that eventually:

$$1)\ D'/D = Y'/Y = g,$$

where D'/D, the proportional growth rate of the nominal external debt (D' is its absolute change), must equal the nominal GNP growth rate, Y'/Y, or g, expressed in decimals. Suppose now that the current account deficit to GNP ratio is stable at some ratio $(CA/Y)^*$. (Note that a deficit corresponds to a positive value of CA.) This corresponds to a stable long-term equilibrium debt/GNP ratio of $(D/Y)^*$ that follows directly from relation 1 (multiply each side by Y/D and note that, ignoring valuation changes, CA = D'):

$$2)\ (D/Y)^* = (CA/Y)^* \div g.$$

Thus the long-term debt ratio is greater the larger the sustained CA in relation to GNP and the lower the country's nominal growth rate.

To determine the relation between the long-term current account and the debt servicing, suppose that the nominal interest rate paid on the net indebtedness is "r" so that debt service payments are $r(D/Y)^*$. The trade deficit, T, is simply the difference between the overall current account and this debt service:

$$(T/Y)^* = (CA/Y)^* - r(D/Y)^*.$$

We can express this in terms of the current account/income ratio as:

$$3)\ (T/Y)^* = (1 - r/g)(CA/Y)^*.$$

It follows that if the interest rate just equals the GNP growth rate, the trade balance must ultimately be in balance, leaving the entire current account deficit to service the external debt. If the interest rate paid exceeds (is less than) the growth rate, the long-term equilibrium trade balance must be in surplus (deficit).

As noted in the text, the point is of potentially significant practical importance because of its implications for the ultimate servicing of the external debt and for the adjustments needed to ensure the sustainability of the current account itself. Recall that the current account is the difference between GNP and national expenditure, A; GNP, or national income, is itself equal to the value of national output or gross domestic product, "Q," less net factor payments to foreign countries. With some inessential oversimplification (ignoring labor remittances and other factor payments unrelated to the external debt), this means that the trade deficit is simply the difference between national output and expenditure, so that eventually:

$$4)\ (T/Y)^* = (A/Y)^* - (Q/Y)^*.$$

To understand the significance of these relations, suppose that a nation having no external debt begins incurring a trade and current account deficit. Initially, of course, this means that national spending exceeds both national income and output. But as the trade deficit subsequently declines, the initial gap between output and spending must close, even if that between income and spending (that is, a current account deficit) remains. For example, if the interest rate equals the economy's growth rate, national expenditure must eventually come back to equal output. That is, in the long run, national output goes entirely to national spending, as it did before the current account imbalance developed. Note, however, that national income will have fallen relative to output by the amount of the long-run debt servicing.

Hypothetical Equilibrium Trade Balance Configurations

(Assuming Nominal GNP Growth of 7.5 Percent per Year)

Trade Surplus/GNP (Percent)	Nominal Interest Rate			
	6.0	7.5	9.0	11.0
With CA/GNP ratio				
of 1 percent	−0.2	0	0.2	0.5
of 2.5 percent	−0.5	0	0.5	1.2
of 4.0 percent	−0.8	0	0.8	1.9

Notes: Figures calculated from relation 3 in the text of the Box. CA refers to the current account *deficit*. (−) indicates a deficit in the trade balance.

Box: Technical Aspects of Current Account Sustainability *(continued)*

In contrast, if the interest rate exceeds the growth rate, national expenditure must eventually fall below real output, part of which is devoted to servicing the external debt. Both the ultimate reduction in national spending and the macroeconomic adjustments needed to bring it about will be greater in this case than when the interest rate is equal to or below the growth rate. (Of course, if the interest rate is less than the growth rate, the nation may be able to maintain a permanent deficit in trade and expenditure above the level of output.) Hypothetical illustrations of the potential size of the trade surplus imposed by the debt-service burden are given in the table. Clearly this burden will be less than would be the case if the current account itself had to return to balance, but it could nonetheless be significant.

Table 2

Consistent Long-Run Rates of Debt and Deficit Ratios to GNP

Net Foreign Debt/GNP (Percent)	Long-Run Deficit/GNP Ratio (Percent)		
	1	2.5	4
With nominal GNP growth of 7.5 percent	13	33	53
With nominal GNP growth of 10.0 percent	10	25	40

Note: Figures calculated according to formula: debt/GNP = (deficit/GNP) ÷ g, where g is the nominal GNP growth rate expressed in decimals. The figures refer to long-run ratios.

Financial terms of the indebtedness

To say that continual U.S. borrowing from abroad is possible in principle conveys little about its actual feasibility or its effects. Theoretically, U.S. borrowing is limited by the amount of available foreign savings; in practice, institutional and other constraints on the capacity of foreign lenders to accumulate U.S. assets almost certainly impose more stringent limitations on U.S. indebtedness. But whether continued U.S. borrowing proceeds smoothly, leads to severe financial strains, or ends in a crisis is likely to depend less on absolute institutional limits than on the *willingness* of foreigners to accumulate the debt and the effects of such willingness on financial markets. In particular, continued rapid increases in U.S. indebtedness may well put significant upward pressures on U.S. real and nominal interest rates and could add to the volatility of domestic and international financial markets.

It is reasonable to expect that the accumulation of U.S. foreign indebtedness will lead to somewhat higher U.S. real interest rates than would otherwise prevail. Generally, the real return on any given type of asset must be greater the larger its supply in relation to the market as a whole. Conceptually, this increase in the yield paid amounts to a premium for the additional risk incurred by the lender in holding more of the asset. This risk can arise from the possibility of default, unexpected changes in the asset price, or other factors affecting an instrument's value to an investor.

The risks associated with U.S. external debt, however, are significantly different from those typically associated with past debtor nations. The major risks associated with lending to most foreign countries in the past have been sovereign and related risks arising from insolvency and/or the inability of debtors to obtain the foreign exchange needed to repay creditors. Such risks are likely to be relatively small in the case of the United States, which can borrow in the major international currency, the dollar, and allows capital to flow freely across its borders. In the aggregate at least, default risk on U.S. debt is also minor for the foreseeable future; even pessimistic projections of U.S. debt service burdens are within limits successfully maintained by other countries in the past.

Instead, the primary risk to foreign holders of U.S. debt is likely to be exchange rate risk arising from unexpected changes in the dollar's value. With the United States a net debtor, a representative foreign investor will almost certainly have to maintain a net exposure to dollar assets and thus will face the risk of loss from fluctuations in the dollar's value.[14] In large

[14]Both U.S. and foreign residents face certain common risks in holding dollar assets, in particular from unanticipated inflation, which reduces the purchasing power of dollar claims. Foreigners, however, face greater losses from fluctuations in the dollar's real value (changes that do not simply offset inflation differentials) than U.S. holders. The reason is that the real depreciation reduces the dollar's value more in terms of foreign goods and services than it does in terms of U.S. goods. Dollar instruments are thus intrinsically more risky to foreign holders than to U.S. holders (the reverse is of course true of foreign currency assets).

part because of the potential size of U.S. indebtedness, this risk could become important and its effects on U.S. interest rates would be at the least persistent and very possibly quite significant in magnitude. Thus there is no reason to believe that the United States can avoid financing strains from external debt simply by borrowing in its own currency. Moreover, these strains are likely to increase as U.S. indebtedness grows in relation to foreign wealth.

Admittedly, very little information is available as to how large these effects might be. Even a modest increase in U.S. real interest rates, however, could have significant long-term impacts on the U.S. economy. Historically, U.S. real interest rates on highly rated corporate bonds have averaged between 2 and 4 percent, depending upon maturity. An increase of as much as one percentage point in this long-term average (an outcome that cannot be excluded on the basis of available evidence) could add perceptibly to the cost-of-capital faced by domestic enterprises and adversely affect domestic capital formation and the productivity advances dependent on it.[15] As noted earlier, higher U.S. real interest rates also tend to raise the effective burden of servicing U.S. external debt.

Beyond the effects on interest rates, the implications of U.S. indebtedness for this country's financial autonomy and the stability of financial markets have raised concern. Worries have been expressed, for example, about the rise in foreign ownership and controlling interest in U.S. corporations that continual borrowing from abroad may produce. Foreign direct investment in the United States is very likely to rise significantly in coming years (for reasons only partly related to our external deficit), although foreigners' controlling share in U.S. industry is likely to remain well below that held in Canada and many other industrial countries.[16]

There is also a real possibility that future growth in U.S. net indebtedness will raise volatility in domestic financial markets and increase their vulnerability to certain disturbances. The basic reason is that the risks from holding dollar assets are generally greater for foreigners than for domestic residents. The larger the net exposure incurred by foreigners in financing U.S. deficits, the greater their potential loss from an adverse change in the dollar's value. For this reason, a given disturbance, say a perceived deterioration in U.S. economic prospects, could lead to greater shifts in desired foreign (and market) holdings of dollars, and thus greater fluctuations in foreign exchange and domestic financial markets, as the share of U.S. assets held by foreigners increases. On this question also there is little evidence whether such effects are likely to be significant or not. However, the sometimes adverse market reaction to announcements of large U.S. trade deficits over the last few years at least suggests that continued rapid growth in U.S. indebtedness could add to financial volatility.

Burdens on wealth and living standards

Finally, it is often asserted that the United States will be poorer in the future as a result of the deficits and that the burden of servicing the external debt will lower future living standards. These living standard and wealth implications clearly cannot be meaningfully defined independently of the ultimate causes of the external deficit. In particular, a deficit that raises domestic investment and capital formation will generally enhance national wealth and real incomes. As we have seen, however, the present U.S. deficit is a reflection of reduced national saving from past trends rather than increased national investment; indeed, the ratio of net investment to GNP since 1982 has been the lowest of any postwar recovery.

At the least, future U.S. wealth will be impaired if the relatively low national savings rate now underlying the external deficit continues. By the mid-1990s, in fact, the national wealth of this country could be nearly $1 trillion lower — nearly $4000 per citizen — than it would have been had the savings rate remained at its pre-1980 average.

Continuation of present trends is also likely to have an adverse cumulative impact on the long-term real incomes and living standards of U.S. households. The servicing of the external debt itself will probably not be the main source of this burden, however. The debt service can largely be borrowed from abroad (without any further increase in the deficit or debt ratios to U.S. or foreign GNP). Only if the external debt raises interest rates drastically or if foreign lending is otherwise curtailed is a substantial trade surplus to meet the service payments likely to be required — a very remote possibility although one that cannot be ruled out. Real domestic spending will, of course, have to slow sharply from its past average to close the present gap with output as the trade deficit declines; at that point, spending *in relation to output* will be back on its pre-1980 trend.

Nonetheless, even if the debt is largely serviced through continued foreign borrowing, the potential for future real output growth (and hence spending) is likely

[15] See Juann Hung, Charles Pigott, and Anthony Rodrigues, "Financial Implications of the U.S. External Deficit," in this issue of the *Quarterly Review*.

[16] In book value terms, the *gross* stock of foreign direct investment claims on the United States now amounts to about 6 percent of GNP. A doubling in this ratio — probably no more than is likely over the next five years — would place it well above the ratios for Germany and Japan, about equal to the ratio for the United Kingdom, and well below the nearly 25 percent ratio for Canada.

to be seriously eroded unless present rates of private consumption and government spending are reduced significantly. As explained earlier, foreign financing of the excess of aggregate spending over output cannot continue indefinitely: its disappearance is a direct consequence of the necessary decline in the trade deficit. If private consumption and government spending were maintained at their present levels relative to output under these circumstances, the present rate of net investment eventually would be cut nearly in half, to about 3 percent of output.[17] A net investment rate of 3 percent would represent a very substantial departure from past trends; it would support little more than a 1 percent annual growth in the nation's capital stock; and increases in capital per worker, a critical source of past productivity increases, would largely cease.

Growth in future potential output and in productivity would very likely be reduced significantly, and growth in real wages and household incomes slowed considerably if not curtailed, by a decline in net investment of this magnitude. A large decline is inevitable, however, unless noninvestment spending is restrained and savings raised relative to output. Admittedly, the impact of lower investment is small in any given year and may be imperceptible at first. Its effects, however, will accumulate over time, with potentially significant adverse impacts on real earnings of workers and on living standards some years from now. This prospect is especially of concern in view of the long-term need to raise productivity and real wages to meet the needs of the growing retired proportion of the population.

Adjustments to the deficit

As we have seen, bringing the U.S. external position to a sustainable long-run equilibrium requires a substantial reduction in the trade deficit. Intrinsic to this restoration of equilibrium are two basic macroeconomic changes that must occur under any circumstances. First, domestic spending on private and public consumption and investment must fall relative to domestic output; this means that the growth of domestic demand will have to be significantly below that of real GNP for at least several years. Second, there must be an expansion of output and reallocation of resources toward manufacturing and other traded goods sectors relative to nontraded activities. These shifts will require significant changes in financial markets, in output and factor prices, and in spending patterns. The exact nature and timing of these changes will depend upon the evolution of the factors underlying the deficit and other future economic circumstances; in particular, the adjustments will be influenced by the interest rate and other financial consequences of the accumulating U.S. indebtedness. Qualitatively, the changes necessary to restore equilibrium are the opposite of those associated with the development of the deficit over the first half of this decade. This process of reversal has been underway for the last several years, but it clearly has further to go.

Three elements of this adjustment process are particularly critical and most likely to present problems. The first is the reduction in the growth of domestic spending that is the necessary counterpart of the elimination of the trade deficit. Spending now going to domestic needs—that is, some combination of government expenditure, private consumption and investment—will have to grow significantly more slowly over the next several years, particularly relative to the first half of the 1980s but also in comparison with historical averages. This reduction is, of course, necessary to correct the overspending relative to domestic production underlying the present trade deficit. Even a relatively gradual adjustment in this imbalance is likely to entail a very marked shift in past spending growth; this is particularly true since resource constraints limit future output growth to rates significantly slower than those over the past several years. For example, eliminating the present gap between spending and production (now about 3 percent of GNP) over the next five years would require that domestic demand growth fall to one-half or less of its nearly 4.5 percent annual increase over 1983-88.

Second, the adjustment process is also likely to pose problems for the authorities in reconciling domestic stabilization objectives with the necessary requirements of the external adjustment. The necessary slowing of domestic demand growth means, of course, that the U.S. economy will be more dependent upon stimulus from the external sector and, in this sense, more vulnerable to fluctuations in real growth abroad. At the same time, any significant further dollar depreciation needed for the adjustment could add to domestic inflationary pressures. In effect, therefore, the adjustment process is apt to mean a deterioration in the effective trade-offs between the maintenance of full employment, real growth, and price stability. (This again is a partial reversal of the situation facing U.S. authorities during the dollar's appreciation, which to some extent improved the trade-offs between growth and inflation.)

The third key aspect of the adjustment process involves the redistribution of national output and

[17] As interest payments rise, national income will fall relative to output. Standard consumption functions imply that consumption will vary with income and hence decline as a share of output. To the extent this occurs, the "crowding out" of investment will be reduced. However, this adjustment may well occur slowly, with the higher per capita consumption levels maintained for some time.

resources toward traded goods industries. This process will be beneficial in helping to restore the international competitiveness of U.S. industries, which was seriously damaged by the dollar appreciation and other macroeconomic forces associated with the development of the trade deficit. The changes needed to achieve this reallocation, however, may again lead to strains over the near to medium term. One concern is whether there will be sufficient capacity in U.S. manufacturing industries to meet the growing demand from the external sector. Such constraints, to the extent they now exist, are likely to ease in coming years as manufacturing industries invest in increased capacity to meet growing demand in international markets. But this process could occur more slowly than in the past because firms may well view such investments as more risky than before, given their losses from the trade balance deterioration, and hence may be more reluctant to expand capacity than in the past.

A related concern is whether the changes in relative prices needed for the reallocation of activity to traded goods sectors can occur without significant upward pressures on the aggregate price level. Attracting the resources needed to expand capacity will entail an increase in output prices and wages in manufacturing relative to nontraded goods sectors, at the same time that U.S. prices relative to those of foreign competitors must decline. Institutional impediments, such as rigidities impeding downward adjustments of prices or strong tendencies for domestic industries to match price changes by foreign competitors, may make it difficult to accomplish the needed relative price adjustments in a noninflationary environment.

All of these adjustments will be substantial, at least cumulatively, although they are unlikely to be as severe as those implied by analyses assuming a balanced current account (or a zero net indebtedness position) as the necessary endpoint. The severity of the adjustments will depend on two factors that have recently elicited much pessimism: the responsiveness of the trade balance to changes in the dollar, and the robustness of foreign real growth.

The responsiveness of the trade deficit to dollar changes depends essentially upon two conditions. The first is the response (that is, elasticity) of the demands for U.S. traded goods to changes in their prices relative to those of competing foreign products; the lower this elasticity, the larger the deterioration in the terms of trade that will be needed to reduce the deficit. The second factor is the pass-through of changes in the dollar to import prices relative to domestic counterparts: the smaller this pass-through, the greater the depreciation required to achieve a given improvement in U.S. relative to foreign traded goods prices. The lower collectively these responses are, the greater the decline in the dollar and the terms of trade that will be needed to achieve a given improvement in the (nominal) trade balance. In this sense, the adjustments needed to restore external equilibrium are likely to be more severe, and the associated trade-offs between domestic real growth and inflation less favorable, if these responses are low rather than high. Over the last several years, the responses of U.S. trade to changes in the dollar and relative prices seem to have been significantly smaller than those observed in earlier periods, although it remains unclear whether the more recent pattern reflects a lower overall response or simply a longer delay in that response. If the former, the strains resulting from the adjustment may be significantly greater in proportional terms than during past episodes of trade deficit reduction.

The robustness of foreign real growth has similar implications for the severity of the adjustments. Achieving equilibrium in the trade balance will require some combination of slower real U.S. domestic demand growth and dollar depreciation, the amounts being greater the slower the real demand growth abroad. Indeed, without adequate growth abroad it may be impossible to achieve a substantial further improvement in the U.S. trade deficit over the next several years while limiting dollar depreciation and maintaining full-employment growth in the United States. In this sense there is a potential trade-off between external adjustment and internal real growth and price stability objectives that partly depends upon foreign growth performance. It is largely for these reasons that U.S. policymakers have repeatedly emphasized the importance of this performance to the global external adjustment process.

Finally, delaying the changes needed to restore long-term equilibrium and relying primarily on automatic market forces rather than changes in U.S. fiscal policy to achieve it are quite likely to increase the severity of the adjustments and the attendant risks. Postponed adjustment will mean larger U.S. indebtedness and quite possibly higher U.S. real interest rates; if these conditions develop, the amount of trade deficit reduction needed to restore equilibrium will be greater. Largely for these reasons, delayed adjustment is likely to involve more severe reductions in real spending growth, more dollar depreciation, and a riskier financial environment. A protracted adjustment will also mean postponement of the restoration of competitive equilibrium to U.S. (and foreign) manufacturing and in this sense involves microeconomic costs as well: as we have seen, the present allocation of resources between traded and nontraded goods sectors underlying the U.S. trade deficit effectively amounts to a departure

from long-run equilibrium.

Fiscal policy will affect the severity of these adjustments in part because it will be a key determinant of the speed at which equilibrium is restored. Compared to a program of budget deficit reduction, maintaining the current status of fiscal policy is very likely to mean a substantially slower reduction in the trade deficit, a larger accumulation of indebtedness, and hence more severe financial and adjustment consequences. To illustrate with an extreme example, eliminating the U.S. trade deficit could take *a decade or more* if the present ratio of the U.S. budget deficit to GNP were to be maintained. Unchanged fiscal policy is also likely to mean that most of the resulting (larger) adjustments will fall on private consumption and investment; capital spending is thus likely to be most adversely affected in this case.[18] In contrast, lowering the deficit by reducing government spending is likely to place less burden on private spending. This does not necessarily mean that arbitrary fiscal policy measures should be undertaken simply to reduce the external deficit without regard to their other benefits and costs. These considerations do strongly suggest, as those worried by the external deficits have warned, that there are real and potentially quite costly trade-offs from simply waiting for the market to correct the deficit.

Conclusion

For most of this decade, warnings have been sounded about the adverse consequences of the U.S. external deficit, as well as the companion federal budget deficit. These warnings have focused on the potential reduction in future living standards and wealth arising from the current account deficit and, increasingly, on the risks of a crisis if the imbalance is not brought down. Given that these dire consequences for the most part have not occurred and that the U.S. economy remains apparently healthy in key respects, it is perhaps not surprising that skeptics have questioned whether the deficit is so great a problem.

The analysis in this article suggests that while the skeptics have raised some valid points, the contention that policy makers can ignore the current account imbalance without risk is incorrect. The U.S. external deficit is admittedly only the consequence of more fundamental factors causing an imbalance between national savings and investment. Moreover, restoration of equilibrium in the external accounts may not require that the current account deficit be eliminated entirely. But these are not the most important issues to be addressed in evaluating policy toward the deficit. More basic from this perspective are the nature and severity of the adjustments needed to restore equilibrium and the long-term consequences of the U.S. indebtedness.

This article has shown that there are genuine problems associated with the external deficit, some already manifest. By any standard, the lost jobs and excess capacity in the U.S. manufacturing sector during the first half of the 1980s have been important problems, with tangible costs in terms of resource reallocation and the resulting strains on the world trading environment. Other potential problems associated with the adjustment to the external deficit are also evident. The effects of the declining dollar, the response of trade flows, and the need to slow U.S. domestic demand growth while sustaining foreign growth have become major focuses of concern about macroeconomic policy here and abroad. These concerns are apt to persist and perhaps intensify since, as we have seen, balance in the trade account must be restored and will take at least the next several years, and conceivably longer, to be completed.

Of as much, and perhaps even more, concern are the longer term financial consequences of the U.S. indebtedness, in part because little is known about their likely severity. A long-term rise of significant magnitude in U.S. real interest rates along with a substantial increase in financial market vulnerability to certain disturbances certainly cannot be ruled out if large deficits continue; such outcomes could have serious consequences for the growth and productivity performance of the U.S. economy in future years. Admittedly, the possibility that the financing of the deficits will continue without significant strains or other adverse consequences cannot be ruled out either. This is not much comfort for policy makers, however, who cannot ignore prospective problems simply because their magnitude cannot be predicted with precision or certainty. What is reasonably certain is that the problems and risks that do arise from U.S. indebtedness will be persistent ones; once these problems appear, policy makers will face a choice between allowing them to continue or making substantial further protracted adjustments in the current account to bring the debt back down.

The ongoing and adjustment costs, and their likely aggravation as the deficits persist, are one set of considerations that must be weighed in deciding on policies toward the external imbalance. Policy must also be based, of course, on the other costs and benefits of specific measures to reduce the deficit. Not all actions to reduce the deficit are equally desirable, and indeed some — for example, measures that discourage investment or raise trade barriers — are likely to create more

[18] This is not to claim that lowering the budget deficit will lead to less severe adjustment regardless of the policy used. Reducing the deficit by raising taxes on investment could well have unfavorable consequences, for example.

problems than they solve. Nonetheless, the overall evidence strongly suggests that the U.S. external imbalance is primarily the result of increased private consumption and public spending arising in part from government actions. The question for policy is, therefore, whether postponing the changes needed to reduce this spending is advisable in light of the growing problems that continuing external deficits are likely to bring.

Charles Pigott

External Adjustment and U.S. Macroeconomic Performance

It is generally accepted that the U.S. current account deficit poses risks to the economy and that its reduction is one of this nation's important policy goals. How the process of external adjustment will affect future U.S. economic performance is, however, less clearly understood. Although many observers contend that adjustment may require temporarily slower growth in U.S. living standards, the extent of this and other economic costs of reducing the current account deficit has not been fully examined.

In this article, we seek to analyze the macroeconomic implications of U.S. external adjustment. To this end, we develop a simulation model of the U.S. economy that allows us to identify alternative adjustment scenarios differing in their projections for future policy actions and market behavior. These scenarios are assessed according to their effectiveness in achieving a sustained reduction in the U.S. current account deficit and other important macroeconomic objectives.

In the course of the analysis, we point to certain specific changes in economic activity that will be required along any path that reduces the U.S. current account deficit. In particular, the virtual elimination of the U.S. merchandise trade deficit, a slowing in domestic demand, and a significant rise in the national savings rate will all be necessary if adjustment is to take place without fueling inflationary pressures or eroding long-term growth prospects in the United States.

We also find that measures increasing world demand for U.S. goods cannot be expected, by themselves, to provide the major impetus for adjustment. After several years of rapid growth, the U.S. economy is approaching full capacity. Consequently, further reductions in the dollar's real value or steps to stimulate foreign demand growth will likely produce only limited improvement in the current account unless they are accompanied by economic changes that slow the pace of demand in the United States.

These results are supported by our empirical analysis. The examination of alternative adjustment scenarios reveals that the failure to take timely actions to reduce the current account deficit poses risks to the U.S. economy. In particular, external adjustment brought about by financial market reactions in the absence of active policy measures could lead to a serious disruption in U.S. and global economic activity. Even without such reactions, postponing the adjustment process into the 1990s will almost certainly lead to a greater cumulative slowdown in real GNP and domestic demand than would occur if adjustment were to begin immediately.

In contrast, appropriate and timely policy actions taken by fiscal and monetary authorities can generate an adjustment path consistent with overall macroeconomic stability. Under a scenario in which fiscal policy contracts and monetary authorities respond accordingly, U.S. output can grow at close to its full capacity rate of between 2½ and 3 percent annually while domestic demand expands at a rate that is one-half of one percentage point less than that of GNP. These rates of expansion require a slowing from recent trends, particularly for demand, but represent paths of maximum sustainable growth consistent with both external adjustment and price stability.

Our analysis further suggests that foreign economic

conditions play an important role in determining the trade-offs facing the U.S. economy. Faster foreign domestic demand growth would allow for more rapid U.S. growth during adjustment. Moreover, under the scenario described above in which domestic policies allow for adjustment with output growth near full capacity, a temporary stimulus to foreign demand, coordinated with U.S. actions, could reduce the magnitude of U.S. policy changes required to reduce the current account deficit.

Conceptual discussion

The U.S. external deficit can be reduced in a variety of ways, and the specific factors inducing adjustment will play a key role in determining the path of economic activity. Nonetheless, there are constraints common to all nations undergoing external adjustment that, when viewed in the light of recent U.S. experience, allow us to identify changes in activity that will be necessary along almost any adjustment path.

In considering these changes, it is useful to recall three identities that describe a current account imbalance.[1] First, a nation's current account deficit, CAD, reflects an imbalance in its overall trade position with other nations. As identity 1 shows, an external imbalance can be decomposed into the sum of the trade deficit — representing the gap between imports, M, and exports, X, of goods and services — and the net investment incomes deficit, IIP, which accounts for returns to foreigners on their net holdings of U.S. assets. Similarly, a current account deficit reflects an excess of national spending on goods and services, DD, over GNP (identity 2). This gap between spending and output must be bridged by net borrowing from abroad, meaning that national savings — net private savings, S^p, plus net savings of the public sector, S^g — is insufficient to satisfy the domestic demand for these savings in the form of investment, I (identity 3).

(1) $CAD = (M - X) + IIP$
(2) $CAD = DD - GNP$
(3) $CAD = I - (S^p + S^g)$

These identities highlight conditions necessary to reduce a current account deficit. Imports (or net investment income payments) must slow relative to exports at the same time that domestic demand slows in relation to output and national savings rises relative to investment. These identities cannot, of course, determine the path of any particular variable over the adjustment period. Exports, output, and savings could all conceivably rise or fall, allowing for a similar variation in the path of their counterparts in the identities presented above.

However, an analysis of recent U.S. experience indicates changes in these identities that will likely take place during adjustment. In particular, the large and growing U.S. debt to foreign countries has clear-cut implications for the pattern of trade adjustment. The U.S. net foreign asset position, representing loans, securities, and direct investment claims, has fallen sharply during this decade, and our net foreign debt, according to official estimates, is now approaching $500 billion (Table 1). This accumulation of debt has been accompanied by a rising stream of interest and dividend payments abroad, reflected in the decline of more than $25 billion in the net investment income balance since 1980.

The continued deterioration of the investment income balance is inevitable, particularly in an environment in which the current account is likely to move only gradually toward balance. Indeed, at current rates of return

[1] In presenting the identities, we ignore the role of unilateral transfers and do not account for differences in measures of the U.S. external account on a Balance of Payments basis and on a National Income and Product Accounts basis.

Table 1

Breakdown of U.S. Current Account Balance

(Billions of Dollars)

	1980	1983	1985	1987	1988
Current account balance	1.8	−46.3	−115.1	−154.0	−135.3
Merchandise trade balance	−25.5	−67.1	−122.1	−160.3	−126.5
Net investment income	30.4	24.9	25.9	20.4	2.6
Transfers and other services	−3.0	−4.0	−18.9	−14.1	−11.4
Memo: U.S. net foreign asset position					
Level	106.3	89.4	−110.7	−368.2	−487.1
Share of GNP	3.9	2.6	−2.8	−8.1	−9.9

Source: Department of Commerce

the U.S. factor income balance will almost certainly move into deficit in the coming years.[2] As a result, the external adjustment burden will be placed entirely on the "primary" trade balance — the merchandise trade balance plus net transfers and other nonfactor services. More specifically, it is likely that the U.S. merchandise trade balance, which has been in deficit since 1975, will need to be balanced eventually, simply to stabilize the current account deficit in relation to GNP.

The necessary adjustment in the U.S. trade position represents, at the macroeconomic level, a large transfer of real resources to foreign countries. The pattern of production in the United States must be shifted away from satisfying domestic needs and towards the export sector. Consequently, the adjustment process will limit the growth of domestic purchases of goods and services. As identity 2 indicates, real domestic demand growth is determined by two factors during the adjustment process — the growth path of output (GNP) and the initial size of the external imbalance, reflected by the gap between demand and output.

Most recent studies that have examined U.S. growth performance suggest that the economy's real potential growth rate — the maximum rate at which growth can be sustained while maintaining stable rates of inflation — currently stands between 2.5 percent and 3 percent annually.[3] Using this as a target for output growth allows us to determine the noninflationary growth rate of domestic demand that is consistent with eliminating the current account deficit. For example, if the U.S. economy were to sustain real GNP growth at the rate of 2¾ percent per year over the next five years, domestic demand growth could grow at most by 2¼ percent annually — one-half of one percentage point slower than GNP — in order to eliminate the U.S. current account deficit during this period.[4]

Domestic demand could, of course, grow more rapidly during the adjustment period if excess capacity existed in the economy. Indeed, this appears to have been the case in the United States since the beginning of 1986 (Table 2). Over the past three years, the current account deficit has declined despite the continued growth in domestic demand at or above the U.S. potential growth rate. This improvement has been made pos-

[2]Estimates based on our simulation model suggest that at current interest rates and net debt levels, the U.S. investment income balance will move into deficit by 1990 and steadily deteriorate through the first half of the next decade, even in an environment of declining current account deficits.

[3]Potential growth is usually determined by identifying growth in an economy's productive resources together with the rate of advance in their productivity. See, for example, the following recent studies: "Potential Output in the Major Industrial Countries," Staff Studies for the World Economic Outlook, International Monetary Fund, August, 1987; Robert J. Gordon, "Unemployment and Potential Output in the 1980s," Brookings Papers on Economic Activity 2: 1984; and Douglas W. Woodham, "Potential Output Growth and the Long-Term Inflation Outlook," this *Quarterly Review*, vol. 9 (Summer 1984).

[4]In real terms the current account deficit represented roughly 2½ percent of GNP in 1988. To appreciate how the size of our initial external imbalance affects the ability of demand to expand, note that if the current account deficit were half its current size (1¼ percent of GNP), domestic demand could expand at 2½ percent per year over the next five years while achieving external adjustment.

Table 2

Recent Trends in U.S. Economic Activity

	1982-I to 1985-IV	1986-I to 1988-IV
GNP growth (annualized percent change)	3.3	3.2
Domestic demand (annualized percent change)	4.5	2.9
Foreign domestic demand (annualized percent change)†	2.3	4.3
Real effective exchange rate (annualized percent change)‡	2.4	−8.8
Current account as a share of GNP		
Level (end of period)	−3.1	−2.5
Change over period (percentage points)	−3.2	0.6
Capacity utilization rate		
Level (end of period)	80.3	84.2
Change over period (percentage points)	2.9	3.9
Unemployment rate		
Level (end of period)	7.1	5.3
Change over period (percentage points)	−1.1	−1.8

†Weighted average of domesic demand growth in Canada, France, Italy, Japan, the United Kingdom, and West Germany.
‡Real trade-weighted value of the dollar against 14 industrial countries, computed using dollar exchange rates deflated by the ratio of foreign to U.S. wholesale prices.

sible by drawing on underutilized resources in the economy. Factor utilization rates have increased steadily since 1981, allowing GNP to expand above its full capacity growth rate of 2½ to 3 percent.

Capacity utilization rates and unemployment rates have, however, reached levels suggesting that attempts to sustain current growth rates will likely fuel inflationary pressures.[5] Thus, even if full employment growth is maintained, a substantial slowing in domestic demand, relative to both its recent trend and output growth, appears necessary if the economy is to follow an adjustment path that does not lead to an acceleration in inflation.

An examination of recent trends in U.S. savings and investment balances provides further insight into the likely nature of the adjustment process (Table 3). These balances, presented as a share of GNP, indicate the importance of a decline in the national savings rate in the deterioration of the U.S. external balance since 1980. Over the course of this decade, net national savings as a share of GNP has fallen sharply from 5.1 percent in 1980 to 2.8 percent in 1988.[6] (This rate is currently less than half that of any other major industrial nation.[7]) As a result, net investment demand has been increasingly financed from abroad, with foreign sources accounting for at least half of U.S. net investment in each of the past three years.

[5]For a detailed analysis of capacity constraints in the U.S. manufacturing sector, see Spence Hilton, "Capacity Constraints and the Prospects for External Adjustment and Economic Growth: 1989-90," in this issue of the *Quarterly Review*.

[6]It is clear from Table 3 that much of the deterioration of national savings between 1980 and 1986 was attributable to public sector borrowing that more than doubled as a share of GNP. Since 1986 net national savings has risen as a decline in private savings has been more than offset by an increase in public savings.

[7]The latest available OECD measures for 1987 indicate that net national savings as a share of GDP were as follows: Japan 18.4, Germany 11.4, France 7.0, the United Kingdom 5.4, Italy 10.0, Canada 7.2, and the United States 2.4.

While external adjustment could, in principle, involve changes in either investment or savings rates, it is difficult to conceive of a viable adjustment path in which the net national savings rate remained at its present level. Eliminating the U.S. current account deficit while maintaining this savings rate would imply a sharp reduction in net investment as a share of GNP and, consequently, a slowing in the economy's capacity for growth.[8] Thus, if adjustment is to occur without eroding long-term prospects for growth, it must be accompanied by a significant increase in national savings.

Adjustment and policy actions

The preceding discussion suggests that three changes in economic activity will characterize any adjustment scenario consistent with stable inflation and unchanged capacity growth rates. First, in order to achieve external adjustment, the U.S. trade deficit will need to be virtually eliminated to offset the likely increase in debt service payments in the coming years. Second, domestic demand growth — meaning some combination of private consumption, government spending, and investment — will have to slow from its pace of recent years. Annual GNP growth of between 2½ and 3 percent (perhaps more safely estimated at 2½ percent) and domestic demand growth roughly one-half of one percentage point less than GNP represent reasonable standards for U.S. performance if external adjustment is to be realized without placing upward pressure on inflation. Finally, adjustment must be accompanied by a substantial increase in net national savings as a share of output to prevent a deterioration of U.S. growth prospects over the long term.

[8]In particular, a decline in the net investment rate to below 3 percent (the current net savings rate) could lower the rate of capital accumulation by as much as 1½ percent per year. The studies of U.S. productive capacity cited earlier would indicate that this slowdown in capital accumulation could reduce potential growth rates and, ultimately, U.S. living standards by three-tenths of one percentage point to five-tenths of one percentage point annually.

Table 3

U.S. Savings and Investment Balances

(As a Percent of GNP)

	1980	1984	1986	1987	1988e
Net investment	5.0	6.9	5.2	5.2	5.6
Net national savings	5.1	4.1	1.9	1.8	2.8
Private	6.4	6.8	5.3	4.1	4.7
Public	−1.3	−2.8	−3.4	−2.3	−1.8
Current account balance	0.1	−2.8	−3.3	−3.4	−2.8

Source: Bureau of Economic Analysis

These changes, which might be viewed as "necessary conditions" for adjustment, limit the alternative adjustment paths available. Nonetheless, the preceding analysis is not sufficient to determine the effects or extent of adjustment on key macroeconomic variables. Shifts in policies (either here or abroad) as well as changes in behavior unrelated to policy could move the current account toward balance. The actual path that the economy follows will depend on the factors underlying the adjustment process.

We have seen, for example, that the economy's potential growth rate plays an important role in determining the maximum rates of expansion in demand and output consistent with adjustment and nonaccelerating inflation. Many observers, however, have argued that as a result of measures necessary to bring about the changes described above, the economy will be unable to sustain full employment growth while undergoing adjustment and will suffer other economic disruptions. The evidence of other industrial nations seems to provide support for this view (Table 4). Over the past fifteen years, industrial nations have generally experienced a slowdown in output and demand growth from long-term trends in the process of reducing large external deficits.

Table 4 also illustrates the variation in the growth experiences of other nations. For example, growth slowed quite considerably in Germany in the course of deficit reduction, but not at all in Canada. In recent U.S. experience, we have seen (Table 2) that the current account deficit was reduced from 1986 onward while demand and output growth proceeded along or above long-term trends. This performance, largely attributable to the dollar's decline and increased foreign expenditure growth, might suggest that the external imbalance could be alleviated by measures that raise world demand for U.S. goods.

However, the gains that can be realized solely through a foreign demand stimulus or dollar depreciation are likely to be limited. While these measures tend to improve the U.S. external deficit, primarily through increased export demand, they also raise total demand for U.S. domestic output. As we have seen, this mechanism can bring about adjustment while reducing the gap between actual and potential output as long as the economy is below full employment. As capacity constraints are approached, however, continued reliance on measures to increase demand for U.S. goods will likely reap diminishing improvements in the current account and instead fuel near-term inflationary pressures.

This analysis does not exclude a role for exchange rate depreciation or stimulative foreign demand policies. As we will see later, these measures may play an important complementary role in the adjustment process. Nevertheless, in an economy operating near full capacity, measures that serve to slow domestic demand growth will be central to the adjustment process.

There are, however, significant risks in promoting adjustment by acting to slow demand. Contractions in demand, whether due to market forces or policy actions, exert strong downward pressure on overall levels of economic activity. The effects on output growth from a negative demand shock may be particularly sizable in the case of the United States, because a slowdown in the pace of domestic demand growth in the world's largest economy is likely to have a powerful effect on activity abroad.

A prolonged downward shift in activity may also have damaging effects through its impact on the composition of demand. Since investment is the component of demand most sensitive to fluctuations in output, a persistent slowing in activity growth could lower the rate of

Table 4

External Adjustment and Rates of Activity Growth in Other Industrial Countries

(Average Annual Percent Change)

	Adjustment Period	Change in Current Account As a Share of GNP (In Percentage Points)	GNP		Domestic Demand	
			Adjustment Period	Trend†	Adjustment Period	Trend†
United Kingdom	1974-78	4.6	1.2	1.7	0.4	1.6
Germany	1980-82	2.5	0.2	1.8	−1.2	1.7
France	1982-85	2.1	1.5	2.2	1.3	2.0
Canada	1975-80	2.3	3.7	3.4	3.4	3.5
Italy	1980-83	2.6	1.6	2.4	1.5	2.3

†Trend period is 1974 to 1987.

capital accumulation and underlying growth capacity. At the same time, the government budget deficit generally rises in an economic downturn, a development that could exacerbate already significant budgetary problems. Thus, the concern raised earlier, that adjustment will result from slowing investment with little or no changes forthcoming in national savings, is not unwarranted. Evidence of the potential significance of this concern is provided in Table 5. In other industrial economies, current account adjustment has been almost uniformly accompanied by declining government budget balances and sharp reductions in net private investment rates.

Domestic policy makers do have some control over the composition of demand during adjustment. It may be possible, for example, to reduce a current account deficit by combining a fiscal contraction to slow demand (and raise national savings) with monetary policy actions that allow real interest rates to decline in order to promote investment demand. However, the net impact of any such policy actions that promote external adjustment must clearly be to reduce domestic demand growth. Thus, to the extent that exchange rates and foreign demand growth are left unchanged, domestic policy makers may be faced with a basic conflict between their goals of maintaining full employment and reducing external imbalances.

These considerations suggest that a coordination of domestic and foreign policies may prove beneficial to the adjustment process. Coordination may not require active measures by policy makers abroad since the dollar's real value would tend to fall as a result of a slowing in U.S. demand growth and a decline in real interest rates. Nonetheless, an agreement to allow some dollar depreciation and/or foreign demand stimulus to offset a contraction to domestic demand in the United States may help maintain the level of economic activity here and abroad and improve the trade-offs facing U.S. policy makers.

Analysis of possible adjustment paths

We now turn from our general discussion to a more detailed analysis of potential external adjustment paths. To this end, we have developed a model incorporating the main determinants of U.S. macroeconomic performance and its external balance that allows us to compare a number of alternative adjustment scenarios.

By projecting the path of key behavioral and policy parameters into the future, we simulate a "baseline" scenario for U.S. economic performance over 1989-97. Under this scenario the current account deficit increases from 1990 onward, reaching 3½ percent of GNP in 1993 and 3¾ percent by 1997. We then consider three alternative scenarios that would allow the

Table 5

External Adjustment and Shifts in Composition of Demand in Other Industrial Countries
(Shares of GNP)

	Current Account	Net National Saving	Budget Deficit	Net Private Investment
United Kingdom				
1974	−4.0	5.1	−3.8	9.1
1978	0.6	7.9	−4.4	7.3
Change (percentage points)	4.6	2.8	−0.6	−1.8
Germany				
1980	−1.7	10.1	−2.9	11.8
1982	0.8	7.7	−3.3	6.9
Change (percentage points)	2.5	−2.4	−0.4	−4.9
France				
1982	−2.2	7.3	−2.8	9.5
1985	−0.1	7.1	−2.8	7.2
Change (percentage points)	2.1	−0.2	0.0	−2.3
Canada				
1975	−2.7	11.3	−2.5	14.0
1980	−0.4	11.4	−2.8	11.8
Change (percentage points)	2.3	0.1	−0.3	−2.2
Italy				
1980	−2.2	14.1	−8.5	16.3
1983	0.4	11.0	−10.7	10.6
Change (percentage points)	2.6	−3.1	−2.2	−5.7

Source: OECD, Department of Economics and Statistics, *National Accounts*, vol. 2.

United States to reduce its current account deficit to 1 percent of GNP by 1993. These scenarios describe adjustment under the following conditions: (1) market-induced changes in interest rates and the real value of the dollar arising from shifts in expectations about the dollar's long-run value or from increased risk premia on U.S. assets, (2) U.S. fiscal and monetary policy actions under unchanged market conditions, and (3) U.S. policy measures coordinated with the actions of foreign authorities.

The alternatives to our baseline scenario are evaluated according to their ability to achieve external adjustment concurrently with three broad macroeconomic objectives: the avoidance of upward pressure on the rate of inflation;[9] full employment (sustaining output at or close to potential); and the maintenance of the economy's long-term growth prospects (adequate investment growth). Furthermore, we evaluate economic performance under each scenario through 1997 in order to consider the sustainability of external adjustment and its implications for activity beyond the adjustment horizon.

The model

The model used in the simulations (described in detail in the Appendix) has been designed to capture in a simple way key macroeconomic trade-offs associated with adjustment. We account for the major determinants of economic activity and the current account balance in the United States, focusing on the medium-term dynamics embodied in these relations.

In our model, output is determined by the level of aggregate demand. Thus, any shock to demand will have a direct and immediate impact on the pace of GNP growth. The domestic component of demand consists of relations for private consumption, private investment, and government consumption. The private components of demand are related to levels of activity, the interest rate, and private sector wealth. Government spending, including federal, state, and local authority expenditure, is an exogenously determined policy instrument, modeled as a share of potential GNP.

The specification of the external component of demand consists of standard volume and price equations for exports and imports of goods and services. Net investment income payments are modeled separately by applying a rate of return (calculated as an average of past values of the U.S. nominal interest rate) to the economy's net foreign asset position. The current account balance reflects the sum of the balances on net exports of goods and services and net investment incomes. Changes in the net foreign asset position of the economy are determined, in turn, by the current account balance.

Although output is demand-determined, supply considerations play an important role in this model through their impact on inflation, interest rates, and private disposable income. The economy's full capacity level of output is based on a production function incorporating the capital stock (determined by past investment trends), estimates of the underlying growth of the labor force, and total factor productivity growth. The gap between actual output and this measure of full capacity is the principal determinant of domestic inflation. In addition, net government tax receipts are related to the output gap, serving to dampen movements in household income over the business cycle.

The nominal interest rate, modeled as an average of short- and long-term yields, is assumed to be a policy instrument of the monetary authorities. Authorities are also assumed to know the inflation process and to adjust the nominal interest rate in line with changes in inflationary expectations, thus neutralizing the impact of inflation on the real interest rate.

The real exchange rate (terms of trade) is determined by assuming (1) that there is perfect capital mobility internationally such that the expected rate of real dollar depreciation equals the U.S.-foreign real interest differential adjusted for risk (covered interest parity); and (2) that the real value of the dollar is expected to return to its equilibrium level (assumed unchanged) at a constant rate. The path of the nominal exchange rate is determined by the real exchange rate and the U.S.-foreign inflation differential. Although exchange rates are determined within the model, other foreign variables — foreign demand growth, prices, and interest rates — follow exogenously determined paths.

It should be emphasized that the results generated by the model are sensitive to both its general structure and the specific parameter values it embodies. Consequently, while precise numerical paths for economic variables are presented, these results must be interpreted only as a general representation of how the economy would respond. Nevertheless, our experiments suggest that the qualitative nature of the results are robust with regard to small changes in the model parameterization. Thus, to the extent that the model reasonably represents the functioning of the economy, our analysis does provide a relevant basis for evaluating the adjustment alternatives and policy trade-offs facing the U.S. economy.

The baseline scenario

The baseline simulation combines the model described above with projections for key (exogenous)

[9] This criterion does not imply that maintaining inflation at its current rate is itself a desirable policy goal.

economic conditions from 1989 to 1997.[10] In particular, we project that foreign domestic demand and foreign prices will grow by 3.25 and 3.5 percent per year respectively. U.S. and foreign real interest rates are assumed to be held constant at 3.5 and 2.8 percent respectively but are equal on a risk-adjusted basis (there is a risk premium of 70 basis points on U.S. assets). Thus, these assumptions are consistent with a stable real exchange rate over the forecast horizon.

These projections, which apply to all other scenarios unless otherwise stated, should not be viewed as a forecast of actual future outcomes. Instead, they illustrate one possible path that economic activity might follow if current trends were extended into the future.

The outcome of the baseline scenario is summarized in Table 6 and Chart 1. We project an acceleration in domestic demand growth in 1989 and 1990 attributable to the lagged effects of rapid GNP growth. Combined with a slowdown in foreign domestic demand growth from its earlier pace and a stable real value of the dollar, this acceleration leads to a deterioration in the U.S. current account that, over time, slows economic growth. On average, domestic demand grows by 2.6 percent over 1989-93 and 2.5 percent during 1994-97; GNP grows by 2.5 percent and 2.4 percent per year during these periods. The current account deficit increases to roughly $250 billion by 1993 and reaches 3.8 percent of GNP at the end of the projection period.

The significance of rising debt service payments in these projections should be noted. Net investment income payments rise by 1.6 percent relative to GNP from 1989 to 1997 and account for all of the deterioration in the current account over this period. This deterioration can be attributed to the rise in U.S. net foreign debt (which nearly triples in relation to GNP during this period), along with the increase in the nominal interest

[10] Historical values are used for all variables through 1987. The model's output for 1988 incorporates actual values, estimates, and model-generated projections.

Table 6

The Baseline Simulation 1988-97

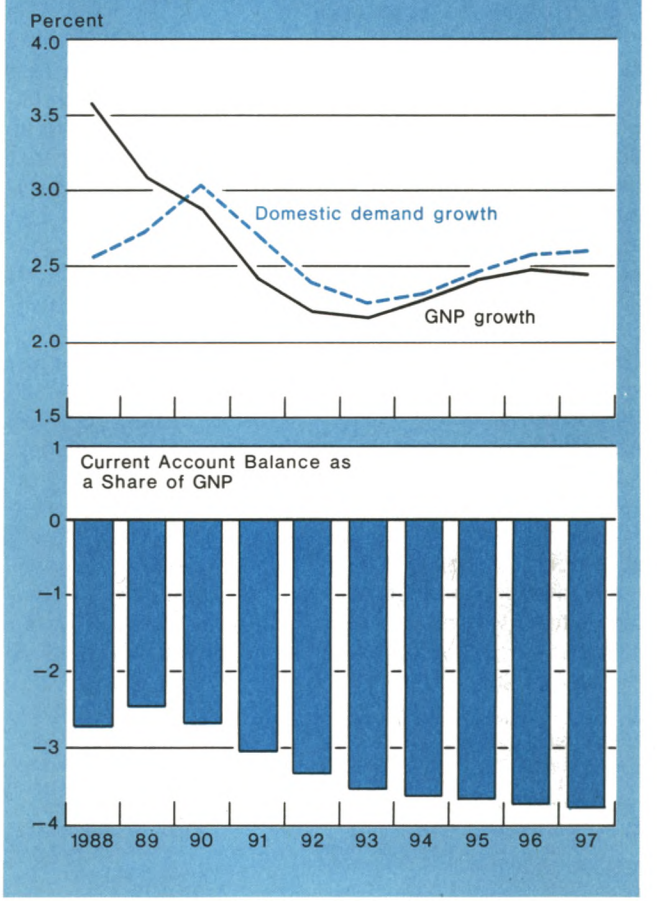
(Average Annual Percent Change)

	1988	1989-93	1994-97
GNP	3.6	2.5	2.4
Domestic demand	2.6	2.6	2.5
Private consumption	2.5	2.6	2.5
Government consumption	0.2	2.6	2.7
Investment	5.5	2.7	2.4
Prices (GNP deflator)	4.6	6.1	5.2
Real exchange rate†	0.0	0.0	0.0
	1988	**1993**	**1997**
Current account balance			
In billions of dollars	−131.0	−260.0	−377.0
As a percent of GNP	−2.7	−3.5	−3.8
Net investment income (as a percent of GNP)	−0.2	−1.2	−1.8
Primary trade balance (as a percent of GNP)	−2.5	−2.3	−2.0
Government budget balance (as a percent of GNP)	−1.8	−2.1	−1.9
Potential output	2.7	2.7	2.6
Nominal interest rate (level)	6.8	9.8	8.4
Real interest rate (level)	3.5	3.5	3.5
Net foreign assets (as a percent of GNP)	−9.9	−18.1	−26.0

†(+) signifies depreciation.

Chart 1

The Baseline Simulation



rate associated with a pickup in inflation.

Scenarios leading to current account adjustment

The baseline scenario traces one possible path of economic activity into the future. A principal implication of this scenario is that external adjustment will end in 1989 and the U.S. current account deficit will steadily rise during the 1990s.

As an alternative to the baseline, we now examine other scenarios that lead to a substantial reduction in the current account deficit during the next five years. Specifically, we consider alternative paths in which the U.S. current account deficit is reduced to 1 percent of GNP by 1993. This criterion, while imposing rigid and somewhat arbitrary terms on the magnitude and timing of external adjustment, enables us to examine the implications of a significant medium-term improvement in the U.S. current account balance. Such an improvement would bring the current account deficit to a level that will likely be sustainable in an environment of roughly balanced trade flows (excluding debt service payments).[11]

Market-induced adjustment

The baseline scenario assumes that the projected increase in U.S. external imbalances will not substantially alter interest rates or other financial market conditions. There is, however, considerable concern that in an environment of large and growing current account deficits, market-induced shocks will bring about external adjustment. Market-induced adjustment paths can arise from a number of factors, two of which we consider here. First, the deterioration of the current account projected in the baseline could lead to a downward revision in market expectations of the dollar's long-run real value. Given the high degree of financial market integration in the industrial world, such a revision would likely lower the dollar's value immediately, unless U.S. interest rates were to rise substantially relative to rates abroad.

Second, foreign investors might require a higher return on U.S. assets in order to absorb the increased supply of dollar-denominated debt that will likely accompany ongoing current account deficits. Conceptually, these higher returns might be necessary to compensate investors for the additional risk (arising primarily from possible fluctuations in the dollar's value) they bear in increasing the share of dollar-denominated assets in their portfolios.[12] Any increase in risk premia on dollar assets would likely result in some combination of a fall in the dollar's real value (at an unchanged long-run value) and an increase in the domestic real interest rate.

Changes in exchange rate expectations and/or risk premia could reduce the current account deficit through the combined effects of a real dollar depreciation that shifts world demand towards U.S. goods and an increase in the U.S. real interest rate that dampens domestic demand. It is difficult, however, to assess the potential magnitude of these exchange rate and interest rate effects. Available evidence regarding the determinants of exchange rate expectations and the importance of exchange rate risk in relative asset yields is inconclusive. Moreover, the real possibility of bandwagon effects or speculative bubbles arising from hard-to-predict investor psychology cannot be assessed in any systematic way. Thus, in our analysis we consider a range of possible combinations of dollar depreciation and increases in the U.S. real interest rate that are consistent with our adjustment criteria. This approach allows us to assess well-defined market-based adjustment scenarios, but it must be emphasized that these scenarios may not adequately represent the actual market response to the conditions embodied in the baseline projections.

Three possible market solutions that reduce the U.S. current account deficit to 1 percent of GNP by 1993 are presented in Table 7. In one case, market forces lower the real value of the dollar with only a small increase in the real interest rate. In another, market forces raise the U.S. real interest rate with only a mild decline in the real value of the dollar. Finally, a third scenario considers an adjustment path involving substantial changes in both the real value of the dollar and the real interest rate.

These scenarios highlight the significant potential risks to macroeconomic stability posed by a market-driven adjustment process. Although our current account target can be obtained largely through a fall in the real value of the dollar (a decline of nearly 13 percent cumulatively over 1989-93), this fall leads to an overheating of the economy. GNP grows by nearly 4 percent per year during the adjustment period, a rate far exceeding the economy's potential growth rate. As a result, inflationary pressures build rapidly, approaching a 9 percent rate by 1993 and rising above 11 percent in 1997.

More significantly, the analysis suggests that adjust-

[11] On the basis of the assumptions for capacity growth rates and real interest rates that underlie the baseline scenario, adjustment of the U.S. current account deficit to 1 percent of GNP is sustainable over the long run in an environment in which the U.S. runs a small surplus in its external balance excluding net payments on its foreign debt. For a more detailed exposition of the relationship between current account and trade balance sustainability, see Charles Pigott, "Economic Consequences of Continued U.S. External Deficits," in this issue of the *Quarterly Review*.

[12] These issues are addressed in considerably greater detail in Juann Hung, Charles Pigott, and Anthony Rodrigues, "Financial Implications of the U.S. External Deficit," in this issue of the *Quarterly Review*.

ment brought about by dollar depreciation alone is not sustainable. The increased pace of activity arising from the dollar's decline supports domestic demand growth well beyond the adjustment period. Domestic demand grows at an average rate of nearly 3 percent per year over 1994-97 under this scenario, roughly one-half of one percentage point above the rate projected in the baseline scenario. In addition, debt service payments rise sharply due to an acceleration in inflation that drives up the nominal interest rate to a level exceeding 16 percent in 1997. The combined effects of rapid demand growth and rising debt service completely reverse the earlier adjustment. The U.S. current account deficit increases by 1½ percent relative to GNP over the years 1994-97, and by 1997 the deficit has nearly returned to its 1988 share of GNP.

An adjustment process resulting from market-induced shocks that primarily raise the U.S. real interest rate presents a very different economic scenario. The substantial increase in the U.S. real interest rate (four percentage points above the baseline level) reduces the current account deficit at the cost of a sharp slowdown in domestic demand growth, to 1 percent per year over 1989-93.[13] As a result, GNP grows only 1.6 percent annually, a full percentage point slower than its pace in the baseline.

The impact of the rise in the real interest rate is transmitted primarily through investment demand. Investment contracts at an annual rate of 2.4 percent over the adjustment period. This severe slowdown in investment, cumulatively about twenty percentage points below baseline projections, lowers the economy's potential growth rate to 2.2 percent by 1993. Despite a declining potential growth rate, there is a buildup of excess capacity in the economy that largely accounts for the considerable fall in inflation and increase in the government budget deficit projected in this scenario.

These scenarios indicate how market-induced movements in the real exchange rate or the real interest rate might individually affect the U.S. economy. However, financial market shocks could have a significant impact on both variables. Thus, the implications of a market adjustment scenario, characterized by a substantial increase in the real interest rate and a decline in the real value of the dollar, are presented in the right hand columns of Table 7.[14]

Despite maintaining full employment growth, this scenario does not provide an attractive adjustment alterna-

[13] It should be noted that domestic demand growth recovers over 1994-97. However, for the period 1989-97 as a whole, demand growth is still considerably slower than that projected in the baseline, by over two and a half percentage points cumulatively.

[14] Note that we have specifically designed this scenario to evaluate a market-based alternative in which the economy adjusts while maintaining output growth close to its long-term trend.

Table 7

Possible Market-Induced Adjustment Paths

(Average Annual Percent Change)

	Large Real Exchange Rate Depreciation		Large Increase in the U.S. Real Interest Rate		Exchange Rate Depreciation and Rise in the Real Interest Rate	
	1989-93	1994-97	1989-93	1994-97	1989-93	1994-97
GNP	3.8	2.5	1.6	3.3	3.0	2.8
Domestic demand	3.1	2.9	1.0	3.6	2.4	3.2
Private consumption	3.2	3.1	1.4	3.6	2.6	3.3
Investment	3.5	2.2	−2.4	5.3	1.5	3.3
Real exchange rate†	2.5	0.0	0.5	0.0	1.9	0.0
	1993	1997	1993	1997	1993	1997
Current account (as a percent of GNP)	−1.1	−2.6	−1.1	−1.6	−1.0	−2.2
Net investment income (as a percent of GNP)	−1.0	−1.6	−1.6	−1.4	−1.2	−1.5
Budget balance (as a percent of GNP)	−0.3	0.4	−6.3	−3.7	−2.3	−1.0
Potential output	2.6	2.8	2.2	2.4	2.4	2.6
Prices (GNP deflator)	8.7	11.4	0.7	4.5	6.0	9.2
Nominal interest rate (level)	11.9	16.2	9.2	11.2	11.0	14.5
Real interest rate (level)	4.5	4.5	7.5	7.5	5.5	5.5
Net foreign assets (as a percent of GNP)	−11.5	−13.6	−17.8	−17.2	−13.3	−14.1

†(+) signifies depreciation.

tive. In fact, it incorporates undesirable characteristics of the other market adjustment scenarios. The current account improvement achieved when market forces significantly affect both the interest rate and the exchange rate is unsustainable. In addition, as a result of the weak investment performance during the adjustment period, the economy's potential growth rate declines.

By the end of our projection horizon in 1997, the U.S. current account deficit as a share of GNP stands only one-half of one percentage point below its 1988 level under this scenario. But a substantial price is paid for even this modest decline in the current account: nominal and real interest rates are higher, inflation has increased, and both net foreign debt and net interest payments are well above their 1988 levels in relation to GNP.

Before proceeding, we again caution that emphasis should not be placed on specific model estimates. Instead, identifying the broad contours of differing market scenarios and highlighting the tendency for market mechanisms to generate disruptive and unsustainable adjustment paths are of key importance. In addition, we note that the potential risks of market-induced adjustment mechanisms could be considerably larger than the ones depicted in these scenarios. Any path that generates a sharp acceleration in inflation or a substantial and persistent slowing in output (or both) runs an additional risk of precipitating other disruptions in the economy (for example, a disruption of financial or credit markets) that could significantly worsen the economic consequences of a scenario of this type.

U.S. policy-led adjustment

The market adjustment scenarios, while by no means inevitable, point to a set of forces that could reduce the U.S. current account deficit. We now examine adjustment paths generated by U.S. fiscal and monetary policy actions. It is often argued that active policy measures promoting adjustment are needed at least in part to avoid the economic costs embodied in potential market solutions. Thus, it is important to compare the possible outcomes of policy-led adjustment scenarios with those arising from market forces.

In seeking to reduce the current account deficit, U.S. authorities are somewhat constrained in their policy choices. In particular, our analysis suggests that U.S. monetary authorities, acting in isolation, cannot generate a feasible external adjustment path. Although a monetary contraction—defined as measures that raise the U.S. real interest rate—can reduce the current account deficit, the net improvement is small because it is limited by the appreciation of the dollar and the increase in debt service payments that are associated with rising interest rates. Consequently, the slowdown in growth and investment demand necessary to achieve adjustment through a monetary contraction is so large that it cannot be considered a realistic alternative.[15]

Thus, actions by fiscal authorities to slow domestic demand must be a necessary component of any policy measures geared toward reducing the U.S. current account deficit. Two possible scenarios of this type are presented in Table 8. The first combines a decline in government spending with monetary policy actions that leave the domestic real interest rate and the real value of the dollar unchanged. In the second case, a decline in government spending is accompanied by monetary policy actions that allow the real interest rate and the real value of the dollar to decline.

When the real interest rate and the real exchange rate remain unchanged, a fiscal contraction significantly slows overall activity growth during the adjustment period. GNP growth declines to 1.9 percent per year during 1989-93, more than one-half percentage point slower than in the baseline scenario; domestic demand growth of 1.5 percent annually represents a slowdown of more than a full percentage point from the baseline. Growth rates of consumption and private investment fall by roughly one percentage point per year from their respective baseline projections as the decline in government expenditures extends to all components of demand.

It is clear that a more favorable trade-off between adjustment and growth can be engineered when policy makers allow the real interest rate and the real value of the dollar to decline. In particular, adjustment in this scenario is consistent with maintaining output close to full employment. Indeed, annual GNP growth of 2.6 percent actually exceeds that projected in the baseline scenario over 1989-93. In addition, consumption growth does not appreciably slow over the adjustment period, and investment growth is over one percentage point faster per year than in the baseline projections.

When viewed together with other characteristics of this adjustment path—stable inflation (although admittedly still high), a relatively mild real depreciation of the dollar (about 5 percent cumulatively), and an increase in productive capacity relative to the baseline—the combination of a fiscal contraction with policies that reduce the real interest rate and the real value of the

[15]This conclusion would remain unchanged even if monetary authorities were able to maintain the dollar's value as they tightened policy. The economic consequences of such a scenario would be similar to those of the market-induced rise in the U.S. real interest rate discussed above. In addition, since the real effects of monetary policy actions are generally thought to dissipate over time, it is not clear that monetary policy offers a mechanism to achieve a sustained adjustment of the external balance.

dollar presents an attractive adjustment scenario.[16] Nevertheless, this scenario has one potential drawback. The necessary contraction in fiscal policy is large. The discretionary shift in fiscal policy — policy changes unrelated to business cycle fluctuations or changes in interest rates — amounts to more than $160 billion or roughly 3½ percent of potential GNP. (In comparison, a discretionary shift of about 2½ percent of GNP is required in the scenario in which the interest rate and exchange rate remain unchanged.[17]) Real government spending on goods and services, excluding transfer payments and debt service, must decline by more than 1 percent per year in order to achieve adjustment in this scenario. Overall, the general government budget balance rises from −1.8 percent of GNP in 1988 to +2.6 percent in 1993.[18]

These considerations aside, the policy-oriented adjustment scenarios present a preferable alternative to those arising from market forces. Unlike the market adjustment scenarios, policy actions can generate a current account improvement that will be sustained beyond the adjustment horizon. In addition, market-induced paths, while quite varied in their possible outcomes, appear to promote adjustment only at the expense of macroeconomic stability. A market-induced decline in the real value of the dollar fuels inflationary pressures while forces that increase the real interest rate lower investment and overall activity growth significantly.

Furthermore, a comparison of Tables 7 and 8 reveals that market adjustment scenarios involve a larger slowdown in domestic demand growth relative to output than their policy-led counterparts. Domestic demand increases at an annual rate that is six-tenths to seven-tenths of one percentage point slower than output under the market adjustment scenarios; this gap is

[16]The importance of allowing the real value of the dollar to decline under this scenario needs to be emphasized. By providing a boost to U.S. demand that arises from the external sector, the fall in the dollar's value both supports activity growth and promotes external adjustment. Our estimates indicate that economic activity would slow (by about three-tenths of one percentage point per year during 1989-93 to about 2¼ percent) if these policy actions took place in an environment of stable real dollar values.

[17]The larger contraction in fiscal policy required when the interest rate and the dollar decline can be seen as necessary to provide additional savings to finance the more rapid investment demand growth in this scenario.

[18]A more balanced contraction in fiscal policy in which personal taxes were increased would enable government spending to grow more rapidly because some of the burden of adjustment would fall on private consumption growth. However, the overall size of the fiscal contraction would be larger than 3½ percent of potential GNP since changes in tax policy have a smaller effect on domestic demand than direct changes in public sector spending.

Table 8

U.S. Policy-Led Adjustment Paths

(Average Annual Percent Change)

	Fiscal Contraction with Unchanged Real Exchange Rate and Real Interest Rate		Fiscal Contraction with a Decline in the Real Exchange Rate and in the Real Interest Rate	
	1989-93	1994-97	1989-93	1994-97
GNP	1.9	2.8	2.6	2.7
Domestic demand	1.5	3.0	2.1	2.8
Consumption	1.9	3.0	2.6	2.9
Government consumption	−0.2	2.6	−1.3	2.8
Investment	1.7	3.3	4.0	2.7
Real exchange rate†	0.0	0.0	1.0	0.0
	1993	1997	1993	1997
Current account (as a percent of GNP)	−1.2	−1.4	−1.1	−1.3
Net investment income (as a percent of GNP)	−0.7	−0.7	−0.5	−0.7
Budget balance (as a percent of GNP)	−0.2	1.1	2.6	3.5
Potential output	2.5	2.5	2.8	2.8
Prices	2.0	3.0	5.1	5.4
Nominal interest rate (level)	5.9	6.4	7.0	7.5
Real interest rate (level)	3.5	3.5	2.0	2.0
Net foreign assets (as a percent of GNP)	−14.2	−15.3	−11.8	−12.3

†(+) signifies depreciation.

four-tenths to five-tenths of one percentage point under the policy-oriented scenarios examined. This greater relative decline in demand can be attributed to two characteristics of the market adjustment path — the large deterioration in U.S. terms of trade that results from the dollar's decline, and the sharp rise in debt service payments that is due to higher interest rates. Both of these factors increase the real resources that must be transferred to foreign countries to achieve adjustment and thus are associated with a larger slowing in U.S. domestic demand relative to GNP.

Thus, our analysis indicates that a policy-managed external adjustment will likely involve lower economic costs than one arising from market forces. Although our policy-induced adjustment scenarios entail, at the least, a sharp slowing in domestic demand growth and a substantial tightening of fiscal policy in the coming years, they produce a more sustained and much more orderly path towards improvement in the current account than market mechanisms are likely to generate.

In this context, the importance of taking timely policy actions needs to be emphasized. Delaying action will almost certainly increase pressures in financial markets for the types of reactions discussed earlier. Admittedly, it is difficult to assess the extent to which these pressures will actually affect interest rates or the dollar. However, even a modest rise in U.S. real interest rates would raise the real costs of adjustment, increase financial market instability, and, over the long-term, have a significant adverse effect on U.S. economic performance.

If financial market conditions remain unchanged, the economic costs of external adjustment are still likely to become more severe the longer imbalances are allowed to persist. The adverse effects of the current account deficit on the economy's traded goods sector may, over time, lead to underlying structural shifts in the economy. As a result, a hysteresis may arise, such that the macroeconomic adjustments needed to restore trade balance increase the longer they are postponed. In addition, the accumulation of U.S. external debt that accompanies persistent current account deficits will increase debt service payments and thus the overall transfer of real resources that will be required when adjustment occurs.

The costs of delaying adjustment that stem from higher debt burdens can be assessed within the framework of our model. In the absence of measures promoting adjustment, the current account deficit rises rapidly in our baseline scenario, and by 1993 net debt service payments are roughly twice as large as those projected under scenarios (Table 8) in which policy measures are taken immediately. As a result of these factors, U.S. economic performance worsens if policy makers decide, for example, to wait until 1993 to take action to reduce the current account deficit to 1 percent of GNP by 1997. In particular, real output and demand grow by between two to three percentage points less over the 1989-97 projection horizon and greater fiscal tightening is required than in scenarios in which policy actions are taken immediately.[19]

The role of policy coordination

In examining medium-term scenarios of current account adjustment, we have assumed that foreign economic conditions are unaffected by changes in U.S. activity. Recognizing that much recent discussion has focused on the increased interdependence of the world economy and the importance of international policy coordination, we now consider how foreign and U.S. policy makers, acting in concert, might affect adjustment paths.

Two scenarios, designed to provide a coordination alternative to the policy-led adjustment simulations discussed in the previous section, are presented in Table 9. In both scenarios, foreign policy makers provide a temporary stimulus to growth abroad at the same time that U.S. fiscal policy contracts.[20] This coordination of demand policies is evaluated under two alternative monetary policy rules: (1) authorities here and abroad set monetary policy to hold real interest rates and the real value of the dollar unchanged; and (2) authorities allow the U.S. real interest rate to decline and foreign real interest rates to rise, thus lowering the real value of the dollar.

A comparison of Tables 8 and 9 indicates that there are potential gains from coordinating policies over the adjustment period. A temporary expansion in foreign growth provides a boost to U.S. activity while promoting external adjustment. As a result, a foreign stimulus helps cushion the effects of a U.S. fiscal contraction on output and demand growth. In the scenario involving unchanged real interest rates, real GNP and domestic demand can each grow three-tenths of one percentage point faster per year over 1989-93 when foreign demand growth temporarily rises.

In the scenario in which interest rates are allowed to change, the output gains from coordination are small.

[19]This conclusion is based on a comparison of the economy's performance over 1989-97 under two types of scenarios: 1) fiscal and monetary policy actions, delayed until 1993, work towards reducing the U.S. current account deficit to 1 percent of GNP by 1997; and 2) fiscal and monetary policy authorities take immediate action in 1989 to reach the same current account target by 1993.

[20]The expansion in foreign activity under these scenarios is assumed to raise foreign demand growth by one percentage point above the baseline projections in 1989 and 1990.

This result can largely be attributed to the policy design, which specifies that monetary authorities maintain output growth at a rate consistent with the economy's potential. However, by raising demand for U.S. exports, a foreign demand stimulus reduces the size of other measures required to bring about adjustment. The fall in the real value of the dollar amounts to less than 3½ percent in this scenario, compared with a decline of over 5 percent when U.S. authorities act on their own. At the same time, the required discretionary cuts in government spending amount to 3 percent of trend GNP when policies are coordinated, about one-half of one percentage point less than the contraction required when U.S. authorities act on their own.

These comparisons are, of course, sensitive to the particular coordination scenario presented. Moreover, since we do not fully account for international linkages in our model, this exercise is limited in its ability to capture the impact of policy coordination fully.[21] However, the analysis does highlight the potential improvements in U.S. economic performance that might be realized if foreign demand policies serve to dampen the contractionary effects of U.S. policy actions during adjustment. In particular, if authorities wish to stabilize exchange rates over the adjustment period, an acceleration in foreign growth coordinated with U.S. fiscal tightening can reduce the cost to the U.S. economy in terms of lost output and demand. At the same time, if authorities attempt to maintain output along its long-term path, the coordination of policies here and abroad can allow for more flexibility on the part of U.S. policy makers in achieving other macroeconomic objectives.

[21] In addition, no attempt is made to measure the effects or desirability of coordination from the viewpoint of foreign economies.

Conclusion

It is reasonably clear that significant changes in U.S. economic activity will be required to achieve a sustained reduction of the large external imbalances that have accumulated in recent years. In particular, an assessment of recent economic trends suggests that the virtual elimination of the U.S. merchandise trade balance, a substantial slowing in domestic demand growth, and an increase in the national savings rate will all accompany adjustment paths that do not endanger overall macroeconomic stability.

The U.S. current account deficit can be reduced in a variety of ways, however, and the actual path of economic activity in the coming years depends crucially on the actions of policy makers here and abroad as well as those of private agents. Using a simulation model of the U.S. economy, we have projected different scenarios offering a range of possible adjustment paths. Although these projections are only illustrative and cannot precisely represent the alternatives facing the

Table 9

Adjustment Scenarios with International Policy Coordination

(Average Annual Percent Change)

	Fiscal Policy Coordination with Unchanged Real Exchange Rate and Real Interest Rate		Fiscal Policy Coordination with a Decline in the Real Exchange Rate and in the Real Interest Rate	
	1989-93	1994-97	1989-93	1994-97
GNP	2.2	2.7	2.6	2.8
Domestic demand	1.8	2.9	2.2	2.8
Private consumption	2.2	2.9	2.6	2.8
Government consumption	0.2	2.7	−0.7	2.8
Investment	2.2	2.9	3.6	2.8
Foreign domestic demand	3.7	3.3	3.7	3.3
Real exchange rate†	0.0	0.0	0.7	0.0
	1993	1997	1993	1997
Current account (as a percent of GNP)	−1.2	−1.5	−1.1	−1.3
Net investment income (as a percent of GNP)	−0.7	−0.8	−0.6	−0.7
Budget balance (as a percent of GNP)	0.1	1.0	1.8	2.8
Potential output	2.5	2.7	2.7	2.7
Prices	3.3	4.4	5.4	5.7
Real interest rate (level)	3.5	3.5	2.5	2.5
Net foreign assets (as a percent of GNP)	−13.1	−14.2	−12.0	−12.2

†(+) signifies depreciation.

U.S. economy, they nevertheless provide a relevant basis for comparing different adjustment mechanisms.

The results of this analysis strongly suggest that there are significant risks in failing to take timely action to reduce the U.S. current account deficit. At the least, postponing the adjustment process until the mid-1990s will lead to a more substantial slowdown in output and demand growth over the next decade than is likely to occur if actions promoting adjustment are taken immediately. Moreover, inaction on the part of policy makers could risk market-induced shocks that would reduce the current account deficit only at the cost of a significant disruption in U.S. activity.

In contrast, an appropriate mix of U.S. monetary and fiscal actions can generate an adjustment path consistent with other major macroeconomic policy objectives. Although domestic demand growth will be required to slow to close to 2 percent per year, the combination of a fiscal contraction and proper monetary policy actions can produce a substantial current account improvement while maintaining full employment, avoiding upward pressure on price inflation, and preserving the economy's long-term growth prospects.

Our analysis further indicates that the coordination of domestic and foreign policy actions along the adjustment path can improve the trade-offs facing the U.S. economy. A stimulus to foreign domestic demand in conjunction with contractionary policies in the U.S. would allow for faster output growth and would reduce the magnitude of U.S. policy changes required during adjustment. Thus, coordinated policy measures by authorities here and abroad may offer the greatest potential for reducing the U.S. current account while maintaining macroeconomic stability in the coming years.

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Appendix: A Model of the U.S. Economy

This appendix presents the equations that make up our model of the U.S. economy. The behavioral equations are based on specifications standard in the empirical literature.† The short-term dynamic properties of these relations have, however, been simplified, reflecting our focus on the medium-term properties of the simulations.

The model can be broken down into three sectors: aggregate demand, aggregate supply and wealth accumulation, and a price sector. All variables are expressed in constant 1982 dollars unless otherwise stated, and the intercept term in each equation (ϵ) is set such that the model generates projections corresponding to actual values for 1988.

Aggregate demand

Aggregate demand, the sum of domestic demand, DD, and net exports, (X − M), equals output, Y.

$$(1)\quad Y_t = DD_t + (X_t - M_t).$$

Domestic demand is the sum of consumption, C, private investment, I, and government spending on goods and services, G.

Private consumption is a function of disposable income, YD, private wealth, W, and the real interest rate, r:

$$(2)\quad ln\ C_t = \epsilon_0 + 0.8 ln YD_{t-1} + 0.2 ln YD_{t-2} + 0.03 ln W_{t-1} - 0.002 r_{t-1}.$$

Private investment demand is a function of the capital output ratio, (K/Y), the real interest rate, and the rate of output growth:

$$(3)\quad ln\ I_t = \epsilon_1 + 1.09(ln Y_{t-1} - ln Y_{t-2}) + .79(ln Y_{t-2} - ln Y_{t-3}) - 1.20[ln K_{t-1} - ln Y_{t-1}] + ln K_{t-1} - 0.04 r_{t-1}.$$

By assumption, government spending on goods and services is maintained as a constant fraction of potential output, Y^P:

$$(4)\quad G_t = 0.197 Y^P_t.$$

Net tax receipts (including net transfers) of the government, T, are the sum of net business tax receipts, TB, and net household tax receipts, TH:

$$(5)\quad T_t = TB_t + TH_t.$$

Business tax receipts are assumed equal to a constant share of output. Net household tax receipts are

†The basic structural properties of our model are similar (albeit at a considerably higher level of aggregation and with less detailed short-term dynamics) to the properties of the U.S. component of the multicountry model developed by the Federal Reserve Board. For a more detailed description of the multicountry model, see Hali Edison, Jaime Marquez and Ralph Tryon, "The Structure and Properties of the FRB Multicountry Model," pt. 1, "Model Description and Simulation Results," International Finance Discussion Papers, no. 293, October 1986.

Appendix: A Model of the U.S. Economy *(continued)*

made up of two components: one assumed equal to a constant share of output and the second depending on the output gap:

$$(6)\ TH_t = 0.043Y_t + 20(lnY_t - lnY^P_t).$$

The public sector deficit, expressed in current dollars, equals government expenditures on goods and services plus net government interest payments on the stock of public debt, PD, less net tax receipts:

$$(7)\ D_t = P_tG_t + i_t{*}PD_{t-1} - P_tT_t,$$

where i* is an average interest rate based on current and lagged values, and P is the GNP deflator.‡

Disposable income is equal to personal income (Y — H) less household taxes. The difference between output and personal income, H, is assumed to remain constant as a share of output:

$$(8)\ YD_t = (Y_t - H_t) - TH_t.$$

Exports, X, consist of exports of goods and services excluding factor income receipts. They are an increasing function of foreign domestic demand, DDF, and a decreasing function of the price of exports, P^x, relative to foreign prices, PF, expressed in dollar terms:

$$(9)\ lnX_t = \epsilon_3 + 2.0ln\ DDF_{t-1} - 1.3[lnP^x_{t-1} - (lnE_{t-1} + PF_{t-1})],$$

where E equals the exchange rate (dollars per foreign currency), and foreign domestic demand and foreign prices are assumed to follow exogenously given paths.

Imports, M, consist of imports of goods and services excluding factor income payments. They are an increasing function of domestic demand and a decreasing function of the dollar price of imports, P^m, relative to domestic prices:

$$(10)\ lnM_t = \epsilon_4 + 2.2lnDD_{t-1} - 1.4(lnP^m_{t-1} - lnP_{t-1}).$$

The current account, in current dollars, consists of net exports of goods and services plus net investment income payments, NII:

$$(11)\ CA_t = P^x_tX_t - P^m_tM_t + NII_t.$$

Net investment income payments in current dollars are assumed to be a function of the stock of net foreign assets and a rate of return of i*:

$$(12)\ NII_t = \epsilon_5 + i_t{*}NFA_{t-1},$$

where ϵ_5 is an adjustment factor intended to account for differences in the rates of return on foreign and domestic asset holdings.

Aggregate supply and wealth accumulation

Potential output, Y^P, depends upon the full capacity supplies of labor, N, capital, K, and total factor productivity, t. Beginning with the assumption that U.S. GNP was equal to potential during 1987, we project the path of potential based on rates of capital accumulation and an assumed growth rate of the labor force of 1½ percent per year. Total factor productivity is assumed to follow a stable time trend:

$$(13)\ ln\ Y^P_t = \epsilon_6 + 0.75lnN_t + 0.25lnK_t + 0.009t.$$

The capital stock is a function of the level of investment. It depreciates at a constant rate:

$$(14)\ K_t = 0.925K_{t-1} + I_t.$$

Private wealth is the sum of the public sector debt, PD, the capital stock, K, and net foreign assets, NFA:

$$(15)\ W_t = PD_t/P_t + K_t + NFA_t/P_t.$$

The stock of public debt changes in line with the public sector deficit:

$$(16)\ PD_t = PD_{t-1} + D_t.$$

The net foreign asset position of the economy expressed in current dollars is an increasing function of the current account surplus:

$$(17)\ NFA_t = \epsilon_7 + NFA_{t-1} + CA_t,$$

where ϵ_7 is an adjustment factor included to account for divergences between changes in the stock of net foreign assets and the current account balance.

Prices, interest rates, exchange rates

Price inflation in the GNP deflator is determined by the output gap, past price changes, and changes in import prices, P^m:

$$(18)\ ln\ P_t = \epsilon_8 + lnP_{t-1} + 0.6(lnY_{t-1} - lnY^P_{t-1}) + 0.3(lnP_{t-1} - lnP_{t-2}) + 0.12(lnP^m_{t-1} - lnP^m_{t-2}).$$

‡In order to determine the nominal budget deficit in 1988, real government spending and real net tax receipts are converted into current dollars using their respective price deflators. However, during the projection period, price deflators for these variables are assumed to move with the GNP deflator.

Appendix: A Model of the U.S. Economy *(continued)*

Export prices are a function of domestic prices and prices of foreign goods expressed in dollar terms:

(19) $ln\ P^x_t = \epsilon_9 + 0.7 ln P_{t-1} + 0.3(ln E_{t-1} + ln PF_{t-1})$.

Dollar import prices are a function of foreign prices, expressed in dollar terms, and domestic prices:

(20) $ln\ P^m_t = \epsilon_{10} + 0.7(ln PF_{t-1} + ln E_{t-1}) + 0.3(ln P_{t-1})$.

The nominal interest rate, i, is determined by monetary authorities. The real interest rate, r, is equal to the nominal interest rate minus inflationary expectations that are assumed to be equal to the lagged inflation rate:

(21) $r_t = i_t - 100(ln P_{t-1} - ln P_{t-2})$.

The real exchange rate, ER, is determined by assuming (1) covered interest parity holds so that the difference between domestic real interest rates and foreign real interest rates, rf, is equal to the expectations of dollar depreciation plus the risk premia, z, on holding dollar assets:

(22) $r_t - rf_t = 100[ln ER_{t+1} - ln ER_t] + z_t$,

and (2) the real exchange rate returns to its equilibrium level, $\overline{ER}$, at a constant rate:

(23) $ln ER_{t+1} - ln ER_t = 0.33[ln \overline{ER}_t - ln ER_t]$.

Combining (22) and (23) yields:

(24) $ln ER_t = ln \overline{ER}_t - 0.033\ (r_t - rf_t - z_t)$.

The nominal exchange rate is calculated from the real exchange rate and relative domestic and foreign price levels:

(25) $E_t = ER_t\ P_t/PF_t$.

Financial Implications of the U.S. External Deficit

Of all the potential problems associated with the U.S. current account deficit, none has caused more concern than its financing. By official estimates, the net book value of U.S. liabilities to foreign countries, including equities, is now about $500 billion and is increasing at a rate of over $100 billion annually. This growth has spawned numerous fears about foreigners' capacity and willingness to continue lending to this country and about the consequences of rising foreign influence on U.S. financial markets. Prominent observers have warned of serious economic strains if the rapid accumulation of external debt continues. These strains include growing pressures on domestic interest rates and the dollar, increased financial volatility with risks of financial crisis, and constraints on U.S. macroeconomic policies imposed by the need to maintain foreigners' willingness to hold our debt.

All of these concerns reflect the presumption that further rapid accumulation of external debt will make the financing of the U.S. current account deficit progressively more difficult. Nevertheless, little concrete information about the potential severity of these problems is available. Prior analyses have generally focused on projected aggregate indicators, such as U.S. debt and debt service relative to GNP or foreign wealth, and have relied upon criteria supplied by past experience to assess the seriousness of the problem. While suggestive, historical comparisons have only limited relevance to the financing of the deficit of the world's largest economic power in an era of rapid internationalization of financial activities. The economic implications of continued U.S. deficits are likely to be determined by more specific conditions. These include the situation of key groups of foreign investors, their capacity and willingness to absorb further U.S. debt, and the magnitude of the changes in interest rates and exchange rates that are likely to be required.

This article examines the present and future implications of financing U.S. external deficits. Without attempting to be comprehensive, we analyze several features of the past funding of the deficit that probably will help to determine the impact of future financing. We then use this analysis, as well as evidence drawn from previous literature, to assess the financial implications of future deficit scenarios and their potential effects on domestic interest rates and on the dollar's value.

As the first section shows, the financing of the U.S. deficit since 1982 has been characterized by the general predominance of private capital inflows, the growing importance after 1985 of official financing, and increasing exposures to U.S. dollar securities by foreign financial institutions, particularly Japanese institutional investors. The analysis suggests that these patterns are likely to change somewhat in coming years. In particular, direct investment is likely to provide significantly more net financing for the current account deficit in future years than it has since 1985. Foreign financial institutions, however, may be somewhat less willing than in the past to rapidly increase their holdings of U.S. dollar assets, particularly in relation to their overall portfolios.

The analysis in the second section draws on past financing experience and other evidence to assess the possible financial impact of future U.S. external deficits. By raising foreign investors' exposures to dollar assets

and their attendant risks, continued rapid U.S. debt accumulation may well lead to upward pressures on domestic real interest rates and downward pressures on the dollar. Estimates from the literature suggest that while the pressures arising from any single year's deficit are probably modest, the cumulative effects over a number of years could be significant, particularly if foreign lenders perceive that large external deficits are likely to persist.

Applying this analysis to two alternative financing scenarios suggests that a deficit that declined steadily to 1 percent of GNP by 1993 would most likely produce only a modest further increase in foreign exposures to U.S. assets; any increases in domestic interest rates and fall in the dollar needed to finance such a deficit path thus are probably relatively small. However, the potential financial strains are likely to be more serious, and less predictable, if the current account deficit remains indefinitely at the high levels of recent years. In such a case, private foreigners' exposures to U.S. debt and its attendant risks are likely to rise significantly over the next five years. This situation, and the prospect of further large debt increases in the future, could cause potentially troublesome financial strains, including a significant rise in domestic long-term real interest rates and ongoing downward pressures on the dollar.

Review of financing since 1982

The more than $600 billion the United States has borrowed from abroad since 1982 is historically unprecedented in magnitude. Indeed, many observers have been surprised by this country's ability to borrow such large amounts without encountering major financial difficulties. Understanding how the external deficit has been financed, therefore, should help in evaluating the prospects for, and implications of, future financing. Accordingly, in this section we present an overview of the main patterns of deficit financing over the last six years and then proceed to focus on two important aspects of these patterns.

Financing overview

The United States has become a net borrower from abroad because the various sectors of the economy collectively are spending more than they earn and thus have an excess demand for funds in the aggregate. In particular, the federal government's borrowing demands have risen sharply with the increase in the budget deficit since 1982, while the surplus of the household sector has fallen with the decline in the personal savings rate. U.S. borrowing from abroad can come through a number of channels and a variety of instruments whose relative importance at any time is a joint reflection of the needs and capacities of the individual borrowers and lenders. To some extent, funds flow directly from foreign savers to U.S. deficit sectors, but more often they come through banks and other financial intermediaries here and abroad. These funds are supplied not only by private entities but also by foreign central banks and, occasionally, other government agencies. Foreign lending to the United States typically occurs through three main channels: banks, securities purchases by financial and nonfinancial entities, and direct investment by foreign corporations in U.S. subsidiaries and affiliates.[1] The *ultimate* source of the funds borrowed by the United States is the group of nations with current account surpluses, now primarily Germany, Japan, and several of the Asian newly industrializing economies. As we will see, these funds to a large extent have been channeled to the United States through other countries.

Table 1 gives the main features of the financing of the U.S. current account deficit since 1982 as given in U.S. balance of payments statistics. These figures reveal the direct channels through which our deficit has been financed although they do not necessarily identify the ultimate sources of the funds. Recorded U.S. borrowing from abroad since 1982 has totaled about $600 billion, but actual borrowings have probably been somewhat greater since not all capital flows are reported.[2]

Several features of this financing are of particular interest. First, private capital inflows have supplied the bulk of the financing of the deficit but their importance has declined noticeably in recent years. Private sources accounted for nearly 80 percent of the total for the period as a whole, and virtually all of the funding during the first three years, 1983-85. Since 1985, however, the share of private capital inflows in total financing has declined to about 70 percent, with the remainder coming from official sources.

The increased importance of official financing of the U.S. deficit after 1985 in large part reflects heavy dollar

[1]The U.S. balance of payments classifications reflect a mix of these channels and instruments. Capital inflows are divided into five major groups: net borrowing by U.S. resident banks from private entities abroad (banking flows), net borrowing by U.S. nonbanks, net securities purchases, direct investment net inflows, and changes in net liabilities to foreign central banks and other official agencies (official flows). Direct investment is defined as the increase in claims on an enterprise in which the foreign investor has a 10 percent or greater interest. The net inflows of course reflect the difference between U.S. gross lending and borrowing (gross outflows and inflows). In 1988, for example, U.S. banks increased their outstanding claims on foreigners by $57.5 billion while their liabilities to abroad rose by $78.9 billion, leaving a net inflow of $21.4 billion.

[2]U.S. statistics report a cumulative current account deficit for 1983-88 of nearly $700 billion, $100 billion more than recorded net capital inflows. The difference, known as "errors and omissions" in the balance of payments, is generally thought to consist primarily, although not entirely, of unrecorded financial flows.

purchases by major foreign central banks in Europe and Japan to slow the dollar's depreciation and consequent appreciation of their own currencies.[3] This activity was largely concentrated in 1986-87 and was actually much more extensive than indicated by recorded capital inflows. Indeed, total foreign central bank intervention in 1987 (the year of greatest activity) is estimated to have exceeded $100 billion, amounting to nearly two-thirds of the total U.S. current account deficit.[4] The bulk of the dollar purchases were placed with institutions abroad, however, and hence were not recorded in U.S. balance of payments data. To some extent, the exchange rate pressures that sparked the official interventions may reflect a decline in private foreigners' willingness to add further to their U.S. dollar assets during this period; probably at least as important, however, were altered market perceptions about the future course of policies affecting the dollar in the wake of the 1985 Plaza agreement. In any case, net official dollar purchases appear to have dropped markedly in 1988 while private financing of the current account has rebounded.[5]

Equally noteworthy is the composition of the private capital inflows financing the U.S. deficit; these inflows are in part typical of past experience and in part a departure from it. As in most years prior to 1982, private foreign funds have been supplied to the United States primarily through banks and through net sales of securities, in large part to foreign institutional investors.[6] The contribution of net direct investment inflows has been comparatively modest and highly variable. Indeed net direct investment inflows were virtually negligible over 1985-87 despite rapid growth in both inflows and outflows, but picked up sharply last year. We consider the factors underlying the direct investment patterns and their likely future development at the end of this section.

The relative importance of banking and securities net inflows has varied considerably over time, a pattern that is consistent with past experience. Bank loans and securities issuance represent alternative but substitutable sources of funds to large borrowers. The funds

[3] In addition, Taiwan's central bank acquired nearly $50 billion in dollar assets in the course of investing its large balance of payments surpluses. See Robert McCauley and Rama Seth, "Financial Consequences of New Asian Surpluses," this *Quarterly Review*, Summer 1987. More recent data can be found in the *Financial Statistics* of Taiwan District, the Republic of China.

[4] See Bank for International Settlements, *58th Annual Report*, June 1988, pp. 187-89.

[5] The combined official foreign exchange reserves of Japan, Germany, and the United Kingdom (the three largest interveners) fell by over $10 billion in the first three quarters of 1988, largely as a result of heavy dollar sales by Germany; substantial dollar purchases resumed in the fourth quarter, however. Taiwan's heavy dollar purchases have also largely ceased. Recorded official inflows in the U.S. balance of payments for 1988 in large part reflect transfers to this country of official accounts placed abroad (in 1987) rather than new acquisitions of dollar assets. In effect, U.S. balance of payments data understate the true role of official sources in financing the deficit in 1987 and somewhat overstate that role in 1988.

[6] The bulk of funds coming through U.S. banks represent transactions with foreign banks, in many cases their own subsidiaries. Banks are also large purchasers of foreign securities although, as noted later in the text, they typically hedge their foreign currency exposures.

Table 1

Direct Financing of the U.S. Current Account Deficit

(In Billions of Dollars)

	1983	1984	1985	1986	1987	1988†
Total net capital inflows	35.1	80.3	97.3	123.3	135.5	118.9
Net official inflow	−0.4	−5.5	−7.9	33.8	55.3	39.1
Net private inflow	35.4	85.8	105.1	89.4	80.2	79.7
Direct investment	11.6	22.5	1.0	6.3	−2.5	21.8
Securities	10.1	30.8	63.9	70.5	30.2	39.4
U.S. nonbanking concerns	−6.6	9.7	0.6	−7.1	5.3	−2.9
U.S. banks nie‡	20.4	22.7	39.7	19.8	47.2	21.4
Memo:						
U.S. current account balance	−46.2	−107.1	−115.1	−138.8	−154.0	−135.3
U.S. net inflows from foreign banks§	−15.7	36.2	27.7	15.4	27.4	—

Sources: *Survey of Current Business; International Financial Statistics;* BIS, *International Banking Developments.*
Note: (+) represents net inflows.
†1988 figures are preliminary. Dash (—) indicates that data are unavailable.
‡nie: not included elsewhere.
§Change in net claims on the United States of BIS-reporting banks outside the United States.

flowing through the two channels are greatly influenced by the relative levels of short-term and long-term interest rates as well as other market factors. For example, the sharp rise in securities relative to banking inflows in 1986 was partly attributable to the decline in long-term relative to short-term dollar interest rates during that period; this flattening in the yield curve encouraged borrowers to shift from shorter term bank funds to longer term securities.

The overall importance of securities inflows in financing the U.S. deficit since 1982 represents a significant departure from past experience, however. In the 1970s, banks typically were the major conduits for private international capital flows. The large external surpluses of the oil-producing nations that arose in the wake of the 1974 oil price increase, for example, were placed primarily with banks in the United States and Europe for relending to deficit nations. Although banks have continued to play a major role during the 1980s, securities flows have become the most important instrument for channeling funds from surplus nations in Europe and Asia to finance the U.S. deficit. Over the 1983-88 period as a whole, cumulative net securities inflows into this country exceeded banking inflows by almost 50 percent and accounted for more than half of total net private capital inflows.

The predominance of securities in financing the U.S. deficit substantially reflects two closely related developments. First, international securities markets have expanded dramatically both in volume and range of participants over the last several years. Spurred by major financial liberalizations undertaken in Europe and Japan in the late 1970s and early 1980s, these markets have become an important source of funds for major corporations and a key outlet for financial intermediaries seeking to diversify their portfolios. Second, international securities transactions have been stimulated considerably by the preference of financial institutions in Japan, the largest surplus nation, for longer term assets. This preference is largely attributable to the prominence of life insurance and pension funds (which typically have long-term investment horizons) in channeling Japanese savings and is reflected in the structure of Japanese capital flows: securities transactions account for nearly all of net private capital outflows from Japan since 1982.

The growth of international securities markets and foreign preferences for holding long-term assets also help to explain the regional pattern of U.S. deficit financing (Table 2). The bulk of the funds provided by the major surplus countries, Japan, Germany, and to a lesser extent Taiwan and Korea, have gone through intermediaries in third countries (primarily in Europe) rather than flowing directly to the United States. Only one-quarter of Japan's total capital outflows have come directly to the United States; most of the remainder has been placed in Europe. In contrast, the United Kingdom, whose current account was close to balance until 1988, has been the proximate source of nearly 40 percent of U.S. private net capital inflows over 1983-87 and virtually all of the banking inflows. These patterns reflect a growing tendency for foreign institutions to place funds in the international banking and securities markets centered in London. Borrowers and lenders often prefer to use these international markets because of their breadth and relative freedom from regulation. For example, institutions throughout the world place large amounts of funds in London (in many cases with their own affiliates) that are then channeled to entities throughout the world.[7] Government and corporate securities of the United States and other countries are issued and widely traded in the Eurobond markets and purchased by investors from a wide range of countries, including, increasingly, Japan.

Finally, Chart 1 shows the cumulative effect of U.S. borrowing on this country's net indebtedness position. Based on preliminary estimates, the *book value* of total U.S. indebtedness to other countries at the end of 1988 was about $485 billion.[8] While much concern has been expressed about this indebtedness, its significance is difficult to assess without further information, including the holdings of U.S. assets in relation to the overall portfolios of the key groups of foreign lenders.

Exposures of foreign financial institutions

While suggestive, the aggregate U.S. investment position is of only very limited use in judging the financial effects of U.S. borrowing from abroad. More important from this perspective are the exposures to U.S. assets and their risks that major groups of foreign investors have incurred in the course of lending to this country. These exposures are likely to be key determinants of the terms that foreign investors will require to maintain or increase their claims on the United States, and hence of the difficulty of financing future current

[7]This institutional feature largely explains why banking inflows into the United States come predominantly from the United Kingdom. In contrast, Japanese banks have been net borrowers of short-term funds from both the United States and Europe in recent years. These funds have in large part been used to fund Japanese bank purchases of foreign securities.

[8]The true market value of U.S. indebtedness is a matter of controversy. U.S. net direct investment claims are probably understated by the official data because the book value of foreign direct investments in the United States tends to be closer to market value than is the case for U.S. direct investments abroad. Other factors, however, may lead to the underestimating of U.S. liabilities. In particular, the discrepancy between the reported U.S. current account deficit and net capital inflows (errors or omissions) is widely thought to include significant amounts of unrecorded U.S. borrowing from abroad.

account deficits. In this respect, the positions of foreign financial institutions are of particular interest, because these institutions have been the primary source of private financing of the U.S. current account. As we have seen, foreign banks have accounted for nearly one-fifth of U.S. net private capital inflows since 1982; along with banks, nonbank financial institutions such as life insurance companies and pension funds are the major foreign private purchasers of U.S. securities.

In financing our deficit, foreign financial institutions are potentially exposed to country and currency risks. Country risk refers to the possibility that a nation's borrowers as a group will be unable to repay foreign creditors. Although country risk is an important factor for institutions lending to certain developing nations, it is unlikely to be a serious constraint on foreign credit to the United States for the foreseeable future, since the possibilities of aggregate default or serious limits on repatriation of foreign funds are quite small.[9] Potentially more important as an influence on foreigners' willingness to lend to the U.S. is the currency exposure involved in (net) holding of dollar assets and the attendant risk of losses from unanticipated dollar depreciation. Continued large U.S. external deficits will, almost inevitably, lead to a rise in private foreigners' aggregate net exposure to dollars. To the extent that the deficit is not financed by official dollar purchases or direct investment inflows, it will usually be financed by dollar-denominated liabilities held by private foreigners.[10]

Banks, however, generally do not bear significant amounts of currency exposure. Foreign banks do make

[9]Note also that foreign banks as a whole remain net debtors to the United States. Admittedly, country risk eventually could become a

Footnote 9 continued
significant factor in U.S. borrowing if large deficits persisted for many years.

[10]U.S. borrowers may issue foreign currency liabilities. In practice, this occurs only to a limited extent, however. Moreover, U.S. entities are not the only issuers of dollar assets. External debt of developing countries, for example, is largely denominated in dollars. Nonetheless, the U.S. budget and current account deficits are likely to be the dominant sources of *additions* to the supply of dollar assets in coming years. We discuss this issue further in the next section.

Table 2

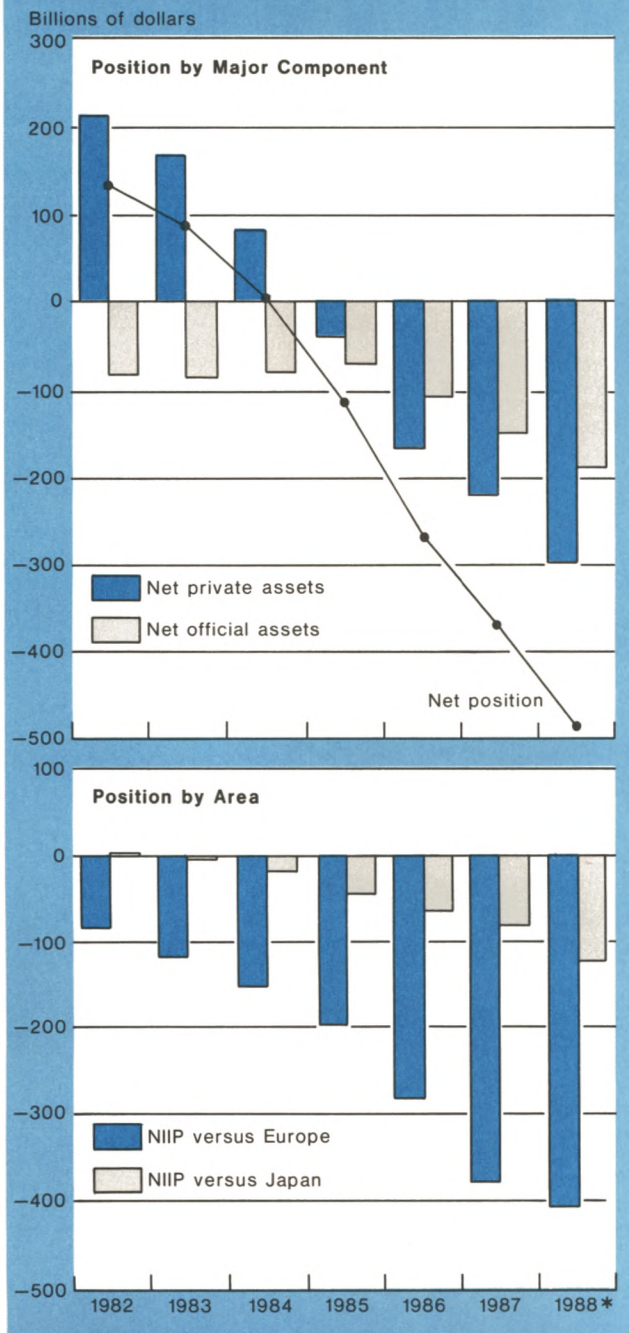
The Financing of the U.S. Current Account Deficit by Area
(In Billions of Dollars)

	1983	1984	1985	1986	1987	1988†
Net capital inflows from						
Japan	3.4	17.7	25.4	24.1	21.0	39.5
Official	−12.1	−5.2	−18.3	1.7	10.1	—
Private	15.5	22.8	43.7	22.3	10.8	—
Direct investment	0.4	4.7	2.2	5.3	3.5	—
Securities	2.1	7.5	21.6	18.8	14.2	—
U.S. banks nie‡	13.0	10.4	19.2	−1.8	−8.5	—
Continental Europe§	7.9	16.4	0.5	7.0	30.2	−7.2
Official	0.5	−1.1	−0.7	−1.6	1.8	—
Private	7.4	17.6	1.2	8.6	28.4	—
United Kingdom	17.0	15.9	32.3	44.2	65.1	20.2
Official	−2.4	−5.9	3.0	−4.1	−2.5	—
Private	19.4	21.9	29.3	48.3	67.6	—
Rest of world	6.8	30.3	39.1	47.9	19.2	64.0
Official	13.7	6.7	8.1	37.7	45.8	—
Private	−6.9	23.5	31.0	10.2	−26.6	—
Memo: Regional current account balances						
Japan	20.4	34.8	49.2	85.4	87.0	78.6
Continental Europe§	4.2	13.9	22.5	50.4	46.5	—
France	−4.4	−0.8	0.0	3.0	−4.1	−4.2
Germany	5.0	9.6	16.7	39.7	44.7	48.1
United Kingdom	5.7	2.7	4.2	0.2	−2.8	−25.4

Sources: *Survey of Current Business; various central bank publications.*
Note: (+) represents net inflows (current account surplus in memo items).
†U.S. data for 1988 are annualized averages of the first three quarters. Dash (—) indicates that data are unavailable.
‡nie: not included elsewhere.
§Includes Belgium, France, Germany, Italy, Luxembourg, Netherlands, and certain European organizations.

Chart 1

U.S. Net International Investment Position



Source: Department of Commerce, Bureau of Economic Analysis.

*Estimates based on 1988 flows added to year-end 1987 positions.

dollar loans but typically hedge their exposure with offsetting dollar liabilities. In contrast, many large nonbank financial institutions have substantial net dollar holdings. Thus the present holdings of these institutions are likely to be quite important in determining the difficulty with which additional dollar exposure arising from future U.S. deficits will be absorbed. Unfortunately, information on the foreign securities holdings of nonbank financial institutions (particularly the currency composition of these holdings) is quite limited for most countries, although substantial data are available for Japan. The Japanese situation is of considerable significance, both because Japanese institutional investors are among the largest foreign purchasers of dollar assets and because their experience is probably at least partly indicative of that of nonbanks generally.

As shown in Table 3, long-term foreign securities holdings of Japanese nonbank financial institutions have grown very rapidly since 1982 and now total more than $250 billion. Estimates by Fukao and Okina[11] indicate that dollar-denominated instruments make up slightly less than three-quarters of this total, although a significant fraction, perhaps as much as one-third, are hedged by offsetting dollar liabilities (mainly forward sales). Life insurance companies and trust accounts — the dominant institutional investors by virtue of their role as the primary managers of retirement funds — are the largest nonbank holders of foreign securities, accounting for one-third and one-quarter respectively of the total; the remainder are held primarily by investment trusts (similar to mutual funds), savings banks, and the government-owned postal life insurance fund. Foreign securities holdings of the major nonbank financial groups are now a significant fraction of their total assets but are generally well below legal ceilings.[12]

Several factors account for the rapid growth of dollar and other foreign securities holdings of Japanese insti-

[11] See Mitsuhiro Fukao and Kunio Okina, "Internationalization of Financial Markets and Balance of Payments Imbalances: A Japanese Perspective," Institute for Monetary and Economic Studies, Bank of Japan, Working Paper, July 1988. Section II of the paper provides a highly informative analysis of the behavior of Japanese institutional investors and its implications for Japanese capital flows. Note that the Table 3 figures for currency composition and amount hedged are rough averages for all financial institutions. Both vary significantly across classes of institutions and over time as market conditions change. Note also that short-term and some other foreign currency assets are not included in the table data. Fukao and Okina estimate that inclusion of such instruments would raise the foreign security share of life insurance company assets by several percentage points.

[12] Ceilings for the major private nonbank financial institutions are now 30 percent of total assets; this is nearly twice the present ratio maintained by life insurance companies, the largest holders of foreign securities. Thus, legal ceilings probably are not presently a binding limit on foreign securities holdings. Note also that because of large equities holdings valued at historical cost, foreign securities' share of the market value of nonbank assets is apt to be considerably lower than the book value shares given in the table.

tutions. The relaxation in the early 1980s of previously stringent government controls on capital flows encouraged nonbanks to diversify into foreign assets. U.S. dollar securities have been especially favored because of their high liquidity and attractive yields. They have proved particularly desirable to the life insurance companies and pension funds, which have very large amounts of funds to invest, a relatively long investment horizon, and a strong preference — based on regulatory and accounting rules — for high-interest-bearing assets.[13] These considerations suggest that the rapid growth in dollar holdings of nonbanks in part represents a stock adjustment to a desired level that, for regulatory and other reasons, could not be attained earlier. The demand for dollar assets has also been stimulated by declining Japanese government borrowing and falling interest rates, which have reduced the supply and attractiveness of domestic long-term investment outlets. At the same time, funds available to life insurance companies and trust funds have grown comparatively swiftly because of the rapid increase in retirement savings and the elimination of most tax preferences on bank savings accounts.

Since 1987, foreign securities purchases by Japanese financial institutions have slowed noticeably.[14] While partly a response to large losses incurred as a result of dollar depreciation, the slowdown suggests that the stock adjustment process may be coming to an end, at least for the major institutions. In particular, Japanese life insurance companies appear now to be almost as diversified into foreign securities as their counterparts in the United Kingdom, and more so than their counterparts in most major European countries.[15] This does not mean that Japanese institutions are

[13]These institutions generally must pay dividends out of their interest income only, rather than total earnings including capital gains. This helps to explain why German mark and Swiss franc instruments make up a negligible proportion of foreign securities holdings; see Fukao and Okina, "Internationalization of Financial Markets," Table 2.

[14]Net foreign securities acquisitions by Japanese investors have nonetheless remained quite high because growing purchases by nonfinancial corporations have substantially offset declining purchases by financial institutions. Preliminary data suggest that nonfinancial investors accounted for at least one-half of Japanese net securities inflows in 1988, compared to about one-third in 1986. Unfortunately, very little information about the holdings or behavior of nonfinancial corporations is available.

[15]U.K. institutional investors tend to be among the most internationally diversified of investors from the major industrial nations. Diversification of Japanese pension funds also appears to be at least as great as in the United States and most of continental Europe, although below that in the United Kingdom; again see Fukao and Okina, "Internationalization of Financial Markets," Table 6. Other more recent Japanese entrants to the foreign securities markets, including public institutions, may continue to undergo stock adjustment for some time.

Table 3

Foreign Securities Holdings of Major Private Japanese Institutions
(End-Year Holdings)

		Institutional Investors			
	Private Banks†	Total‡	Life Insurance	Trust Banks§	Investment Trusts
Level in trillion yen					
1983	2.7	5.7	2.9	0.9	0.2
1985	7.3	14.1	4.8	3.5	1.6
1987	10.6	29.4	10.3	7.9	4.1
1988	11.1	33.6	12.1‖	8.3	4.8
Share of total assets					
1983	0.9	—	7.7	2.0	1.7
1985	2.0	—	9.3	5.4	8.3
1987	2.2	—	13.7	7.9	9.2
1988	2.1	—	14.1	7.2	9.1
Memo: 1988 foreign securities holdings					
In billions of dollars#	86.7	262.5	94.5	64.8	37.5
Share of total securities holdings	12.5	—	31.0	15.3	14.5

Source: Bank of Japan, *Economic Statistic Monthly.*
Note: Data generally include securities with maturities of one or more years only.
†Includes banking accounts of trust banks.
‡Dash (—) indicates that data are unavailable.
§Trust accounts only.
‖November figure.
#Valued at 128 yen/dollar, approximately the average for 1988.

likely to curtail purchases of U.S. dollar securities; simply maintaining present asset shares would entail very substantial acquisitions in coming years.[16] However, Japanese nonbanks now may be less willing than before to add substantially to their dollar exposures relative to total assets and, if so, could demand somewhat higher U.S. interest rates to do so.

More generally, the Japanese record suggests that future demand for dollar assets will be subject to a number of important but potentially conflicting influences. In particular, the forces generated by international financial integration and the domestic financial liberalization now underway in all major industrial countries could affect the demand for dollar assets significantly. These changes are likely to encourage further diversification into foreign securities, particularly in continental Europe where it has so far been relatively limited. At the same time, however, as foreign financial markets and the range of available instruments broaden, the availability of assets competing with the dollar in foreign securities portfolios is apt to increase. Partly for this reason, institutions abroad may reduce the dollar share of their expanding foreign holdings in coming years. Demand for dollar assets will also be affected by the availability of attractive investment outlets in foreign countries and by perceptions of the currency exposure and other relative risks associated with dollar investments.

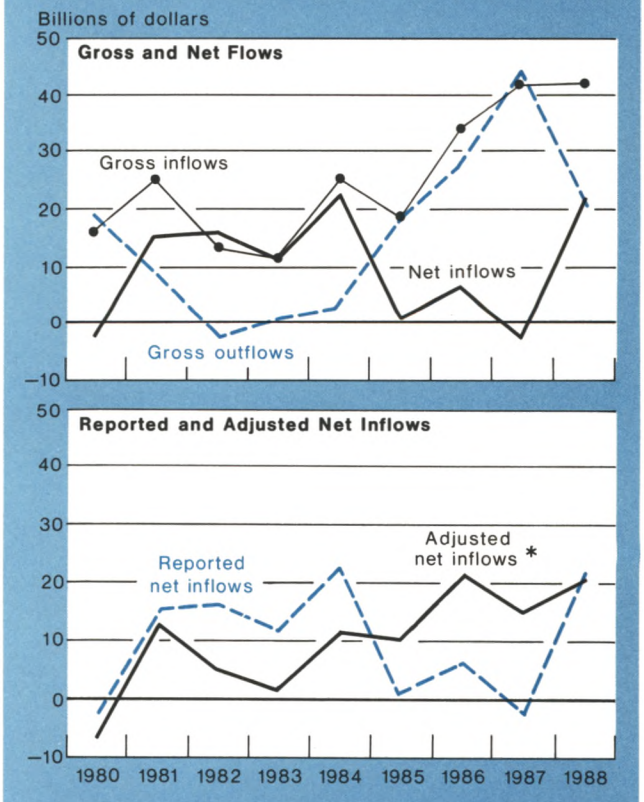
Role of direct investment

The rapid growth in direct investment inflows and outflows (Chart 2, upper panel) raises questions about the reasons for the trends and their implications for future financing from this source. These questions are of interest in part because direct investment net inflows may reduce, at least to some extent, the effective dollar exposure foreigners incur in financing a given U.S. external deficit.[17]

Recent trends in direct investment flows are analyzed in detail in Appendix A by David Fernandez. That analysis indicates that the increase in outflows over the last several years is in large part an artifact of the dollar's depreciation. Much of the growth in outflows reflects imputed capital gains of U.S. affiliates arising from revaluation of assets denominated in foreign currency; these imputed earnings automatically rise when the dollar falls. In the U.S. balance of payments accounts (but not in those of most other countries), these are recorded as direct investment income in the current account and, to the extent they are unrepatriated, as an offsetting direct investment outflow in the capital account. Direct investment outflows excluding this component are well below the total reported figures and show much less growth over the last several years. This pattern strongly suggests that future (reported) U.S. direct investment abroad will be significantly below the levels of recent years — unless the dollar continues to decline rapidly.

Chart 2

Net Direct Investment and Its Components



Source: Department of Commerce, Bureau of Economic Analysis.

* Adjusted net inflows exclude imputed capital gains arising from dollar depreciation and selected transactions with Netherlands Antilles. Figure for 1988 is authors' estimate.

[16] A rough calculation suggests that Japanese nonbank financial institutions could add $15 billion to $20 billion per year to net dollar holdings without increasing their exposure relative to total assets. This assumes that total assets grow by about 12 percent in yen terms (roughly the rate of the last several years) while the dollar depreciates by about 3 percent each year, enough to offset the projected inflation differential between the two countries. Nonfinancial corporations could probably also make substantial further dollar purchases without increasing their exposure.

[17] Of course, direct investments involve some currency exposure. Real estate investment, for example, may be subject to as much currency risk over the medium term as a bond holding. Nevertheless, for other types of direct investment, and over longer horizons, the currency risk is probably a less significant factor than for a fixed nominal income instrument.

In contrast, the sharp increase in direct investment inflows appears to arise from more fundamental and potentially lasting economic forces. Virtually all of the inflows represent new equity purchases by foreigners. A significant portion of direct investment here, particularly inflows from U.K. investors, has gone to finance foreign participation in the merger and acquisition boom now underway in the United States. Also important has been the establishment or expansion of production and business facilities by foreign-owned enterprises, primarily in manufacturing, wholesale and retail trade, and finance. In addition, Japanese institutional investors have been making substantial investments in U.S. real estate, recreation, and related facilities, in part to diversify their large holdings of U.S. fixed income assets.

The strong foreign incentives to invest in the United States suggest that direct investment inflows may remain quite high for some time. To a significant degree, however, the recent inflows probably also represent a stock adjustment to newly perceived U.S. opportunities that is unlikely to continue indefinitely. Japanese investment in U.S. auto facilities, for example, is likely to decline once production targets are achieved. These considerations suggest that although direct investment inflows may remain high, they probably will not grow as rapidly as in the past several years. However, since outflows are likely to be much lower than recently (unless the dollar falls quite substantially), a significant amount of *net* financing through direct investment can probably be expected in coming years. In particular, net inflows excluding exchange rate valuation effects have averaged nearly $20 billion over the last three years (Chart 2, lower panel) and probably provide a much better indication of future funding from this source than the much smaller recorded figures would suggest.

Future financing prospects and implications

Our review of the past six years suggests that the financial effects of future U.S. external deficits will be determined by a variety of forces. The impetus to financial diversification that has stimulated demand for dollar assets over the past six years may continue, although not necessarily as strongly. However, incentives to diversify into currencies other than the dollar could grow, particularly given the significant dollar exposures that have already been incurred by some major foreign investors. Future demand for U.S. assets will also be affected by various domestic and international economic conditions and by developments in the supply of competing assets issued by foreign governments and other entities, among other factors.

The net effect of these developments on future financing of the U.S. current account cannot be predicted with precision. Nonetheless, we can attempt in this section to indicate how plausible future current account paths might be financed and to provide a qualitative assessment of the financial pressures that may result. We begin with a conceptual analysis of the effects of U.S. debt accumulation on interest rates and exchange rates. We then apply this analysis in evaluating illustrative financing scenarios corresponding to alternative evolutions of the current account deficit over the next five years.

Financial implications of the debt accumulation

When the United States runs a current account deficit, it must borrow from abroad by giving foreigners claims on U.S. residents. Most assets issued by U.S. residents are denominated in dollars, so foreigners will typically accumulate dollar assets when financing a U.S. current account deficit.[18]

The response of financial markets to a U.S. current account deficit will therefore depend importantly on the willingness of foreigners to hold a larger share of dollar assets in their portfolios. Dollar assets are likely to be riskier for foreigners than assets denominated in their domestic currency if only because of the difficulty of predicting exchange rate changes. Thus as foreigners' dollar holdings rise in relation to their wealth, an adjustment in the financial markets is likely. This adjustment can take a combination of two forms. First, rates of return on U.S. assets might increase to compensate foreigners for the additional risk they face by holding dollar assets. That is, U.S. real interest rates would have to increase relative to interest rates in other countries in order for additional dollar holdings to become attractive. Second, exchange rates could adjust to restore equilibrium in asset markets by reducing the value of dollar assets in foreign portfolios. This dollar depreciation would effectively offset the rise in the dollar share of foreign portfolios that would otherwise occur.

The financial adjustment accompanying the current account deficit depends on the extent to which foreigners are willing to substitute dollar assets for assets denominated in their home currency. Factors influencing the substitutability of internationally traded assets include regulatory provisions toward cross-border financial transactions, differences in tax treatment, and differences in risk. For most industrial countries, the most important influence on the substitutability of foreign and home assets is their relative risks, which are

[18]The U.S. external deficit reflects both a decline in the private saving rate and a rise in government borrowing. Together, these developments imply that foreigners must hold a greater share of outstanding dollar assets.

largely a reflection of two factors: the perceived volatility in their own returns and the extent to which foreign assets offset (diversify) fluctuations in domestic asset yields. Evidence on this point suggests that dollar assets and foreign currency assets generally are good substitutes; that is, investors require relatively small additional return to change the shares of the two assets in their portfolios.[19] Thus, a U.S. current account deficit is likely to have a large effect on U.S. interest rates only if it substantially raises the share of dollar assets in foreign portfolios.

While the recent U.S. current account deficits are large in historical terms, they do not represent a very large share of private industrial country wealth. For example, the 1988 current account deficit of about $135 billion represents roughly 1.3 percent of the wealth of the seven major industrial countries at the end of 1987 (that is, the value of outstanding government bonds and equities for the United States, Japan, Germany, the United Kingdom, Canada, France, and Italy). Thus, a U.S. current account deficit of this size would add a relatively small amount to the share of dollar assets in aggregate foreign portfolios during any particular year. The cumulative effects of a deficit sustained over several years would be greater and potentially more significant, however.

To provide an indication of the likely size of the interest rate adjustments accompanying current account deficits, we use a mean-variance model of international asset demand.[20] This model of asset choice assumes that investors choose their portfolios to balance required return and risk (as measured by the variance of returns). Assuming that international investors have a fixed trade-off between risk and expected return, the expected returns on a particular asset will be proportional to the additional risk introduced into the average, or world, portfolio by holding slightly more of that asset. Changes in portfolio shares will generally alter the risk associated with each asset in the portfolio and thus alter the required return on each asset. Our estimates suggest that small to moderate increases in the dollar share of aggregate portfolios add only modestly to total risk; consequently only fairly small compensating increases in yield are required.

Table 4 reports estimates of the effect of a U.S. current account deficit equal to 1 percent of industrial country wealth on the annualized real return of one-month dollar-denominated assets measured relative to returns in selected countries. The U.S. external deficit is assumed to be matched by the combined surpluses of Japan and Germany. The estimates are based on return volatilities estimated from observed (ex post) yields over the last several years.[21] The table shows, for example, that the deficit would raise U.S. real interest rates relative to German interest rates by 6.1 basis points. This estimate represents the direct impact of a single year's external deficit only. If the deficit is expected to persist, the effect on longer-term yields is likely to be greater, since short-term rates would be expected to rise in future years.

These estimates may somewhat understate the effect of additional dollar indebtedness to foreigners. The estimates are based on the assumption that investors expect to experience risk in the future similar to that observed on average in the past. In practice, however, the return volatility and associated risks of financial assets can vary considerably over time horizons of several years. It is not unusual, for example, to observe volatility varying by a factor of two or more over periods of several years.[22] If this pattern were to per-

[19] See Jeffrey Frankel, "The Implications of Mean-Variance Optimization for Four Questions in International Macroeconomics," *Journal of International Money and Finance*, March 1986; Jeffrey Frankel and Charles Engel, "Do Asset-Demand Functions Optimize over the Mean and Variance of Real Returns? A Six-Currency Test," *Journal of International Economics*, December 1984; and Benjamin Friedman and Kenneth Weiller, "The Substitutability of U.S. and Foreign Assets," Federal Reserve Bank of New York, Research Paper no. 8714, in *International Integration of Financial Markets and U.S. Monetary Policy*, December 1987.

[20] See William Branson and Dale Henderson, "The Specification and Influence of Asset Markets," in Ronald W. Jones and Peter B. Kenen, eds., *The Handbook of International Economics*, vol. 2 (New York: North-Holland, 1985), for a detailed description of this model.

[21] These estimates are described in Appendix B. They are obtained using the model presented in Karen Lewis, "Inflation Risk and Asset Market Disturbances: The Mean-Variance Model Revisited," *Journal of International Money and Finance*, September 1988.

[22] See Charles Engel and Anthony Rodrigues, "Tests of International CAPM with Time-Varying Covariances," *Journal of Applied Econometrics*, 1989 (forthcoming); and Alberto Giovannini and

Table 4

Change in U.S. Return, Relative to Other Countries, Resulting from a U.S. Currrent Account Deficit Equal to 1 Percent of World Wealth

(Annual Rate in Basis Points)

Country	Change in One-Month U.S. Real Interest Rate Relative to Other Countries†
Germany	6.1
Japan	7.7
Canada	0.3
United Kingdom	4.3
France	5.9
Italy	5.0

†The calculations assume current account surpluses in Germany and Japan equal to one-third and two-thirds of the U.S. total deficit, respectively.

sist, the additional return required for holding more dollar assets, under some circumstances, could be as much as twice that in Table 4. Such an outcome, or an even greater interest rate effect, is at least a real possibility if large external deficits persist and foreign dollar exposures consequently grow well beyond those observed in the past.

If domestic real interest rates do not adjust to the additional U.S. debt arising from the current account deficit — a plausible development if monetary authorities were pursuing a policy of stable real interest rates — then dollar depreciation is likely to restore equilibrium. This depreciation would effectively reduce the foreign currency value of dollar assets, leaving unchanged the dollar asset share in foreign portfolios.[23] The exchange rate adjustment in one year depends on the shifts in the overall demand for assets associated with the current account deficit. For example, the combination of a U.S. deficit and a Japanese surplus shifts demand from dollar assets to yen assets. The change in demand induced by U.S. and Japanese current accounts of the size that occurred in 1988 would lead to roughly 3 percent depreciation of the dollar against the yen.[24]

Future financing scenarios

While the precise financial impacts of future U.S. deficits are impossible to predict, the evidence we have reviewed above provides a basis for roughly assessing the consequences of alternative plausible paths for the external deficit over the next several years. Of particular interest is whether the financing of future U.S. deficits will be feasible without significant increases in domestic interest rates or dollar depreciation beyond those needed to offset the differential between U.S. and foreign inflation. We base our assessments in part on two hypothetical scenarios for the financing of the assumed deficit paths, using assumptions about various components derived from past experience. These scenarios should be viewed as indications of the range of possible outcomes rather than precise forecasts.

The main assumptions underlying the two scenarios are given in Table 5. The two paths for the U.S. current account deficit probably span the range of the most likely outcomes: in the first, more pessimistic path, the deficit remains at 2¼ percent of GNP, roughly its present level, over the next five years. This scenario essentially corresponds to little change in policy or other fundamental conditions underlying the external deficit. In the second path, the deficit falls steadily to 1 percent of GNP by 1993. This path is most likely to accompany a substantial reduction in the U.S. fiscal deficit and reasonable demand growth abroad. Most other plausible paths for the current account deficit fall between these two illustrative cases.

Our assumptions for net direct investment and official inflows are based on recent experience, as reviewed in the last section. We assume that the net direct investment inflow increases by $2.3 billion per year from a 1988 base of $21.8 billion. This growth is consistent with the trend of net inflows, excluding currency translation effects, over the last several years (see Appendix A). As explained earlier, these translation effects are unlikely to be as large as those observed recently. In order to concentrate on potential strains associated with private financing, we assume that official dollar asset holdings rise by 8 percent per year, a rate roughly consistent with average recent behavior and foreign nominal GNP growth.[25] While official interven-

Footnote 22 continued
Philippe Jorion, "The Time-Variation of Risk and Return in the Foreign Exchange and Stock Markets," Columbia University Working Paper, 1987. These authors present evidence that conditional variances of monthly returns are occasionally at least twice the value of the unconditional variances on which our calculations are based.

[23] To the extent that dollar depreciation is anticipated, nominal U.S. interest rates will rise relative to foreign returns.

[24] The basis for this calculation is described in more detail in Appendix B. Frankel, in "The Implications of Mean-Variance Optimization," has argued that expectational effects could imply larger depreciation.

[25] According to figures reported by the International Monetary Fund, official dollar holdings as measured by dollar foreign exchange reserves were about $320 billion at year-end 1987. Average growth in

Table 5

Assumptions Underlying the Financing Scenarios

(In Billions of Dollars)

	1988	1989	1990	1991	1992	1993
Official inflows†	39.1	27.7	29.9	32.3	34.8	37.6
Direct investment net inflows	19.0	24.1	26.4	28.7	31.0	33.3
Current account deficit						
Scenario I	135	125	135	146	157	170
Scenario II	135	125	100	80	65	55
Memo:						
Foreign nominal GNP growth (foreign currency)	6 percent per year					
Dollar depreciation	2 percent per year					
Net wealth growth‡	8 percent per year					

Note: 1988 data are actual (preliminary) figures.
†Official inflows are assumed to include all net foreign official purchases of dollar-denominated assets.
‡Net wealth is approximated by government debt plus stock market capitalization for the United States, the United Kingdom, Germany, Japan, Canada, France, and Italy. Growth is in dollar terms.

tion may be greater in periods of financial market pressure, we argue below that the intervention would have to be extraordinarily large to avoid private financing strains entirely, at least under the high deficit scenario.

The projected financing of the high current account scenario, given in Table 6, indicates that continuation of U.S. deficits at their present level relative to GNP will lead to substantial growth in external debt, both absolutely and (more importantly) relative to industrial country wealth. Under this more pessimistic scenario, total net debt increases at an annual rate of more than 20 percent, while the position excluding official obligations (a very rough proxy for the dollar exposure of private investors) grows by 24 percent per year, roughly triple the assumed growth of foreign GNP measured in dollars. As a share of wealth, the private net debt of the U.S. doubles from about 2.6 percent of wealth in 1988 to 5.2 percent in 1993 — a modest level in absolute terms but a substantial proportionate rise.

In contrast, in the second scenario with a steadily falling deficit, net debt grows much less rapidly, particularly after 1990, and net private debt varies little after 1990 relative to wealth (Table 7). The current account deficits and the debt increases are close to those of the first scenario through 1990 but much lower in the subsequent years.

Because of potential financial strains in the high deficit scenario, actual official financing could exceed the amounts assumed in our calculations. Central bank intervention would probably not be great enough, however, to eliminate the differences between the scenarios.[26] In particular, official financing would have to average over $100 billion annually during the next five years to keep the share of dollar assets in wealth at its 1988 estimated level (see the memorandum in Table 6). This level of official financing could probably be kept up for a year or two but, if sustained over the entire five-year horizon, would more than double the stock of for-

Footnote 25 continued
these holdings was about 5.3 percent per year over 1982-86, compared to about 10.8 percent for 1982-87. Our projected growth over the next five years is thus about midway between these averages.

[26] If, for example, official inflows after 1988 were twice the value shown in Table 5, private holdings of dollar-denominated debt as a share of total wealth would be about one percentage point less at the end of the horizon under the pessimistic current account scenario than our projections now imply, but would remain higher than in scenario 2.

Table 6

Financing Projections — Scenario I

	Average Annual Flow		End-Year Stock†		
	1989-90	1991-93	1988	1990	1993
U.S. external debt (billions of dollars)	130	158	488	748	1221
Annual growth (percent)	24	18			
Private capital inflows (billions of dollars)	101	123	299	502	870
Securities and banking (billions of dollars)	76	92	324	476	751
External debt as a share of net wealth‡ (percent)			4.3	5.6	7.3
Private external debt as a share of net wealth‡ (percent)			2.6	3.8	5.2
Memo: Required official financing to maintain 1988 private net debt share of wealth (billions of dollars per year)					
Scenario I	105	128			
Scenario II	91	37			

Note: The calculations are based on the assumptions in Table 5.
†Debt stocks are book value terms and are based on the end-1987 official estimates.
‡Net wealth is government debt plus stock market capitalization for the United States, United Kingdom, Germany, Japan, Canada, France, and Italy.

Table 7

Financing Projections — Scenario II

	Average Annual Flow		End-Year Stock†		
	1989-90	1991-93	1988	1990	1993
U.S. external debt (billions of dollars)	113	67	488	713	913
Annual growth (percent)	21	9			
Private capital inflows (billions of dollars)	84	32	299	467	562
Securities and banking (billions of dollars)	58	1	324	441	443
External debt as a share of net wealth‡ (percent)			4.3	5.4	5.5
Private external debt as a share of net wealth‡ (percent)			2.6	3.5	3.4

Note: The calculations are based on the assumptions in Table 5.
†Debt stocks are book value terms and are based on the end-1987 official estimates.
‡Net wealth is government debt plus stock market capitalization for the United States, United Kingdom, Germany, Japan, Canada, France, and Italy.

eign official dollar holdings.[27] To maintain control of money and credit growth, central banks would have to offset dollar purchases of this magnitude with large sales of domestic assets; consequently, the banks might experience significant technical difficulties in carrying out monetary policy.[28] For these reasons, sufficient official financing to prevent a marked rise in the dollar exposure of private foreign lenders under the first scenario seems unlikely, unless strains in financial markets were to become very substantial.

Financial implications

Coupled with the analysis earlier in this section, our examination of the financing projections scenario strongly suggests that a sustained current account deficit near current levels will lead to potentially significant financial pressures on domestic interest rates and the dollar. In contrast, such financial pressures are likely to be much smaller, particularly after 1990, in the declining deficit scenario. The exact size of these pressures is hard to predict because it depends on a variety of influences affecting demand for U.S. dollar assets and on factors influencing the supply of U.S. and foreign currency assets. However, the scenarios imply that the financial pressures will be lower if the deficit declines than if it does not.

These impressions are confirmed by rough estimates of the scenarios' financial implications based on the framework discussed earlier in this section. Table 8 shows the increase in U.S. real interest rates relative to rates abroad needed to ensure private financing for the projected current account deficit path with no further real dollar depreciation (that is, assuming that all the financing pressures fall on interest rates rather than exchange rates). These estimates are measures of the effect of additional dollar exposure and do not include other influences on interest rates that could arise.

The analysis suggests that continued large external deficits would lead to moderate increases of about 26 to 33 basis points in U.S. short-term interest rates relative to rates abroad. The estimated increase in longer-term rates is noticeably higher, about 37 to 46 basis points, because of expectations of increasing short-term rates as the debt continues to accumulate in future years. In contrast, the declining deficit scenario would imply an increase in long-term interest rates relative to foreign returns that was less than half as large, with much of the change early in the period.

Table 9 shows the decline in the dollar that would be needed to induce private foreigners to supply the necessary deficit financing without an increase in real interest rates. (The required depreciation is essentially that required to prevent foreign dollar holdings from increasing in relation to wealth). Higher relative U.S. real interest rates are likely to be avoidable under the pessimistic current account scenario only at the cost of significant further dollar depreciation. Indeed, the dollar might fall by 25 percent further in the next few years under these circumstances.

In practice, financing of a continued large U.S. deficit is likely to lead to a combination of interest rate increases and dollar decline. Moreover, the absolute effects on U.S. interest rates also depend upon the deficit's impact on foreign yields. The effects shown in Tables 8 and 9 appear fairly moderate, but they may be somewhat misleading. An increase of 37 to 46 basis points in U.S. long-term real interest rates, for example, is not large in comparison with the rates' yearly fluctuation. A permanent increase of this magnitude, however, is more substantial in relation to the longer term average of this rate (typically about 2 to 3 percent for government bonds). Such an increase could have a

Table 8

Increases in U.S. Real Interest Rates Relative to Japan and Germany

(Basis Points)

	Short-Term Rate		Long-Term Rate	
	Scenario I	Scenario II	Scenario I	Scenario II
Japan				
1990	13	11	26	15
1993	33	16	46	17
Germany				
1990	10	9	21	12
1993	26	13	37	14

Notes: The increases in U.S. real interest rates relative to specific foreign rates are measured from end-1988 through the end of the given period. The scenarios are defined in Table 5. The short-term rate refers to an annualized one-month holding period yield. The long-term rate is the annualized return on five-year bonds.

[27] Indeed, current official dollar reserves may now be significantly above those desired under more normal circumstances because of the heavy interventions since 1985. To a greater extent than over the last three years, future intervention is likely to arise from the actions of a few major industrial country central banks. The reason is that Taiwan, which accounted for nearly one-quarter of all official dollar purchases in 1986-87, is unlikely to add significantly to its holdings over the next several years.

[28] Three major countries, Japan, Germany, and the United Kingdom, have typically accounted for most of the dollar purchases by foreign industrial country central banks. In all three countries, dollar purchases exceeded the total growth in bank reserves in 1987. Monetary policy operations to control bank reserve growth are conducted most easily in domestic assets and only with more difficulty in foreign securities. While serious monetary control problems do not seem to have resulted from the heavy interventions of 1986-87, they could develop if dollar purchases were to continue at that rate for several more years.

noticeable impact on the domestic cost of capital and on investment spending. Furthermore, the required increase in U.S. interest rates would be even greater if foreign real interest rates were to rise—a particularly likely outcome if the external deficit remains high.

More important, these estimates of financial impacts are probably conservative, especially if the current account deficit does not decline appreciably. As indicated earlier, investors may perceive the risk of holding dollar assets as substantially greater than that implied by past experience. It is conceivable, for example, that continued large U.S. external deficits would seriously undermine market confidence in this country's policy credibility and economic stability; in that case, the interest rates required to maintain foreign holdings of U.S. debt could be considerably higher than those shown in the table.

These exercises can only suggest the possible patterns that the future financing of U.S. external deficits may follow. Because future demand for U.S. dollar assets is likely to be affected by a number of factors not explicitly considered in our analysis, the potential outcomes in either deficit scenario may vary greatly. Nevertheless, the analysis does strongly imply that continued external deficits at present levels could lead to increased financial pressures with economically significant implications. In this sense, continued high deficits may pose clear financial risks. In contrast, the analysis suggests that these risks might be largely avoided if the deficit declines steadily and substantially over the next several years.

Conclusion

For a number of years there have been warnings that continued rapid accumulation of U.S. external debt to finance large current account deficits will lead to serious financial strains. Yet the financing of the deficit has proceeded more smoothly than most observers thought possible when the deficits first emerged in the early 1980s. This apparent contradiction between prediction and experience has raised questions about how serious the financial consequences of continued large deficits might be. Historical precedents provide only very limited guidance in answering such questions because of the exceptional size of the U.S. deficit and the rapidly changing world financial environment in which it is being financed.

This article has attempted to identify key features of the financing of the U.S. current account deficit and to assess what past experience and other evidence suggest about the risks that may arise under plausible future deficit scenarios. We have seen that the experience with funding the deficit since 1982 provides both positive and negative signals about future financing prospects. Among the positive indications is the fact that most of the $600 billion borrowed from abroad over 1983-88 has come from private sources. Official financing admittedly has become important during the last three years, although in part because of exchange rate policies; private financing, in any case, has again been the dominant financing source over the last year. Also encouraging is the likelihood that direct investment will provide a significant amount of current account financing over the next several years.

At the same time, however, there are signs that future conditions may be somewhat less favorable to U.S. borrowing from other countries. Purchases of U.S. securities, the largest single source of current account financing, have been greatly encouraged by the diversification of foreign investor portfolios in response to the growing international financial integration of the 1980s. Major foreign financial institutions, particularly in Japan, now have significant exposures to U.S. dollar assets as a result of this process and they may be less willing to increase these exposures in the future. Additional development of international financial markets, as well as changes in the financial climate within major foreign industrial countries, may encourage investment in assets competing with the dollar, and hence may lead to slower growth in the demand for U.S. assets than in the past.

Given the complexity of the factors involved, any assessment of the effects of future financing of U.S. external deficits is likely to be quite imprecise. Our analysis has been based on the assumption that the private foreign exposure to dollar assets arising from the U.S. external deficit will be a key determinant of the deficit's financial impacts. In principle, increases in private foreign net dollar holdings relative to wealth, or in the perceived risks of dollar assets, are likely to lead to financial changes, including upward pressures on domestic real interest rates and downward pressures on the dollar. Continued external deficits at present

Table 9

Cumulative Dollar Depreciation against the Yen Implied by the Scenarios

(In Percent)

	Scenario I	Scenario II
1990	11	9
1993	26	13

Notes: Depreciation is measured from end-1988 through the end of the given period and is an addition to that assumed in Table 5. Financial pressures are assumed to fall entirely on exchange rates with no change in real interest rates.

rates in relation to GNP are very likely to lead to ongoing growth in private foreign dollar exposures and may imply significant financial pressures in coming years. The estimated increase in long-term real interest rates under this scenario, slightly less than one-half of one percentage point by 1993, is sizable compared to historical averages, although not so large in relation to the average of the last several years. But this estimate, based largely on historical experience, is likely to prove conservative. Given the growing uncertainties about the macroeconomic and financial environment that are likely to accompany continued high deficits, the pressures on interest rates and exchange rates could easily be considerably greater than those implied by the simple model used for the text estimates, and their economic impacts could be significantly more adverse.

On balance, therefore, the evidence suggests that there is a basis for concern about the potential financial consequences of continued large external deficits and rapid accumulation of indebtedness to foreigners. This, of course, does not mean that major financial strains are either imminent or inevitable; nor can the possibility be ruled out that further changes in world financial conditions favoring demand for U.S. assets, or other factors, will allow future U.S. deficits to be financed without serious problems. Nonetheless, there is tangible and concrete evidence that the risks of serious financial problems are growing and will continue to rise in coming years if the external deficit is not brought down substantially.

Juann Hung
Charles Pigott
Anthony Rodrigues

Appendix A: The Role of Direct Investment

This appendix examines the role of direct investment in the financing of the U.S. current account deficit and considers how that role might change as the adjustment process proceeds. Foreign direct investment inflows into the United States have grown steadily throughout the decade, spurred on mainly by favorable U.S. economic conditions. The outflow of U.S. direct investment abroad, while exhibiting more volatile behavior, has also expanded over this period. Between 1985 and 1987, the inflows and outflows of direct investment basically canceled each other out, leaving net direct investment with little to contribute to the financing of growing U.S. current account imbalances. (It has, however, made a substantial contribution in 1988.) Nevertheless, our analysis suggests that many of the factors that recently affected direct investment inflows and outflows may be transitory, and that direct investment will provide significant net financing over the next several years.

Overview

In the balance of payments accounts, "direct investment" refers to investments by foreigners in business enterprises in which the foreigners' control exceeds 10 percent. Direct investment funds can enter the country in three different ways. First, a parent corporation can directly place funds in a business outside its home country's borders — establishing a new plant abroad, buying out an existing factory, purchasing real estate, participating in a joint venture with a foreign firm, or increasing its equity holdings beyond the 10 percent threshold. Second, a foreign affiliate may decide not to repatriate its earnings to the parent corporation but to reinvest them in its own operations. Third, the foreign affiliate can raise funds in the Euromarket or other foreign securities markets.

The motives for undertaking direct investments are generally more complex than those determining portfolio investments. While the composition of a securities' portfolio is typically based primarily on the expected yields and risks of its components, direct investments are influenced by a mix of corporate strategies, macroeconomic conditions in different nations, and national policies toward foreign investment.

Chart 2 of the text shows the pattern of net direct investment flows during the 1980s. The chart reveals that earlier in the decade a surplus of direct investment entered the United States; these funds significantly offset concurrent imbalances in the U.S. current account. From 1985 to 1987, the current account deficit continued to balloon, but direct investment flows fell into balance, providing little net capital inflow to offset our net current outflows. This pattern changed again in 1988 as direct investment outflows fell and net inflows rose to over $20 billion.

Foreign direct investment in the United States

The low level of net direct investment over 1985-87 cannot be attributed to any diminution of foreign willingness to invest in U.S. businesses. Indeed, flows of foreign direct investment have grown steadily throughout the decade, building to a high of $42 billion in 1988. Most of these funds are "new" investments made by foreign corporations, which means that foreigners are concentrating on buying out existing U.S. firms or establishing U.S. affiliates.

Appendix A: The Role of Direct Investment *(continued)*

Much of this growth can be attributed to favorable economic conditions in the United States. Moderate growth in economic activity and low inflation, combined with the depth of the domestic market, make the United States an attractive location for foreign firms. In addition to the country's favorable economic climate, factors that have recently strengthened foreign direct investment include increased mergers and acquisitions activity, foreigners' desire to diversify their investment portfolios, and the fall in the dollar's value since 1985.

The current wave of U.S. corporate restructuring has created an unusual opportunity for foreigners to obtain U.S. businesses. By far the most active players in this international mergers and acquisitions activity have been the British. A recent study by the *British-American Deal Review* estimates that the British committed $32.5 billion to acquire 400 U.S. companies in 1988; the Japanese are estimated to have bid roughly $12 billion last year. British investors, reaping large corporate profits at home, have moved aggressively during this period of restructuring, particularly in the areas of manufacturing, retail trade, and financial services. These purchases have secured the British position as the largest direct investor in the United States. The Japanese, however, have been reluctant to engage in hostile takeovers of U.S. corporations, although their direct investment position in the United States has increased. The Japanese share of total direct investment in this country rose from 8 percent to 13 percent during the 1982-87 period, making Japan the third largest direct investor after the United Kingdom and the Netherlands.

Much of the growth in Japanese direct investment can be explained by the desire of Japanese institutional investors to diversify their portfolio of U.S. assets. Well-publicized real estate purchases by Japanese life insurance companies and other financial entities have increased Japanese direct investment in the United States without necessarily augmenting productive capacity here. The placement of these funds, however, does provide the Japanese investor with a stream of returns in the form of rents and, in this sense, represents an alternative to bond or other securities investments. Moreover, income from real estate and other similar ventures, at least over the long run, is apt to provide a better hedge against inflation than fixed (nominal) income instruments.

Dollar depreciation since 1985 has also supported the growth of foreign direct investment in the United States. Though the purchase price of U.S. assets falls with the drop in the dollar, the foreign currency value of income from these investments falls as well. A recent paper by Richard Caves, however, finds that net foreign direct investment responds positively to dollar depreciation.†

The boost given to direct investment inflows by these three factors — increased mergers and acquisitions activity, foreign portfolio diversification, and dollar depreciation — may be viewed as a break from the growth path determined by long-term corporate planning. What we may be observing is a stock-adjustment process in which foreigners are building up their stocks of U.S. corporate assets to some desired level dictated in part by the global strategies of different multinationals (strategies such as developing niches in foreign markets, diversifying raw materials sources, or capitalizing on lower wage rates abroad). To the extent that the acceleration in direct investment inflows since 1986 is the result of foreigners seizing the opportunity to close the gap between their actual and desired stocks, we can expect the inflows to slow from their present growth at some point in the future.

U.S. direct investment abroad

In contrast to the steady growth of foreign direct investment through the 1980s, flows of U.S. direct investment abroad have been quite erratic, exhibiting little trend growth. Direct investment outflows were near zero in 1982, jumped to over $44 billion in 1987, and then fell to $20 billion in 1988. In this decade, almost all of the growth in U.S. direct investment abroad has come from the reinvested earnings of U.S. foreign affiliates. In 1987, 72 percent of direct investment outflows came from reinvested earnings, and between 1981 and 1985 the flow of reinvested earnings actually exceeded the total outflow of direct investment funds.‡ Equity capital, or "new" direct investment, which constituted the bulk of the increase in foreign direct investment into the United States, contributed little to the outflow of direct investment (only 9 percent in 1987).

The fluctuations in direct investment outflows do not necessarily reflect changes in the desire of U.S. multinationals to invest or expand their operations abroad. In fact, much of the volatility in direct investment outflows is due to two accounting peculiarities that have a sub-

†See Richard E. Caves, "Exchange Rate Movements and Foreign Direct Investment in the U.S.," Harvard Institute of Economic Research, Discussion Paper no. 1387, May 1988.

‡This is possible if the sum of the two other types of direct investment flows, equity capital and intercompany debt, is negative. The continued strong contribution of reinvested earnings to total outflows from the United States contrasts with direct investment financing in other industrial nations. For example, reinvested earnings represented only 1 percent of German direct investment outflows between 1980 and 1983. See "International Investment and Multinational Enterprises," OECD, 1987.

Appendix A: The Role of Direct Investment *(continued)*

stantial impact on the data.§ First, the Commerce Department treats changes in asset values arising from exchange rate changes as income accruing to the foreign affiliate in the current account. This bookkeeping profit is then recorded as an offsetting capital outflow (to the extent it is not repatriated). These items can be quite large when the value of the dollar changes significantly. For example, in 1987 capital gains from dollar depreciation added over $15 billion to reported direct investment outflows, more than one-third of the total. Removing these capital gains and losses (which are generally ignored in the balance of payments accounts of other industrial countries) provides a more accurate picture of the true underlying trend in direct investment outflows.‖

The second adjustment to the direct investment outflow data arises from transactions between U.S. parent companies and their affiliates in the Netherlands Antilles. Before 1984 it was advantageous for U.S. corporations to raise new capital by issuing Eurobonds through their Netherlands Antilles affiliates and then to borrow these funds from their offshore subsidiaries. In the direct investment outflow data, these transactions appear as *negative* capital outflows. The Tax Reform Act of 1984 repealed the 30 percent withholding tax on interest paid to all foreigners, not just to tax havens like the Netherlands Antilles, making this convoluted financing path unnecessary. As a result, the main flow of capital between the countries is now *from* the United States *to* the Netherlands Antilles as the U.S. corporations pay off the old Eurobonds. Capital outflows with Netherlands Antilles affiliates became positive in 1985 and totaled $2.5 billion in 1987. The removal of these transactions will increase direct investment outflows before 1985 and lower them in subsequent years.

Adjusting for these two distortions of the outflow data involves subtracting both capital gains due to translation adjustment and outflows to Netherlands Antilles affiliates. The reported and adjusted data are shown in Chart 1A. With these adjustments, flows of direct investment abroad are much less volatile than they appear in the Commerce Department data and considerably below reported outflows for 1985-87.

§See Robert N. McCauley, "Prospects for U.S. Debt Service Obligations," study prepared for the Joint Economic Committee, 1989 (forthcoming).

‖Translation adjustments resulting from exchange rate movements should be assessed at the end of the year along with the other valuation adjustments. Therefore, these corrections to the flow data will not affect the direct investment position series reported by the Commerce Department.

Future prospects

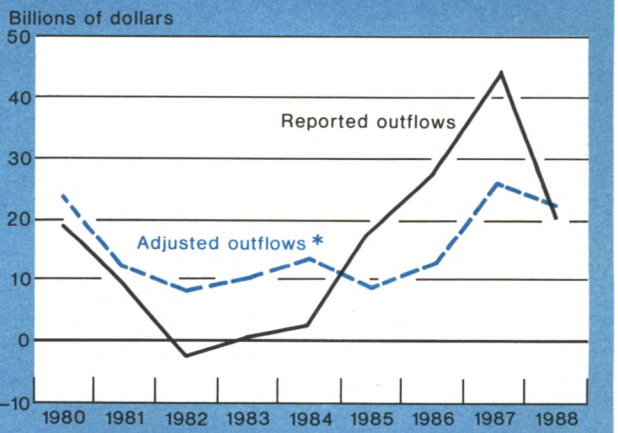
As Chart 2 of the text reveals, net direct investment inflows, excluding the two adjustments just discussed, have been significantly positive in recent years. Our analysis suggests that while direct investment inflows should grow more slowly than in recent years, they are likely to exceed outflows. Assuming that the dollar is fairly stable, net direct investment should make a significant contribution to current account financing in the coming years.#

David G. Fernandez

#Box-Jenkins models of direct investment inflows and adjusted outflows imply that both components, as well as net direct investment, tend to increase over time. The text estimates of future net direct investment are based on a regression of net adjusted inflows on a time trend; this regression implies an increase of net direct investment of about $2.3 billion per year.

Chart 1A

Reported and Adjusted Direct Investment Outflows



Source: Department of Commerce, Bureau of Economic Analysis.

*Adjusted direct investment outflows exclude capital gains and selected transactions with Netherlands Antilles affiliates. Figure for 1988 is authors' estimate.

Appendix B: Computing Interest Rate and Exchange Rate Effects

Our estimates of interest rate and exchange rate effects are derived from the single-period mean-variance model of asset choice, which assumes that investors choose their portfolios by balancing expected return against variance of return. Specifically, investors will continue to add a risky asset to their portfolios until the marginal return from the asset is equal to the marginal variance, weighted by the investors' desired trade-off between return and variance. Assuming a one-month time horizon for investors, the major sources of uncertainty are unexpected changes in exchange rates and unexpected inflation. Lewis has shown that asset demand under these conditions will depend on both the expected return and risk of assets as shown below:†

$$x = [R\ \mathrm{Var}(a)]^{-1}\ [r - r^{us} - Ea] - [\mathrm{Var}(a)]^{-1}\ \mathrm{Cov}(a,p)\ w.$$

In the expression above, demand for foreign currency assets is given by the desired shares of each asset in the portfolio, x, and may be expressed as the sum of a speculative portfolio, $[R\ \mathrm{Var}(a)]^{-1}\ [r - r^{us} - Ea]$, and a minimum variance portfolio, $-\ [\mathrm{Var}(a)]^{-1}\ \mathrm{Cov}(a,p)\ w$. The speculative portfolio suggests holding each asset at a share that sets its contribution to expected return equal to R times its contribution to variance. R, the coefficient of relative risk aversion, gives the additional expected return investors require for each additional unit of risk, which is measured here by the variance of unexpected dollar appreciation, $\mathrm{Var}(a)$. Speculative demand rises with the expected returns on the assets, relative to the return on dollar assets, which equals $[r - r^{us} - Ea]$ where Ea represents the expected rate of dollar appreciation relative to other currencies.

The minimum variance portfolio gives asset demand when investors are completely risk averse, that is, when $R = \infty$. Even an extremely risk averse investor might hold an asset denominated in a foreign currency with the same expected return as a domestic asset if unexpected dollar appreciation against the currency, a, were negatively correlated with unexpected changes in the investor's inflation rate, p. This strategy creates a hedge against domestic inflation. World demand for assets will depend on the distribution of wealth over countries, w, with greater weight placed on the demand of investors in wealthier countries. A current account deficit leads to a change in world demand as wealth shifts from the deficit country to surplus countries.

Our estimates of the key parameters in the model—the variance of unexpected exchange rate appreciation and the covariances between forecast errors in exchange rates and in inflation—are derived using data from November 1977 through October 1988 for Japan, Germany, Canada, France, Italy, the United Kingdom, and the United States. The forecast error variances from a vector autoregressive model of spot exchange rates and inflation rates, measured by country consumer price indexes, are used to estimate $\mathrm{Var}(a)$ and $\mathrm{Cov}(a,p)$.

The literature has provided a wide range of estimates for the coefficient of relative risk aversion.‡ Lewis estimated our model over a similar time period and obtained a coefficient around six. Her measure was used throughout this analysis.

Country net government debt and wealth stocks are measured following a procedure proposed by Frankel.§ We add the debt measures to stock market capitalization, obtained from published figures in *Morgan Stanley Capital International Perspective,* to obtain 1987 figures for country wealth and assets denominated by currency.

The asset markets, interacting with product and factor markets, will determine the exchange rate and interest rate changes associated with a current account deficit. Two views of asset market adjustment are used here to bound the likely exchange rate and interest rate changes. The first emphasizes interest rate adjustment, which is most likely when authorities follow policies of fixed exchange rates. In this case, relative returns will change to equate asset demand and supply after a shift in demand induced by a current account deficit. The second emphasizes exchange rate adjustment, which is most likely when monetary authorities fix interest rates. As world demand for assets shifts with a current account deficit, exchange rate movements could restore equilibrium through appreciation of currencies whose assets are in excess demand and through depreciation of currencies in excess supply.

The mean-variance model typically implies small annual interest rate responses and somewhat larger exchange rate responses to a current account deficit. Since current account deficits are typically a small share of wealth, they imply small shifts of wealth from deficit to surplus countries and relatively small shifts in world demand for assets. Most evidence suggests that assets denominated in different currencies are reasonably good substitutes so that small changes in the demand for assets will be accompanied by modest changes in relative returns.

To illustrate these points, consider a model of demand for assets denominated in yen and U.S. dollars:

$$x^{jp} = [R\ \mathrm{Var}(a)]^{-1}\ [r^{jp} - r^{us} - Ea] - [\mathrm{Var}(a)]^{-1}\ [\mathrm{Cov}(a,p^{jp})\ w^{jp} + \mathrm{Cov}(a,p^{us})\ w^{us}].$$

†Lewis, "Inflation Risk."

‡Estimates range from two, in Frankel, "In Search of the Exchange Risk Premium," to fifty, in Giovannini and Jorian, "The Time-Variation of Risk and Return."

§See Frankel, "In Search of the Exchange Risk Premium."

Appendix B: Computing Interest Rate and Exchange Rate Effects *(continued)*

Here x^{jp} is the share of Japanese yen assets in the world portfolio, R is the coefficient of relative risk aversion, a is the rate of appreciation of the dollar against the yen, r^{jp} and r^{us} are one-month rates on yen- and dollar-denominated assets respectively, p^{jp} and p^{us} are Japanese and American inflation rates, and w^{jp} and w^{us} are the shares of Japanese and American wealth in world wealth. We used a value of 6 for R and obtained the following variances and covariances using data from November 1977 through October 1988:

$$\text{Var}(a) = .001229,\ \text{Cov}(a,p^{jp}) = -.001235,$$
$$\text{and Cov}(a,p^{us}) = -.00000073.\|$$

According to these estimates, demand for yen assets grows as Japanese wealth or U.S. wealth increases:

$$x^{jp} = [6 \times .001229]^{-1}\,[r^{jp} - r^{us} - Ea]$$
$$- [.001229]^{-1}\,[-.001235\ w^{jp} - .00000073\ w^{us}] \text{ or}$$

$$x^{jp} = 135.6\,[r^{jp} - r^{us} - Ea] + 1.005\ w^{jp}$$
$$+ .000594\ w^{us}.$$

The size of the coefficient on the expected return implies that investors view yen and dollar assets as good substitutes, since small changes in relative returns generate large shifts in the share of yen assets. Inverting the equation, we can express expected returns on dollar assets relative to yen assets as a function of the yen asset share as well as Japanese and U.S. wealth shares:

$$[r^{us} - r^{jp} + Ea] =$$
$$-.007374\ x^{jp} + .00741\ w^{jp} + .00000438\ w^{us}.$$

A U.S. current account deficit of $135 billion (the size of the deficit in 1988), would imply a decline of 1.3 percent in the U.S. share of industrial country wealth, measured at the end of 1987.# If the Japanese current account surplus were two-thirds of the size of the U.S. deficit, somewhat above the 1988 level, the Japanese wealth share would increase by 0.9 percent. Our equation for expected return implies that the annualized U.S. return would increase relative to Japanese returns by about 12 × .00067 = .008, or about 8 basis points at an annual rate. The magnitude of this estimate is consistent with others in the literature.

The exchange rate change required to equilibrate asset markets, assuming no change in relative returns, is derived using the fact that the share of yen assets in total wealth x^{jp} is the ratio of the dollar value of yen-denominated assets divided by the dollar value of world assets, or:

$$x^{jp} = A^{jp}\ e\ /\ (\ A^{row} + A^{jp}\ e\ ),$$

where A^{jp} is the stock of yen-denominated assets, e is the exchange rate measured in dollars per yen, and A^{row} is the dollar value of assets not denominated in yen. A U.S. current account deficit, accompanied by a substantial Japanese current account surplus, shifts wealth from the United States to Japan and, according to the demand equation, induces an increase in the world demand for yen assets. Dollar depreciation will raise the dollar value of yen assets, equating demand and supply.* Each percentage point depreciation of the dollar raises the dollar value of yen assets by x^{jp} $(1\text{-}x^{jp})$ percent so the required dollar depreciation is $[\ x^{jp}\ (1\text{-}x^{jp})\ ]^{-1}$ times the change in demand for yen assets. If the previous example of a $135 billion U.S. current account deficit is used, the Japanese wealth share increases by 0.9 percent, generating greater demand for yen assets of approximately nine-tenths of one percentage point. A dollar depreciation of $[.39(1\text{-}.39)]^{-1}0.9 = 3.8$ percent is required to match the increased demand for yen assets induced by the U.S current account deficit.†† This estimate is comparable to others reported in the literature.‡‡

The calculations of interest rate or exchange rate effects for the financing scenarios are similar to the examples above except that a specific pattern of future current account surpluses in Germany (one-third of the U.S. deficit) and Japan (two-thirds of the U.S. deficit) is assumed, the seven country version of the asset demand model is used to compute interest rate and exchange rate effects, and 1987 asset shares are used throughout the projection period.

‖These estimates are in decimal form and imply a standard error in forecasting monthly dollar appreciation of about three and a half percentage points ($=100\ \sqrt{.001229}$). The similarity between the variance of unexpected dollar appreciation and the covariance between unexpected appreciation and Japanese unexpected inflation results largely from measuring Japanese inflation in terms of the dollar, which is the numeraire currency for aggregation. This method is based on Lewis, "Inflation Risk."

#Industrial country wealth is defined as government debt plus stock market capitalization in Japan, Germany, Canada, France, Italy, the United States, and the United Kingdom.

*This approach follows Frankel, "The Implications of Mean Variance Optimization."

††This is based on the estimate that Japanese outside assets and stock market capitalization were about 39 percent of the total dollar value for the United States, Japan, Germany, the United Kingdom, Canada, France, and Italy.

‡‡In "The Implications of Mean-Variance Optimization," Frankel argues that larger estimates will be obtained if present deficits lead to an expectation of greater future deficits. In that case, present asset demand reflects both the wealth shift arising from the current account deficit and the expectation of future exchange rate depreciation. Greater exchange rate adjustment will be required to equate asset supplies and demands.

Capacity Constraints and the Prospects for External Adjustment and Economic Growth: 1989-90

Capacity pressures in the manufacturing sector are approaching critical levels. In the initial stages of the current economic expansion, the utilization rate in manufacturing moved up sharply from a postwar low of 68 percent of capacity to about 80 percent. The operating rate remained near that level for three years despite continued expansion of the economy overall because a deteriorating trade balance stalled growth in the manufacturing sector. Since the trade balance began to turn around late in 1986, manufacturing output and capacity utilization have risen steadily. The utilization rate in manufacturing is still somewhat below the peak rates of earlier economic expansions; however, continued revitalization of the manufacturing sector could soon place widespread strains on existing productive capacity.

Many analysts believe that the turnaround in the U.S. net export position underway for the past two years is likely to remain an important source of growth in the economy this year and possibly beyond.[1] Continued trade improvement would primarily benefit manufacturers because the value of goods traded internationally originates mostly in the manufacturing sector. However, sufficient productive capacity must be available to ensure that additional demand for manufactured goods leads to further economic growth rather than rising price inflation. The recent rebound in manufacturing investment should ease capacity and price pressures in that sector, but historically capacity growth has not always responded strongly to a pickup in capital spending. If the trade picture continues to improve and demand at home remains strong, then operating rates in manufacturing could soon surpass levels associated with accelerating inflation.

This article examines the implications of continued economic growth in general and of a robust performance of the trade sector in particular for capacity utilization in manufacturing through 1990. Operating rates associated with different paths of economic growth and investment spending are used to assess the conditions under which capacity constraints would contribute to inflationary pressures or would create a barrier to further trade improvement over the next two years.

The two components of the capacity utilization index, output and capacity, are derived independently in the following analysis. First, projections for capacity growth over the next two years are constructed based on investment expectations and estimates of the relation between changes in the stock of capital and capacity. Investment spending assumptions for this period are conditioned on a robust performance of the manufacturing sector. To assess the outlook for manufacturing output, rates of growth are postulated through 1990 for the major components of GNP based on recent trends and current conditions. Alternative paths for exports, imports, and domestic demand are considered in order to measure the sensitivity of manufacturing output to these assumptions. The implications of each scenario for manufacturing output are calculated using an input-output framework, which translates exports, imports, and domestic demand into output by industrial sectors of the economy. These results are combined with the capacity growth calculations to derive outcomes for the

[1] A debated issue among economists and policymakers is whether the dollar must depreciate substantially more in order to realize further trade gains.

rate of capacity utilization in manufacturing over the next two years.

For most of this analysis manufacturing is divided into its advanced processing and primary processing components in order to address concerns that capacity pressures in basic or primary processing industries are likely to become especially tight.[2] Further disaggregation is made in order to highlight particular industries where capacity bottlenecks could become severe.

Current capacity pressures in manufacturing

The capacity utilization series graphed in Chart 1 shows that at the end of 1988 the operating rate in manufacturing was about 84½ percent of capacity, still below previous peaks. The utilization rate peaked at 86 percent late in 1978 and remained near that level for much of the following year. In 1973, immediately prior to the first oil price shock, capacity utilization stood at 87 percent. Even higher rates of utilization were recorded during earlier economic expansions.

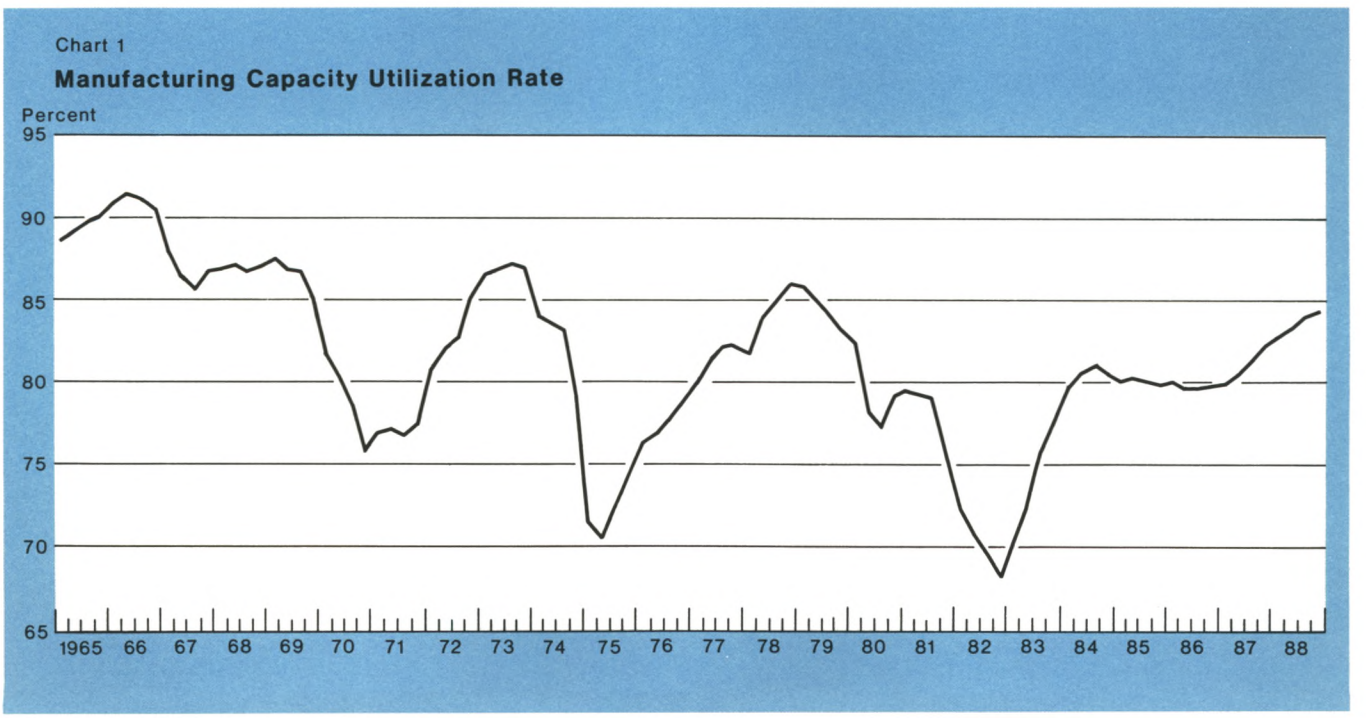
Levels of capacity utilization frequently differ across industries, but typically they move in tandem. As shown in Chart 2, operating rates for primary processing and advanced processing industries have moved closely together over recent business cycles. However, the variability of the primary processing series exceeds that of its advanced processing counterpart. During periods of sustained economic growth, utilization rates in primary processing industries normally rise above rates in other industries, and they usually drop below rates in the advanced processing sector during economic downturns.

The relation between capacity utilization and producer price inflation for manufactured goods is very imprecise, but the series graphed in Chart 3 support the general conclusion that there is an association between rising capacity utilization and higher inflation. The operating rates at which inflationary bottlenecks first emerge and then spread throughout the manufacturing sector are below the peak rates attained during an economic expansion. In the late 1970s producer price inflation advanced markedly as the utilization rate neared its peak level of 86 percent. In early 1973 inflation began to accelerate sharply as the rate of utilization moved beyond 85 percent, almost a year before reaching its peak for the period. The link between capacity utilization and inflation during the 1960s and earlier years is less clear. Moreover, structural changes in the economy since then compromise comparisons of

[2]Advanced processing industries includes producers of processed foods, apparel, chemical products such as drugs and toiletries, furniture, machinery, transportation equipment, and other finished goods. Primary processing industries includes manufacturers of textile products, paper products, industrial chemicals, petroleum products, rubber and plastics, lumber, primary metals, fabricated metal products, and stone, clay, and glass products. Together these two groupings account for all manufacturing output.

Chart 1

Manufacturing Capacity Utilization Rate



critical pressure points between different eras. But even during that earlier period there was a perceptible pickup in price inflation as the utilization rate moved beyond a level between 85 to 86 percent, although the acceleration appears mild compared to later experience. The available evidence does not establish whether there is a stable critical level of capacity utilization above which price inflation necessarily begins to accelerate, nor does past experience indicate how rapidly prices will rise once capacity pressures reach such an inflationary threshold. But the historical record strongly suggests that the inflation rate for manufactured products tends to move up when the capacity utilization rate exceeds a level between 85 and 86 percent.

The outlook for capacity growth

Developing an outlook for capacity begins with an examination of the relation between changes in the stock of capital and capacity growth. Next, estimates of investment spending through 1990 are used to derive changes in the net stock of capital. The results of these two exercises are the basis of capacity projections over the next two years. Later, these capacity estimates are combined with output projections to derive capacity utilization rates through 1990.

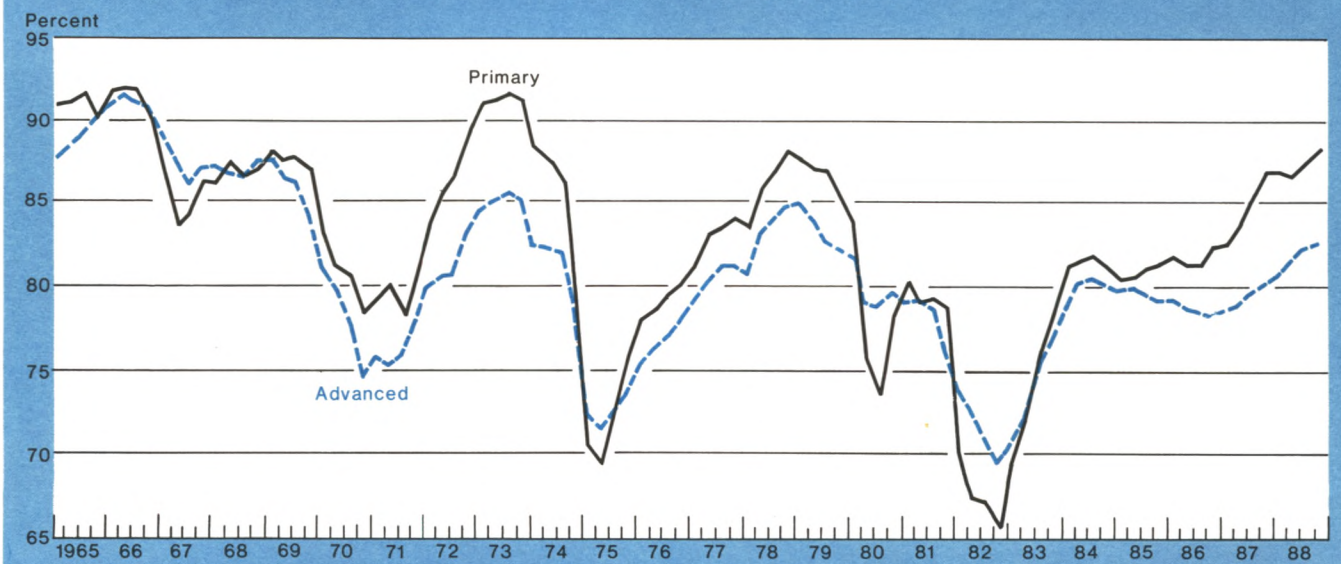
Capacity growth and capital stock changes

Indexes of capacity are typically based on manufacturers' responses to surveys on the maximum output their establishment could produce "using a realistic employee work schedule with the machinery and equipment in place."[3] The preceding quotation highlights the importance of the capital stock, or plant and equipment, as a determinant of capacity. In practice, other factors can affect capacity, or survey respondents' perception of existing capacity. For example, the increased labor and depreciation costs associated with operating machinery at high rates normally cause estimates of capacity to fall well below the theoretical engineering maximum pace of operations. Cost considerations of this kind in part determine what constitutes a "realistic employee work schedule" to use with capital. Rising profitability brought on, say, by a generally improving business climate or declining labor costs can induce managers to step up their pace of operations and alter their calculation of a "realistic" work schedule. In this environment, a manager's estimate of capacity can rise with no material change in the physical capital stock. Analysts frequently comment on the tendency of capacity estimates to behave in this manner over business cycles, and some effort is made to minimize this fea-

[3]This is the definition of "practical capacity" used by the Bureau of the Census. For a helpful presentation of the conceptual and practical difficulties in constructing capacity measures, see Richard Raddock, "Federal Reserve Estimates of Capacity and Utilization," Board of Governors, 1987.

Chart 2

Capacity Utilization in Primary and Advanced Processing Industries



ture in constructing capacity indexes. Over time, however, the size of the capital stock and the technology it embodies dominate other determinants of capacity.

The close association between capacity growth and changes in the capital stock is highlighted in Chart 4. The net capital stock measures the rate of expansion of the stock of plant and equipment after discounting for the effects of depreciation. The plotted series confirm that a slowdown in the rate of expansion of capital this decade, related to a downturn in investment spending, was a major factor behind the slowing in capacity growth over the same period. Net capital expanded about 3½ percent per year on average during the late 1970s, and annual capacity growth ranged from 3 to 3½ percent. In contrast, in the current expansion, net capital has expanded about 1 percent per year, and capacity growth has mostly stayed between 2½ and 3 percent. On the basis of this close historical relationship, the following analysis uses anticipated movements in the stock of capital to derive the outlook for capacity over the next two years.

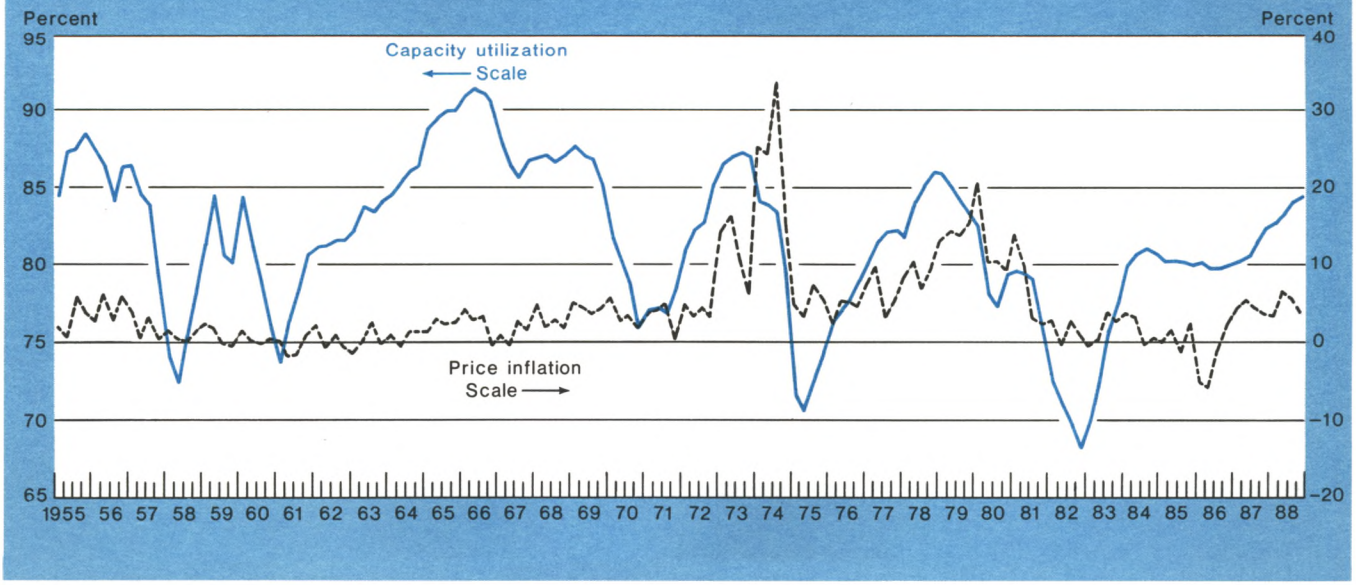
Despite the close association of these two series, several factors can distort the relation between investment and changes in productive capacity. On the one hand, not all investments are made to expand productive capacity. Some additions to the capital stock have replaced labor as part of a trend towards automation and have not raised capacity. Whenever new capital serves as a substitute for labor and is not accompanied by increased employment, capacity growth may lag the rate of growth in capital. On the other hand, more recent vintages of capital embody the latest technology and can raise capacity even in instances where the depreciation of older plant and machinery causes the total stock of available capital to decline or remain unchanged. Price indexes of capital goods, which are used to deflate the value of the capital stock into "real" or constant dollar indexes, do not always fully capture the impact that advancing technology has on the quality of new capital goods. Consequently, capacity at times may expand at a faster rate than net additions to the capital stock.

To sort out these various effects, an equation was estimated using the aggregate manufacturing capital stock and capacity data underlying Chart 4. The results of this exercise, reported in Appendix A, indicate that a one percentage point rise in the rate of growth of the net capital stock increases capacity growth by about three-tenths of one percentage point. Moreover, capacity may rise over 2 percent even in periods when the net capital stock is unchanged. The capital stock-capacity relation also was estimated separately for the primary processing and advanced processing industries of the manufacturing sector. These results, also presented in Appendix A, are similar to those found for the total manufacturing sector. Estimates also were

Chart 3

Capacity Utilization and Manufacturing Prices

Percent Change, Seasonally Adjusted Annual Rates



derived for 21 industries making up the manufacturing sector, and in most cases the estimated sensitivity of capacity to changes in capital stock growth rates is close to the three-tenths level found in the aggregate equations.

The outlook for the net capital stock

Projected changes in the net capital stock are based on estimates of future investment spending and rates of depreciation according to the following relationship:

(1) $KK = I/K - D/K$,

where KK is the percentage change in the net capital stock from the start to the end of any period, I is the level of new investment, D is the value of depreciation on existing capital, and K represents the value of the capital stock at the start of the period. The first of the two ratios in the above equation, I/K, measures the rate at which new investment adds to the existing stock of capital while D/K represents the rate at which capital depreciates. Their difference determines the rate of expansion of the net capital stock. Recent values and projections through 1990 of these variables are presented in Table 1 for all of manufacturing and for the primary and advanced processing industries.

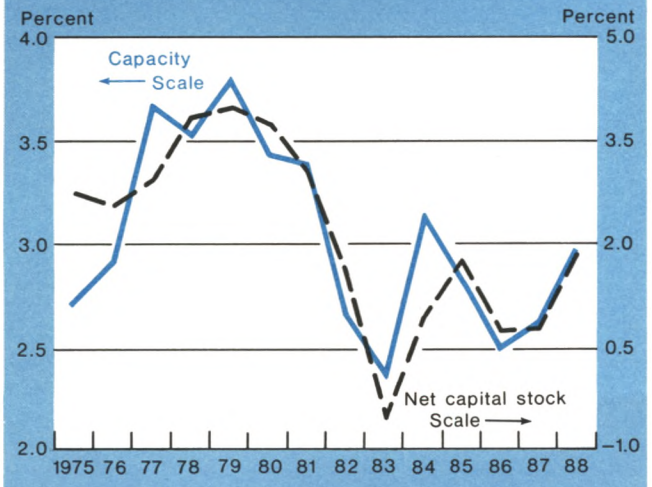
Estimates of investment spending in 1988 and plans for 1989 are presented in the Department of Commerce survey of business capital spending for all manufacturing and for many industries within manufacturing.[4] The survey findings, once adjusted for inflation, indicate that manufacturers stepped up investment spending in 1988 by more than 12 percent over the 1987 level. This represents a significant advance over the sluggish pace of investment that prevailed in the preceding two years and reflects the growing pressure placed on existing capacity by the trade-related rebound in manufacturing. A baseline investment path is constructed using spending plans taken from the survey for 1989, and for 1990 investment is extrapolated on the assumption that continued strong demand for manufactured products will lead to further growth in capital goods spending, although at a rate of advance well below the 1988 pace. The survey results indicate that manufacturing investment will rise 3.6 percent in 1989 in real terms, and it is assumed that investment will grow another 4 percent in 1990. If realized, this pattern of growth would represent a departure from recent investment trends. Not since the period 1978-80 has investment increased in three consecutive years. Because of expanding domestic demand and an improving foreign sector, investment spending in manufacturing rose an average of 4 percent per annum for two years following a 12 percent rise in 1978. The experience of that earlier period closely parallels the baseline investment path through 1990. To measure the sensitivity of capacity growth to investment, an alternative scenario is constructed that assumes a faster rate of growth in investment spending. The rate of growth in spending on capital goods is doubled to 8 percent a year in 1989 and 1990, a change that brings the average annual increase for the three years 1988-90 to its highest level for any three-year period since 1972-74.

The Department of Commerce capital spending survey shows that investment in the primary processing industries, where capacity growth has been relatively slow during the current expansion, grew 16 percent in 1988, compared to 11 percent in the advanced processing sector. For 1989, the survey results indicate that investment will grow 6 percent in the primary processing sector and just 2 percent in the advanced processing sector. Investment is assumed to rise 4 percent in both sectors in 1990 in the baseline case. The Department of Commerce survey of capital spending also provides estimates of investment in 1988 for many disaggregated industries within manufacturing. The survey results are used to project capital spending for individual industries in 1989, and in 1990 investment in each industry is assumed to increase 4 percent.

Chart 4

Capacity and Net Capital Stock in Manufacturing

Percent Change, Fourth Quarter over Fourth Quarter



[4]Survey results from December 1988 are used in this analysis. Updated survey results do not affect the conclusions of this study.

The jump in investment spending in 1988 explains the sharp rise in the value of investment relative to the existing stock of capital, the first of the two ratios from equation 1. For all of manufacturing, this ratio rose from a level of 10.6 percent in 1987 to 11.8 percent the following year, with a larger percentage point rise registered in the primary processing sector. In 1989 and 1990, continued growth of investment ensures that this ratio rises further, although at a much slower pace even when using the higher investment outlook. The rate of depreciation in manufacturing, the second ratio in equation 1, currently stands close to 10 percent per annum, but this rate has been steadily rising over the past 10 years. The projections assume that this upward trend continues through 1990.

The change in the net capital stock for each industry is calculated as the difference between the investment-capital ratio and the depreciation rate. For all of manufacturing, the net capital stock rose an estimated 1.9 percent in 1988, up from 0.8 percent the preceding year and above the 1.1 percent annual pace in the four-year period ending in 1987. This pickup reflects the rise in the investment-capital ratio, which itself was caused by the sharp rise in investment. Moreover, the net capital stock in the primary processing industries rose in 1988 for the first time in the current economic expansion. For 1989 and 1990, the rate of growth of the net capital stock continues to rise, but only marginally under the baseline investment assumptions. For all of manufacturing the projected net capital stock rises just over 2 percent per year, with most of the pickup concentrated in the primary processing sector.

Estimates of capacity growth

Capacity growth for 1989 and 1990 is extrapolated from its 1988 rate by combining projected changes in the net capital stock with the estimated sensitivity of capacity to movements in the net capital stock.[5] For most industries, the rate of growth in the net capital stock over the next two years remains close to the 1988 rate of expansion because growth in investment spending slows in the baseline case. Consequently, capacity growth edges up only marginally. For all manufacturing, capacity growth rises only slightly above the 3 percent pace of 1988, with somewhat greater expansion occurring in the primary processing sector

[5]These extrapolations are based on the coefficient estimates on the net capital stock variable reported in Appendix A for the manufacturing, primary processing, and advanced processing industry groups. For the more disaggregated industries, capacity projections (not reported) are constructed assuming an elasticity of 0.30 between capital stock changes and capacity growth.

Table 1

Investment and Capacity Growth

	Average 1984-87	1988	Baseline Investment 1989	Baseline Investment 1990	High Investment 1989	High Investment 1990
All manufacturing						
Investment (percent change)	6.4	12.4	3.6	4.0	8.0	8.0
Investment/capital (ratio)	10.6	11.8	12.0	12.2	12.5	13.2
Depreciation/capital (ratio)	9.6	9.9	10.0	10.1	10.0	10.1
Net capital stock (percent change)	1.1	1.9	2.0	2.1	2.5	3.1
Capacity (percent change)	2.8	3.0	3.0	3.1	3.2	3.3
Primary processing						
Investment (percent change)	2.7	15.5	5.8	4.0	10.2	8.0
Investment/capital (ratio)	8.1	9.6	10.2	10.5	10.6	11.3
Depreciation/capital (ratio)	9.1	9.4	9.5	9.6	9.5	9.6
Net capital stock (percent change)	−1.0	0.3	0.7	0.9	1.1	1.7
Capacity (percent change)	1.7	3.3	3.4	3.4	3.5	3.7
Advanced processing						
Investment (percent change)	9.0	10.5	2.3	4.0	6.7	8.0
Investment/capital (ratio)	13.1	13.8	13.6	13.7	14.2	14.8
Depreciation/capital (ratio)	10.0	10.4	10.5	10.6	10.5	10.6
Net capital stock (percent change)	3.1	3.4	3.1	3.1	3.7	4.2
Capacity (percent change)	3.3	2.9	2.9	2.9	3.0	3.1

Notes: Investment changes are year-over-year, net capital stock and capacity changes are end-year over end-year, and other values are ratios. Net capital stock is the difference between investment/capital and depreciation/capital. Some results may not add exactly due to rounding.

(Table 1). When the high investment assumptions are used, capacity growth is stronger, with annual capacity growth nearing 3½ percent by 1990.

These capacity estimates are used with the output projections taken from the following section to calculate changes in capacity utilization through 1990. These projected changes in capacity must be interpreted cautiously, especially at the detailed industry level. Factors other than investment or changes in the capital stock frequently have affected capacity growth over a short-term horizon. For example, the intensive application of new technology and managers' revised estimates of production possibilities during periods of rapid economic expansion sometimes have caused capacity growth to jump with no corresponding pickup in capital spending. Thus, considerable uncertainty surrounds any given industry estimate of capacity growth. Taken together, however, these estimates provide a general picture of likely capacity trends in the manufacturing sector under the assumed investment environment.

The outlook for manufacturing output

Historically, changes in capacity utilization have been brought on by rapid production shifts more than by movements in capacity (Chart 5). The implications of continued economic growth, and an improving external balance in particular, for manufacturing output are explored in this section. In the approach adopted, two plausible scenarios for the economy over the next two years are developed, with assumed growth paths specified for the major components of GNP. Then the implications of the scenarios for the manufacturing sector are calculated. In later sections these calculations, which may be viewed as conditional forecasts of manufacturing production, are combined with the outlook for capacity growth to determine implied capacity utilization rates. These results are used to evaluate the likelihood that inflationary bottlenecks will develop in the manufacturing sector and to highlight particular pressure points within manufacturing.

The analysis uses two accounting relationships to break down or translate economic activity from one basis of measurement to another. The first holds that total purchases of final goods and services in the economy, the most common measure of GNP, equals domestic demand plus exports minus imports. Exports minus imports, or "net exports," includes international transactions of services. Domestic demand measures U.S. residents' purchases of all final goods and services regardless of national origin. Consumer, investment, and government spending on domestically produced and imported goods and services are part of domestic demand, but exports are omitted. The second accounting relationship used is the input-output table of the U.S. economy. This describes the various intermediate inputs consumed by an industry during production. The input-output table translates purchases of final goods and services into production activity in particular industries or sectors of the economy.

Economic scenarios

Growth rates associated with two economic scenarios are presented in Table 2.[6] Each scenario represents a path the economy could take over the next two years, based on assumed changes in domestic demand, exports, and imports. In the *moderate growth scenario,* real GNP growth falls to a pace consistent with long-run trends and considerably below the rate of economic expansion during the past two years. The *high growth scenario* is designed to highlight the inflation risks arising from continued strong growth in the economy.

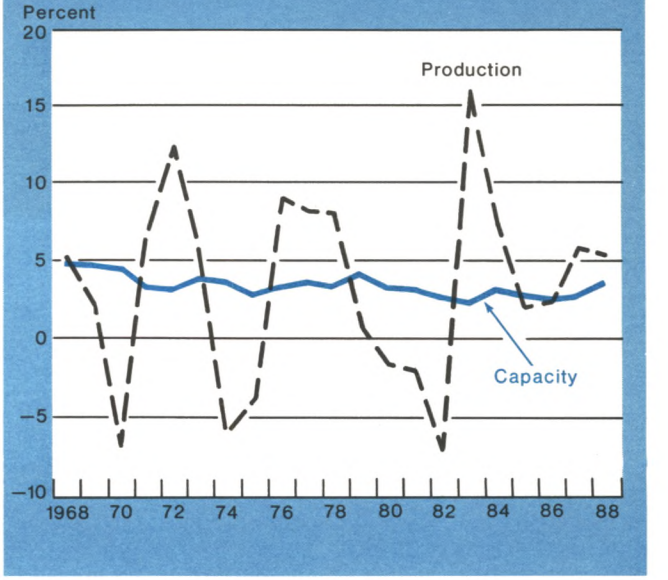
In the moderate growth scenario, both domestic demand and net export growth slow, but their relative contributions to GNP growth do not change significantly. Domestic demand growth drops to about 2 percent per year, well below the pace of the past two

[6]Historical changes in 1988 and projected changes in 1989 are net of the effect of the drought on GNP. The drought reduced GNP and domestic demand growth by an estimated half a percentage point in 1988; it should boost growth in 1989 by a similar amount.

Chart 5

Production and Capacity Growth in Manufacturing

Percent Change, Fourth Quarter over Fourth Quarter



years.[7] Manufacturing export growth decelerates from its recent 20 percent annual rate to 10 percent by 1990 as the effects of past exchange rate changes wear off. Imports grow at slightly under their average pace of the past two years. Exports and imports of advanced processing goods rise more rapidly than primary processing goods, as they have for the past two years. Other components of net exports, such as trade in services and nonmanufactured goods, are assumed to move in line with recent trends. Overall, these assumptions leave real GNP growing at about 2½ percent by 1990, close to many estimates of long-run potential growth in the economy.

The high growth scenario assumes that domestic demand does not adjust to a lower growth path. Instead, domestic demand rises about 3 percent per year over the projection period, only slightly below its average rate of growth over the past two years. Imports of manufactured goods rise at a faster pace than in the moderate growth case because of stronger domestic demand, but export growth is the same in both scenarios. These assumptions leave real GNP growing at just over 3 percent per year by 1990.

[7]Total domestic demand growth averages 2 percent across all sectors, but demand is assumed to be somewhat stronger for the final output of the manufacturing and services sectors than for the output of other sectors.

The input-output structure of the economy

If the demand for all final goods and services produced by an economy were to grow by the same percentage amount, then production in all sectors of the economy also would expand uniformly. But when changes in demand are not the same for all categories of final products, output growth in different sectors may diverge. This section describes the input-output framework and its use in calculating how these

Table 2

Economic Growth Scenarios

(Annualized Percent Changes)

	Historical 1986-IV to 1988-IV	1988-IV to 1989-IV	1989-IV to 1990-IV
Moderate growth case			
Domestic demand	3.7	2.0	2.0
Manufacturing exports	19.8	14.0	10.0
Primary processing	10.3	8.0	6.0
Advanced processing	23.7	16.0	12.0
Manufacturing imports	7.2	3.0	3.5
Primary processing	−0.3	1.5	2.0
Advanced processing	9.4	3.5	4.0
Domestic GNP	4.3	2.7	2.4
Foreign GNP		2.6	2.5
High growth case			
Domestic demand		3.0	3.0
Manufacturing exports		14.0	10.0
Primary processing		8.0	6.0
Advanced processing		16.0	12.0
Manufacturing imports		4.0	4.5
Primary processing		2.0	2.5
Advanced processing		5.0	5.5
Domestic GNP		3.5	3.2
Foreign GNP		2.6	2.5

Notes: Growth rates from 1986-IV to 1988-IV are average annual percent changes. Historical changes and economic scenarios for 1989 exclude the effects of the drought on GNP and domestic demand. Historical changes in exports and imports of manufactured goods are derived from movements in related trade components taken from the National Income and Product Accounts. Changes in the nonmanufacturing components of trade have a negligible impact on activity in the manufacturing sector and are not presented in Tables 2 and 3.

economic scenarios, which assume different rates of growth for various categories of final products, affect output in the manufacturing sector.[8]

Growth of GNP, or purchases of final goods and services, can be determined by summing changes in domestic demand, exports, and imports. However, a similar decomposition cannot be used for most individual industries because they do not produce final products exclusively. Typically, some portion of each industry's output is consumed by other industries as an intermediate input during production. For example, the steel industry produces few final products but many intermediate inputs required for the manufacture of other products such as machinery. The impact that a rise in steel exports has on steel output can be determined directly. However, the steel industry also would receive a boost in demand from a rise in machinery exports or from changes in demand for any other good that uses steel in production. The total impact that a broad-based increase in exports has on any one industry's output will be understated if these indirect effects are not considered.

The input-output framework details the intermediate inputs each sector produces and uses during production. In general terms, if there are n separate industries, the output of any industry represented by the subscript i can be grouped according to its uses:

$$(2)\quad Q_i = I_{i1} + I_{i2} + \ldots + I_{in} + DD_i + X_i - M_i, \quad i = 1, 2, \ldots, n,$$

where Q_i is the total value of the goods produced by the industry, each I_{ij} measures the value of good i used by industry j during production, DD_i is domestic demand, X_i represents exports, and M_i is imports of good i. The sum of DD_i and X_i less M_i represents all purchases of final goods produced by industry i, while the I_{ij} are demands for output of industry i derived from the production requirements of other sectors. Alternatively, each industry's output can be decomposed according to the inputs required for its production:

$$(3)\quad Q_i = I_{1i} + I_{2i} + \ldots + I_{ni} + VA_i, \; i = 1, 2, \ldots, n,$$

where each I_{ji} is the value of inputs from industry j consumed by industry i during production, and VA_i is the value added to output in sector i during production.

Equation 2 is used to calculate the *direct* impact that changes in the components of final demand taken from the economic scenarios (DD_i, X_i, and M_i) have on each industry's output. Then, the impact that the direct change in each industry's output has on its input requirements is estimated using equation 3, on the assumption that input requirements (and value added) are fixed in proportion to output. This derived demand for inputs is sometimes referred to as the *indirect* demand for goods. The indirect demand for each industry's output is added to the direct demand to arrive at an estimate of the *total* impact on output arising from changes in final demand.[9] In practice, these direct and indirect effects are calculated simultaneously using the input-output framework.

Manufacturing output and economic growth

The input-output table presented in Appendix B is used to estimate the sensitivity of manufacturing output to changes in the main components of final demand (Table 3). These calculations show that a one percentage point increase in domestic demand, broadly based over all sectors of the economy, raises manufacturing output by 1.1 percent.[10] A 1 percent rise in exports of manufactured goods raises manufacturing output by 0.18 percent, and a one percentage point rise in imports of manufactured goods reduces manufacturing output by an estimated 0.27 percent.

The elasticities reported in Table 3 reflect the relative importance of some sectors as suppliers of intermediate inputs. For example, a one percentage point rise in exports of advanced processing goods, when other exports are held fixed, increases output in that sector by 0.17 percent; however, it also raises output in the primary processing sector by 0.08 percent because exports of advanced processing goods require intermediate inputs from the primary processing sector for their production. In contrast, a one percentage point rise in exports of primary processing goods raises output in that sector about 0.11 percent, but output in the advanced processing sector is virtually unchanged because it supplies few intermediate inputs to the primary processing sector. A similar result holds for the import elasticities.

The contribution of the components of final demand to growth in each sector of manufacturing over the past two years can be approximated using the elasticities in Table 3 and the historical data from Table 2. From the end of 1986 through 1988, output in the manufacturing sector rose 11.7 percent, three percentage points faster than GNP. More than half of this growth is directly attributable to the rapid rise in exports of manufactured goods. The rise in exports of the advanced processing industries was the single biggest source of growth for

[8]Further analysis of the input-output structure is presented in Appendix B.

[9]The calculation of all indirect effects is an iterative process because changes in output induced by increased demand for inputs will themselves generate demand for more inputs.

[10]All elasticity calculations are made holding other components of final demand fixed.

that sector. In fact, the rise in advanced processing exports contributed more to growth in the primary processing sector than the rise in primary exports did. Output in the primary processing sector also was boosted by a small decline in imports of primary goods. In the advanced processing sector, rising imports slowed growth.

Under the moderate growth scenario, a decline in export and domestic demand growth leads to a slowing in manufacturing output gains. By 1990 the manufacturing sector is expanding just under 3½ percent per year. The deceleration in growth is somewhat more pronounced in the primary processing sector because of the assumed import developments. Imports of primary processing goods have declined during the past two years, but in the projection period they begin to rise, slowing output growth in that sector. In contrast, import growth of advanced processing goods is assumed to slow substantially. Thus, imports become much less of a net drag on growth in this sector during the projection period than they were during the preceding two years.[11] Manufacturing output rises over one and a half percentage points more in the high growth scenario than in the moderate growth case by the end of 1990. In both scenarios, the continued improvement in the net export sector causes manufacturing output to rise at a faster rate than total GNP.

Capacity utilization in manufacturing

The percent change in the capacity utilization rate is

[11] A different configuration of import growth in the two sectors would affect projected output in each sector, but total manufacturing output growth would not be affected so long as overall import growth was unchanged.

Table 3

Elasticities of Manufacturing Output to Changes in Domestic Demand, Exports, and Imports

	All Manufacturing	Primary Processing	Advanced Processing
Total domestic demand	1.09	1.12	1.07
Manufacturing exports	0.18	0.19	0.18
Primary processing exports	0.04	0.11	0.00
Advanced processing exports	0.14	0.08	0.17
Manufacturing imports	−0.27	−0.32	−0.25
Primary processing imports	−0.07	−0.21	−0.01
Advanced processing imports	−0.20	−0.11	−0.24

Notes: Each entry indicates the percentage change in output of the industry listed at the top of the column to a one percentage point change in the component of final demand named in the row. For example, a 1 percent rise in all manufacturing exports increases output in the primary processing sector by 0.19 percentage point. Elasticities are calculated holding other components of final demand fixed. The sensitivity of industry output to a change in all manufacturing exports (imports) is the sum of the elasticities to a change in primary and advanced processing exports (imports). Domestic demand elasticities are calculated assuming that domestic demand for the final output of all sectors rises 1 percent. Elasticities for the "all manufacturing" column are a weighted average of elasticities for the two sectors, based on relative value added in the sectors. Elasticities may vary over time. Estimates in this table are based on 1988 data.

Table 4

Percentage Changes in Manufacturing Output Based on Economic Scenarios

	Historical	Moderate Growth Scenario		High Growth Scenario	
	1986-IV to 1988-IV	1988-IV to 1989-IV	1989-IV to 1990-IV	1988-IV to 1989-IV	1989-IV to 1990-IV
All manufacturing	5.7	4.1	3.4	4.9	4.2
Primary processing	6.1	3.7	3.2	4.4	4.0
Advanced processing	5.6	4.4	3.5	5.2	4.4

Note: Growth rates from 1986-IV to 1988-IV are average annual changes.

the difference between the percent changes in output and capacity. Under the moderate growth scenario and the baseline investment case, the operating rate rises to a level just over 85 percent for all manufacturing by the end of 1989 (Table 5). With some further slowing in export growth in 1990, the utilization rate levels off near 85½ percent. In contrast, under the high growth conditions, capacity utilization approaches 86 percent by the end of 1989 and continues rising through 1990 despite the slowing in export growth. Even when the capacity outcomes from the high investment alternative are used, the operating rate continues to climb in 1990 in the high growth case past levels previously associated with accelerating inflation. In both scenarios, capacity utilization increases are greater in the advanced processing industries, a departure from the recent pattern. This reflects both the greater output gains projected in that sector, for the reasons cited in the preceding section, and the relative strength of capacity growth expected among primary processing industries following the strong pickup in investment in that sector during 1988.

Peak levels of capacity utilization from previous business cycle expansions are compared to the projected levels in Table 6. In the moderate growth scenario, the utilization rate does not reach the peak rates realized in the 1973-74 expansion, but it is not far below the highest level from the 1978-80 period. This result holds for both the primary processing and advanced processing sectors. Under the high growth conditions, by

Table 5

Outlook for Capacity Utilization

	Operating Rate 1988-IV	Percent Change — 1989 Output	Percent Change — 1989 Capacity	Operating Rate 1989-IV	Recent Change — 1990 Output	Recent Change — 1990 Capacity	Operating Rate 1990-IV
Moderate growth case							
All manufacturing	84.4	4.1	3.1	85.2	3.4	3.1	85.5
Primary processing	88.0	3.7	3.4	88.2	3.2	3.4	88.0
Advanced processing	82.7	4.4	2.9	83.9	3.5	2.9	84.4
High growth case							
All manufacturing	84.4	4.9	3.1	85.8	4.2	3.1	86.8
Primary processing	88.0	4.4	3.4	88.8	4.0	3.4	89.4
Advanced processing	82.7	5.2	2.9	84.5	4.4	2.9	85.7

Note: The percentage change in the capacity utilization rate is equal to the percentage change in output less the percentage growth of capacity.

Table 6

Capacity Utilization Rates
Results from Economic Scenarios and Previous Business Cycle Peaks
(Quarterly Rates)

	1988-IV	Peak Rates 1973-74	Peak Rates 1978-80	Moderate Growth Scenario 1990-IV	High Growth Scenario 1990-IV
All manufacturing	84.4	87.3	86.0	85.5	86.8
Primary processing	88.0	91.6	88.2	88.0	89.6
Advanced processing	82.7	85.5	84.7	84.4	85.6
Paper	94.2	94.0	89.1	92.1	
Chemicals	89.3	87.3	82.1	89.3	
Primary metals	90.0	98.2	94.6	96.7	
Fabricated metal products	84.4	85.7	84.7	85.9	
Nonelectrical machinery	82.9	87.7	84.3	87.3	
Transportation equipment, excluding autos	85.6	76.3	77.2	90.2	

the end of 1990 the operating rate in both sectors of manufacturing rises to a level above the highest utilization rate realized in the preceding economic expansion. The operating rate does not reach the peak rate from 1973-74 during the projection period, but it is still climbing at the end of 1990.

Some major industries likely to experience capacity pressures even under the conditions of the moderate growth scenario are identified using a more detailed input-output table.[12] Simplifying assumptions are needed to work at this level of disaggregation because of data limitations. For example, percentage changes in the components of final demand are assumed equal in most industries, and capacity growth is based on extrapolations of recent changes. Thus, these results indicate where bottlenecks are most likely to develop, but they are not intended to be forecasts of individual industry operating rates.

At the end of 1988, the paper and chemicals industries were operating at utilization rates at or above previous peaks. Capacity pressures do not ease significantly in these industries in the moderate growth scenario, but the industries' strong investment performance raises capacity growth sufficiently to prevent further increases in the operating rate despite continued growth in output. In the primary metals sector, capacity utilization continues to rise despite a sharp slowing in output growth and an end to the cutbacks in existing capacity that characterized this industry in recent years. Only a significant expansion of capacity precludes a rise in the operating rate to peak levels realized in earlier expansions. Capacity pressures on makers of fabricated metal products surpass their historical peaks as a result of continued steady output gains combined with sluggish capacity growth. The relative importance of trade for nonelectrical machinery producers causes this sector to benefit disproportionately from the assumed trade improvement in the moderate growth scenario. Similarly, a strong export performance contributes to growing capacity pressures for manufacturers of aircraft, the dominant subcomponent of transportation equipment excluding autos.

Implications of the results

In the moderate growth scenario, the capacity utilization rate reaches levels historically associated with increased price pressure but, significantly, those levels are not breached. Instead, operating rates settle into a range from 85 to 86 percent of capacity. Thus, under these circumstances capacity bottlenecks leading to widespread inflationary pressures could be avoided, although such an outcome is not certain because of the high level of utilization reached in many industries. This result assumes that the economy begins to expand at a pace consistent with many estimates of long-run potential growth and that trade improvement, which affects the manufacturing sector disproportionately, remains an important source of growth. The high growth case indicates that, without a slowing in growth from the pace of the past two years, capacity in many manufacturing industries soon will become very strained. The conclusions for both scenarios rest upon an investment climate associated with annual capacity increases of about 3 percent, a growth rate above that of recent years but still below growth rates of earlier periods.

Capacity pressures are not likely to be felt evenly across industries. Even under the conditions of the moderate growth scenario, some basic industries such as paper and chemicals probably will continue to operate at historically high utilization rates despite a recent acceleration in capital spending. Unless capacity growth of primary metals producers reverses its downward trend, pressures on capacity in that sector will continue to increase despite a slowing in output growth. Manufacturers of fabricated metal products also will see a gradual tightening of capacity unless capacity growth rises. A continued strong export performance will place increased pressure on the most export-oriented sectors, such as producers of machinery and aircraft, and on those sectors that provide intermediate inputs to these manufacturers.

At a more aggregate level, utilization rate increases have been especially large in the primary processing sector of manufacturing during the past two years. In the economic scenarios developed in this analysis, the advanced processing sector begins to show more of a buildup in capacity pressures over the next two years. This result rests upon three developments: faster capacity growth in the primary processing sector brought on by a relatively sharp rise in investment first seen in 1988 and expected to continue in 1989; continued strong export growth that benefits disproportionately the more export-oriented advanced processing industries; and a convergence of import patterns in the two sectors that during the past two years tended to place additional pressure on capacity in the primary processing sector while relieving pressure in the advanced processing sector. The failure of any one of these factors to materialize could upset the conclusion that future rises in capacity utilization rates will be more pronounced in the advanced processing sector.

Prompted by the steady rise in operating rates, many observers have voiced concern that capacity bot-

[12] A more disaggregated input-output table, dividing manufacturing into 21 industries corresponding to the two-digit Standard Industrial Classification System, was used for these calculations.

tlenecks could limit improvement in the trade deficit over the next two years. The external adjustment that could be sustained depends upon several factors, including the strength of domestic demand, the pace of capacity expansion, and the utilization rate that can be reached before capacity pressures become widespread; but some of the calculations presented above can be used to address this issue. If 85½ percent is chosen as a benchmark level above which capacity constraints might begin to retard further trade improvement, then the results of the moderate growth scenario indicate that over the next two years the trade deficit on manufactured goods could narrow perhaps as much as $40 billion in nominal terms before the utilization rate reached this critical level.[13] This conclusion assumes that capacity rises about 3 percent a year and that domestic demand growth falls to an annual rate of 2 percent. Of course, with stronger domestic demand or more sluggish capacity growth, considerably less capacity would be available for trade improvement. For instance, if domestic demand were to rise at an annual rate of 2½ percent, then the nominal trade balance for manufactured goods could improve only about $17 billion over the next two years before the operating rate reached 85½ percent. And if domestic demand were to rise at a 3 percent annual pace, capacity utilization could rise to 85½ percent by the end of 1990 even with no further improvement in the nominal trade balance for manufactured goods. These last two results, while only illustrative, underscore the importance of domestic demand for the capacity dimension of external adjustment.

[13]The nominal improvement in the trade balance is valued on a National Income and Product Accounts (NIPA) basis, and the balance of nonagricultural exports and nonpetroleum imports from the NIPA accounts is used as a proxy for trade in manufactures. Changes in trade volumes are taken from the moderate growth scenario, and export and import prices for manufactured goods are assumed to rise 4 percent a year.

Conclusion

During the two years ending in 1988, utilization rates in the manufacturing sector rose from just under 80 percent to about 84½ percent of capacity after having remained nearly unchanged during the preceding three years. This surge in the operating rate was largely the result of an improving U.S. external position and strong domestic demand growth, which combined to boost output in the manufacturing sector well above overall economic growth during this period. Should the pace of manufacturing output growth fail to slow significantly in the near future, inflationary bottlenecks in that sector almost certainly will become widespread regardless of any foreseeable capacity developments. Even with a return to more moderate growth, some specific manufacturing sectors are likely to feel a capacity pinch. However, capacity pressures in manufacturing can remain tolerable while the trade deficit continues to improve if economic growth adjusts to levels consistent with long-run trends.

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Appendix A: Estimating the Capital Stock-Capacity Relation

To measure the impact of changes in the capital stock on capacity growth in the manufacturing sector, percentage changes of capacity are used in regression analysis with percentage changes in the net capital stock. Changes are calculated on an end-year to end-year basis for both series. Historical values of the net capital stock in constant dollar terms are provided by the Department of Commerce, and capacity indexes are obtained from the Board of Governors.† Estimates of the coefficient on the net capital stock variable indicate how capacity growth responds directly to changes in the rate of growth of the net capital stock. The constant term captures other influences, including the impact that advancing technology has on capacity growth independent of the size of any change in the capital stock.

All equations are estimated using the ordinary least squares method, and the results appear in the accompanying table. The sample period was restricted to 1975 through 1988. Results using a longer sample period indicate that a substantial shift occurred in the capital stock-capacity relation sometime in the early 1970s. Tests were conducted to determine whether a change in this relation occurred more recently, but no evidence was found of a shift at the aggregate level. For the primary and advanced processing sectors, however, the estimates indicate that a shift in this relation occurred during the current expansion. This is reflected in the estimated coefficient on the dummy variable D85, which takes a value of 1 beginning in 1985 and is 0 in earlier years. Dividing capital stock changes into additions to plant and additions to equipment failed to substantiate the often stated view that capacity growth is more dependent on investment in industrial structures, or "bricks and mortar," than on new machinery. The reason may be that technological advances are embodied

†Capital stock values for 1988 are estimated from investment spending data for that year.

Appendix A: Estimating the Capital Stock-Capacity Relation *(continued)*

more in new equipment than in buildings or plant.

The results for "all manufacturing" indicate that a change of one percentage point in the growth of the net capital stock raises capacity growth by .28 percentage point. The constant term shows that even in periods when the net capital stock is unchanged, capacity rises nearly 2½ percent. This finding reflects the impact that new technology embodied in investment has on capacity. The manufacturing sector was disaggregated into its two major components, primary processing and advanced processing industries, and separate estimates of the capital stock-capacity relationship were made.‡ For both industries, the estimated sensitivity of capacity to changes in the capital stock was near 0.30, a level similar to that found for all manufacturing. Separate equation estimates also were made for 21 disaggregated industries making up the manufacturing sector. The explanatory power of many of these estimated equations was low, and some of the estimated results were found to be unstable. In most cases, however, the estimated sensitivity of capacity to changes in capital stock growth was close to the 0.30 level found at the more aggregate industry level. Consequently, projections of capacity growth for these 21 industries were made using the estimated sensitivity of capacity growth to capital stock changes taken from the aggregate equations.

‡Data for the petroleum refining industry were excluded in the estimation of the primary processing sector because no sensible relation was found between capital stock changes and capacity growth in that industry.

Footnote ‡ continued

Estimated Effects of Capital Stock Changes on Capacity Growth

	Constant	D85	KK	R^2
All manufacturing	2.43		.28	.68
	(18.5)		(5.4)	
Primary processing	1.29	1.12	.33	.80
	(10.4)	(5.4)	(6.5)	
Advanced processing	2.91	−.85	.30	.75
	(11.2)	(3.9)	(4.5)	

Notes: KK is the percentage change in the net capital stock, end-year to end-year, and D85 is a dummy variable with a value of 1 beginning in 1985 and 0 otherwise. Coefficient estimates appear along with corresponding t-statistics in parentheses. R^2 is the coefficient of determination adjusted for degrees of freedom.

Appendix B: The Input-Output Framework

The input-output (IO) structure of the economy is summarized in Tables B1 through B3 for six sectors: agriculture, mining, construction, primary processing manufacturing, advanced processing manufacturing, and services.† These are aggregated versions of tables prepared by the Department of Commerce, and all values in the tables are expressed in constant 1982 dollar terms.

The columns of Table B1 describe the inputs that are required directly for the production of every dollar's worth of industry output. For example, each dollar of advanced processing manufacturing output uses about 15 cents of inputs originating in the services sector and another 17 cents from the primary processing sector of manufacturing. In total, about 58 cents worth of inputs is needed to produce each dollar's worth of output in this sector, and another 42 cents of value is added directly in production by the labor and capital employed in the industry.

Several modifications were made to the Department of Commerce tables in deriving Table B1 in order to reflect changes in production requirements since 1982. The importance of oil and steel as inputs for most industries is scaled back to reflect declining usage of these two inputs in production in the economy since 1982. For the nonelectrical machinery industry, which includes computer manufacturers, the relation between

†Detailed versions of the latest (1982) input-output tables of the U.S. economy appear in the *Survey of Current Business,* April 1988. A full description of the IO system, including accounting practices, is in *Definitions and Conventions of the 1977 Input-Output Study,* Department of Commerce. For simplicity, several categories of the economy that are treated separately in the input-output accounts are not presented here. These include the household sector, government employee compensation, noncomparable imports, scrap production, and the rest-of-world accounts. Moreover, output data are collected using an "industry" classification system while final demand and trade data are available on a "commodity" classification basis. The IO accounts are designed to resolve discrepancies between the systems that arise when an industry produces more than one commodity, or secondary products, but at the cost of added complexity. The differences between industries and commodities are minor at the six sector level of detail and are ignored in this study.

Table B1

Direct Input Requirements

(Direct Value of Inputs Required to Produce One Dollar of Industry Output, at Producers' Prices)

	Agriculture	Mining	Construction	Primary Processing	Advanced Processing	Services
Agriculture	0.249	0.000	0.002	0.009	0.058	0.003
Mining	0.001	0.055	0.007	0.176	0.004	0.015
Construction	0.008	0.036	0.001	0.007	0.003	0.019
Primary processing	0.105	0.031	0.281	0.297	0.168	0.037
Advanced processing	0.085	0.025	0.064	0.028	0.194	0.040
Services	0.156	0.115	0.227	0.161	0.148	0.259
All inputs	0.605	0.262	0.581	0.687	0.581	0.376
Value added	0.395	0.738	0.419	0.313	0.419	0.624
Output	1.000	1.000	1.000	1.000	1.000	1.000

Table B2

Output and Final Demand

(Billions of Dollars at Producers' Prices, 1988-IV)

	Total Output	Intermediate Usage	Final Output	Exports	Imports	Domestic Demand
Agriculture	204	164	40	18	6	28
Mining	184	240	−57	6	60	−3
Construction	469	89	380	0	0	380
Primary processing	940	835	104	61	126	169
Advanced processing	1563	528	1035	196	312	1151
Services	3683	1495	2188	103	0	2085

Appendix B: The Input-Output Framework *(continued)*

input usage and value added in production is changed to reflect the declining quantity of inputs required to produce a given value of output measured in constant dollar terms. These changes do not have a major impact on calculations made at an aggregate level.

Values of industry output and components of demand estimated for the fourth quarter of 1988 are presented in Table B2. To estimate the output produced in each sector, Commerce Department statistics on value added in each industry in 1987 are updated to 1988-IV levels using various sources of data describing industry activity over the past two years. These estimated levels of value added in 1988-IV are then translated into output levels using the historical ratio between output and value added derived from the bottom two rows in Table B1. The value of each industry's output that was used as production inputs in other industries is determined by multiplying the first six rows of the matrix formed by Table B1 and the vector representing industry output. This product is the column labeled "intermediate usage." The difference between total output and intermediate uses represents the final goods produced in each sector.

Final output is decomposed into its export, import, and domestic demand components. Export and import data are obtained for each industry, and domestic demand is calculated as the difference between demand for final goods and net exports (exports less imports). In accordance with IO accounting practices, transportation and other costs incurred in the movement of goods from the factory to the port of exit are recorded as services exports.

Table B3, commonly called the total requirements table, describes the total value of output from all industries that is required directly and indirectly to produce one dollar's worth of final goods produced in each sector. In addition to including the inputs required directly for production (listed in Table B1), total requirements include all inputs needed to produce these direct inputs. Table B3 is derived from Table B1 in the following manner. As noted above, final demand can be calculated as:

$$(1) \quad f = q - Aq,$$

where f is the vector of final demand or output, q is the vector of total industry output, and A is the matrix formed by the first six rows of Table B1, that is, the input requirements of each industry. The product of A and q is the vector of intermediate inputs originating in each industry. Equation 1 can be algebraically manipulated to show:

$$(2) \quad q = (I - A)^{-1}f,$$

where I is the identity matrix with 1's on the diagonal and 0's in the off-diagonal elements, and the superscript -1 indicates the inverse function.

The matrix formed by $(I - A)^{-1}$ is Table B3. Each column shows the total output from all sectors that is needed to produce final goods in the sector labeled at the head of that column. For example, each dollar's worth of final goods produced in the advanced processing manufacturing sector requires directly or indirectly about 37 cents worth of output from the services sector and 35 cents worth of output from the primary processing sector.

Changes in manufacturing output associated with the economic scenarios presented in Table 2 of the text are calculated by multiplying Table B3 by the changes in final demand assumed in each scenario. These projected changes in manufacturing output are compared to the initial level of output presented in Table B2 to derive percentage changes. Because the structure of the IO system is linear, the impact of changes in domestic demand, exports, and imports on industry output can be calculated separately and summed to measure their

Table B3

Total Input Requirements

(Total Inputs Required to Produce One Dollar of Industry Final Output, at Producers' Prices)

	Agriculture	Mining	Construction	Primary Processing	Advanced Processing	Services
Agriculture	1.350	0.006	0.020	0.027	0.106	0.014
Mining	0.061	1.078	0.102	0.285	0.077	0.043
Construction	0.023	0.043	1.017	0.028	0.017	0.029
Primary processing	0.277	0.088	0.467	1.492	0.353	0.107
Advanced processing	0.175	0.051	0.125	0.086	1.287	0.078
Services	0.395	0.211	0.458	0.400	0.373	1.406

Appendix B: The Input-Output Framework *(continued)*

total effect on output. In both economic scenarios, it is assumed that growth of domestic demand is concentrated on the final output of the manufacturing and services sectors. Thus, in the moderate growth case, domestic demand rises a bit over 2 percent per year for final services and manufactured goods and somewhat less than 2 percent in other sectors, but total domestic demand growth averages 2 percent exactly. This represents a continuation of recent historical patterns. Export and import growth rates for manufactured goods are specified in Table 2. Trade changes in other sectors are assumed to remain in line with recent experience, and in any event they have little impact on output in the manufacturing sector.

The Performance of the U.S. Capital Goods Industry: Implications for Trade Adjustment

Throughout the 1970s, the capital goods industry was the strongest U.S. export sector and enjoyed mounting trade surpluses that culminated in a surplus of over $45 billion in 1981. Between 1982 and 1987, however, the trade performance of the industry sharply deteriorated, generating a surplus of only $3 billion in 1987 and accounting for roughly 30 percent of the increase in the merchandise trade deficit over those six years. Although the industry's trade performance improved in 1988, the marked decline in the surplus that had occurred earlier and the strong growth in imports that continued even after the dollar depreciation began in 1985 suggest that U.S. capital goods producers may have lost some of the underlying competitive strength they demonstrated in the 1970s. This article examines the extent to which a loss of competitiveness has occurred and analyzes its implications for the near-term course of adjustment in the capital goods trade balance.

A framework for the analysis is established by projecting how the capital goods trade balance would have evolved in the 1980s if exports and imports had followed their 1975-81 growth patterns. Deviations in the 1980s in the factors determining these 1970s growth patterns are then examined to see if the capital goods trade balance in the 1980s could have been expected to evolve differently than a simple extrapolation of its 1970s trend projection would have suggested. These underlying factors include exchange rate changes and other macroeconomic factors as well as longer term structural changes in the capital goods industry itself.

A continuation of 1970s trends would by itself have implied that the huge surpluses of the early 1980s were not going to be sustained. A narrowing of the capital goods trade surplus to roughly one-half of its 1981 value by 1988 would have been predicted by the trend growth pattern — more rapid import growth than export growth — already observed in the 1970s. The surplus in 1988, however, was even smaller than that projected by 1970s trends, suggesting that new developments in the 1980s adversely influenced U.S. capital goods trade.

The long-run implications of macroeconomic factors in the 1980s do not appear to explain this poorer-than-expected 1988 trade performance. Rather, they seem to be beneficial to the U.S. trade balance. The net impact of 1985-88 dollar depreciation following 1982-84 dollar appreciation left the relative price competitiveness of U.S. capital goods in 1988 at about its initial 1981 level. The behavior of prices between 1982 and 1988 contrasts sharply with the steady loss of U.S. price competitiveness in the 1975-81 base period. The positive effect on the trade balance that ultimately can be expected to arise from the overall 1980s price pattern replacing the deteriorating 1975-81 price trend has been only partially undercut by faster average U.S. economic growth and slower average foreign growth during 1982-88 than during 1975-81.

Structural developments in the 1980s on net did hurt the U.S. capital goods trade position. The Asian newly industrializing countries (NICs) — Hong Kong, South Korea, Singapore, and Taiwan — began to offer stiff competition, particularly to U.S.-based information-processing equipment producers. U.S. producers of traditional factory equipment were hurt by a relatively

poor productivity performance combined with a sharp drop in sales to indebted developing countries. On the plus side, 1980s shifts in the composition of demand toward capital goods in which the United States was particularly competitive offered some help to the U.S. capital goods trade position.

Rough estimates suggest that the overall adverse effects of 1980s structural shifts about offset the positive effects that could ultimately be expected from macroeconomic developments. However, adjustment to macroeconomic developments, particularly the sharp dollar swings of the 1980s, is probably still incomplete, especially on the export side. It takes time for U.S. producers to set up foreign distribution centers and for foreign purchasers to become re-attuned to U.S. products. This delayed adjustment appears to explain in large part why the 1988 capital goods trade balance fell short of its projected level based on 1970s trends.

Even if full adjustment to 1980s macroeconomic developments is achieved in coming years, without further macroeconomic changes a continuation of the structural changes that occurred in the capital goods market during the 1980s is likely to result in a gradual deterioration in the capital goods trade balance during the 1990s. The pace of the deterioration may be relatively slow, however, because of the favorable effects of the changing composition of world demand for capital goods and the likely slowing in the rapid expansion of productive capacity abroad. If full adjustment to 1980s macroeconomic developments is not achieved because foreign producers are able to maintain some of their market share gains from the 1980s period of dollar appreciation, the U.S. capital goods position will be weaker and its deterioration may quicken in pace.

The following section briefly describes the U.S. capital goods industry and its recent performance. The next section discusses the trends in capital goods exports and imports during 1975-81 and, on the basis of these trends, shows how capital goods exports and imports would have evolved in the 1980s. The macroeconomic and structural factors influencing capital goods trade in the 1980s are then compared with their 1975-81 trends. Changes in these factors are examined and estimates are made of the impact of the changes on capital goods trade. A final section adds the estimated effects together and discusses the role of delayed adjustment in explaining the export shortfall. This is followed by some concluding observations on the trends in place in the 1980s and their effect on the evolution of the capital goods trade balance in the 1990s.

Table 1

Major Products of the U.S. Capital Goods Industry

Industry†	Major Products
Noncomputer machinery and equipment	Generators; motors; transformers Steam and gas turbines Nuclear power boilers Robots; numerical controls Machine tools; hand tools Mining equipment; oil rigs Pumps; compressors; fans Heating, plumbing and refrigeration equipment Farming equipment; food processing equipment Textile machinery; papermaking machinery Hospital and medical equipment
Computers and information-processing equipment	Mainframe computers; PCs Supercomputers Magnetic and optical disks Semiconductors Telecommunications equipment
Nonautomotive transportation equipment	Aircraft; satellites Railroad equipment

†Industry groups reflect the Department of Commerce method of classifying exports and imports of capital goods.

The U.S. capital goods industry: products and recent performance

The U.S. capital goods industry manufactures a broad range of production-oriented machinery and equipment, as well as all nonautomotive transportation equipment. Examples of the major products of the U.S. capital goods industry are listed in Table 1. Although the products are all of an investment nature, they span a broad range of type, cost, and technological sophistication. One category of machinery and equipment covers computers and other information-processing equipment; it includes telecommunications equipment, semiconductors, and precision measuring instruments. A second category covers noncomputer machinery or more traditional factory equipment. A third category consists primarily of aircraft.

The traditional competitive strength of the U.S. capital goods industry is reflected in a current and constant dollar net export surplus throughout the 1970s and early 1980s (Chart 1). Strong export growth generated a peak nominal net export surplus of over $45 billion in the first quarter of 1981. Thereafter, the picture changed. Sustained growth in imports virtually eliminated the net export surplus by the first quarter of 1987. Since then, however, the U.S. trade performance has shown steady improvement.

Capital goods trade has expanded rapidly relative to

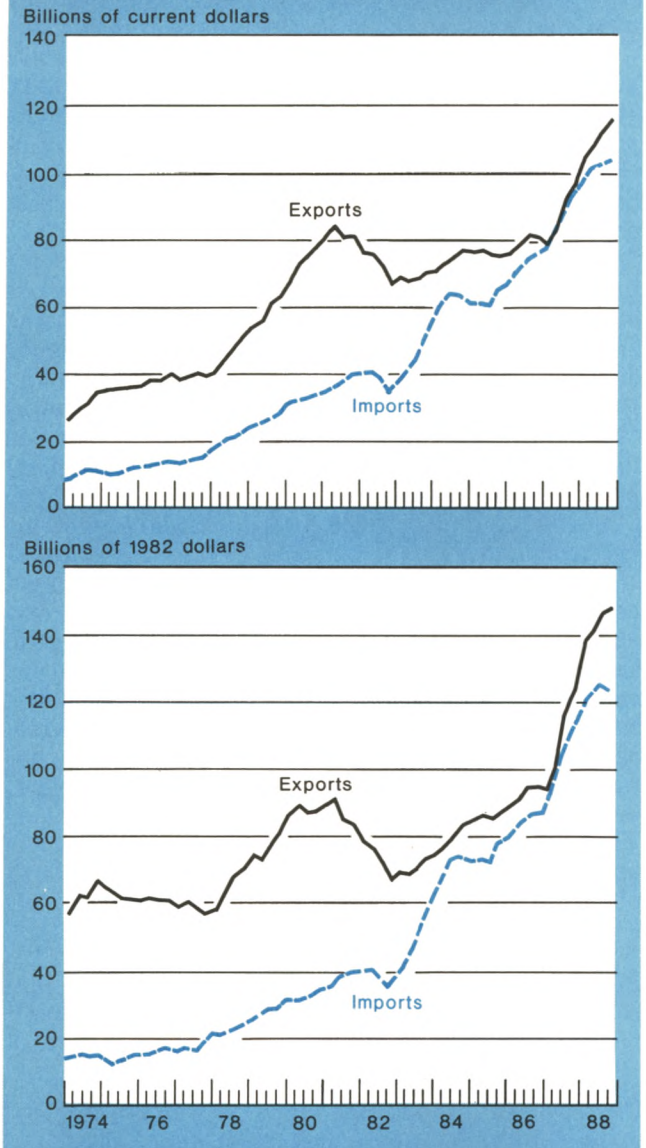
the trade of other commodities. In 1988, capital goods accounted for 47 percent of total nonagricultural exports.[1] This share compares with 44 percent in 1981 and 40 percent in 1970. Capital goods also raised their share of nonpetroleum imports from roughly 11 percent in 1974 to over 30 percent by 1988. The shifting composition of exports and imports within the capital goods sector since 1974 can be seen in Chart 2. The share of information-processing equipment in both exports and imports has expanded largely at the expense of the noncomputer factory equipment category.

Western European and Japanese producers have been major competitors with the U.S. capital goods industry in world markets. Japanese producers are major suppliers of power generators, paper mills, and office machines, among other types of capital goods. West German producers command a large share of world exports of turbines, nuclear reactors, printing machinery, and several types of machine tools. In addition to these traditional competitors, the Asian NICs

[1]Shares refer to real (inflation-adjusted) exports and imports.

Chart 1

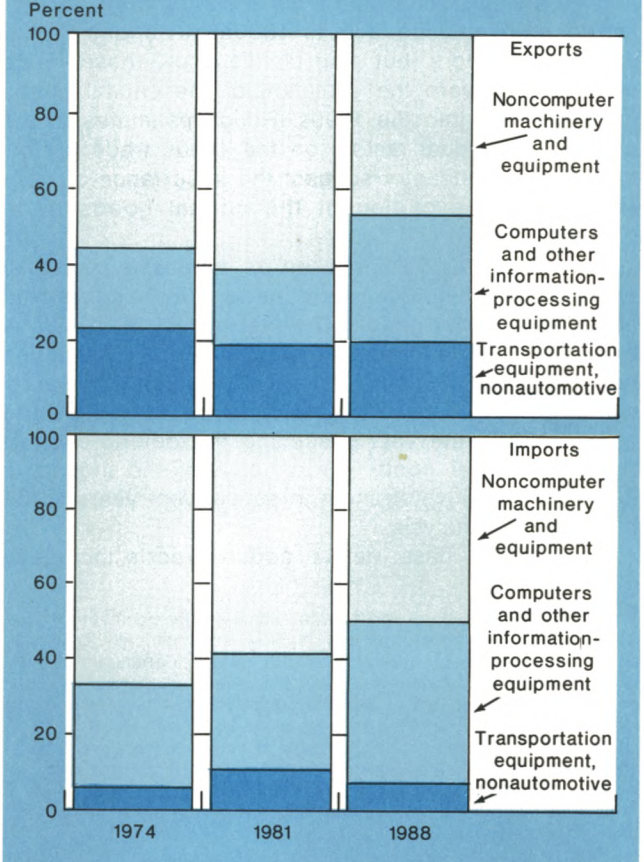
U.S. Capital Goods Exports and Imports



Note: All figures are charted quarterly, on a seasonally adjusted annualized rate, on a NIPA basis.

Chart 2

Shares of U.S. Capital Goods Trade



Note: All shares computed from nominal end-use category data except 1974 computer trade figures, which are taken from SIC-based data.

have greatly improved their competitiveness across a wide range of information-processing equipment industries in the 1980s, raising their world market shares in all categories of office machines.

Factors influencing trade adjustment in capital goods

The first step in the analysis of the trade evolution of the capital goods sector in the 1980s is to project a trade performance level that could have been expected for the industry in 1988. This projection is made by estimating how the capital goods trade balance would have evolved in the 1980s had there been no change from earlier trends in the underlying factors — exchange rates, economic growth in the United States and abroad, and structural demand and supply factors — that determined the performance of the industry.[2] The analysis then turns to a comparison of the 1980s trends in these underlying macroeconomic and structural factors with those of the 1970s. This comparison not only helps to explain the extent to which the deviation in the performance of the industry from its projected path may be due to 1980s deviations in the underlying factors, but also clarifies how these 1980s trends will govern the evolution of the capital goods trade balance into the 1990s. Rough estimates of the effect of individual factors on the 1980s trade performance of the industry suggest the importance of each factor in the evolution of the capital goods trade balance.

The period 1975-81 is used as the base period to establish a projected growth pattern for exports and imports of capital goods. The first half of the 1970s is excluded to allow for adjustment to the sharp exchange rate movements accompanying the switch to floating exchange rates at the beginning of 1973. For an end point, 1981 is the year preceding the deterioration in the U.S. capital goods trade balance; the industry's loss of competitive strength in subsequent years is the focus of this analysis.

From a 1974 base, capital goods exports increased 40.1 percent, or 4.9 percent annually in volume terms, by 1981. Capital goods imports increased by 156.3 percent, or 14.4 percent annually, in volume terms. Since imports grew from a very small base, however, they continued to be dwarfed by expanding exports in dollar value.

These volume growth rates may be converted into nominal growth projections for the 1980s by assuming that the falling export and import price deflators for capital goods over the last seven years led to an equal increase in the volume of capital goods purchased.[3] Falling capital goods price deflators in the 1980s primarily reflected technological advances in computers — in other words, for a given price a purchaser could buy a better quality computer in 1988 than in 1981. This shows up as a fall in the price of computers according to the price deflators. It is assumed that purchasers bought better quality computers as the decade progressed rather than reduce the amount they spent on computer purchases.[4]

If both these 1975-81 export and import volume trends had continued, by 1988 nominal capital goods exports would have been roughly $115 billion and imports would have been $95 billion.[5] These trends alone would have reduced the capital goods trade surplus from $45 billion in 1981 to roughly $20 billion by 1988. Thus these trends suggest that developments in the macroeconomic environment and in the microeconomic factors relevant to the capital goods industry in the 1970s on net would have an adverse effect on the capital goods trade balance.

In contrast to the projected 1988 surplus of $20 billion, the actual capital goods surplus last year was only about $10 billion. An accounting of the deviation of roughly $10 billion between the projected and actual capital goods trade balance in Table 2 shows that it was the result of a $5 billion, or slightly less than 5 percent, shortfall in exports and a $5 billion, or slightly more than 5 percent, overshoot in imports relative to their projected levels. These deviations of exports and imports from their estimated levels suggest that factors appeared in the 1980s that altered the growth patterns of the 1970s and at least to some extent adversely

[2]An alternative procedure would be to estimate pure competitiveness trend growth rates for exports and imports econometrically. Unlike actual growth rates, pure trend growth rates are independent of the impact of price and demand conditions. However, removing the impact of relative price and demand conditions on trade flows during the base period would make an understanding of why trade flows changed between the two periods more difficult. Consequently, the analysis here relies on a two-step procedure of first calculating actual export and import growth rates during the base period and projecting them through 1988, and then calculating the impact of a change in the trends in relative price movements and demand between the two periods. The analysis does assume that firms and consumers responded to changes in price and income in the 1980s similarly to the way they responded in the base period — in other words, that the price and income elasticities of demand remained constant.

[3]The capital goods export price deflator fell 18 percent between 1982 and 1988; the capital goods import price deflator fell 17 percent. The effect on purchases of the change in relative price between capital goods exports and capital goods imports is explicitly treated in the text.

[4]Some of the less advanced computer models of 1981 were not available in 1988.

[5]Actual nominal growth rates for 1975-81 were not used because of the high inflation rates of that period. The capital goods export and import deflators rose by roughly 50 percent over the period. If nominal growth rates had been used, projected exports would have been over $215 billion and projected imports over $135 billion.

affected U.S. capital goods producers.

The analysis now turns to the role of exchange rates, economic growth, and structural supply and demand shifts in the 1988 capital goods trade performance. The current disposition of these macroeconomic and structural factors will set the initial trend growth conditions for capital goods trade evolution in coming years. Moreover, an analysis of these factors will suggest where the sources of future improvements in the U.S. capital goods trade balance in the 1990s are to be found.

Macroeconomic developments

Exchange rates and price competitiveness

Large exchange rate swings in the 1980s significantly altered the prices of all U.S. goods relative to those of our trading partners. By 1985 dollar appreciation had reduced the price competitiveness of U.S. producers to its lowest level since the start of the floating exchange rate period.[6] Subsequent dollar depreciation reversed that decline and raised U.S. price competitiveness to its highest rate over the same period.

These relative price movements are broadly mirrored in a comparison of U.S. capital goods prices with the dollar level of capital goods prices in Germany and Japan, our two major capital goods competitors. As Chart 3 shows, U.S. capital goods prices rose sharply relative to German and Japanese prices in the early 1980s through 1985, as measured by the respective capital goods components of the producer price indexes. U.S. capital goods prices then fell sharply, more than regaining their 1981 position relative to German and Japanese prices. In fact, by 1988 U.S. prices were about 20 to 25 percent more competitive relative to German and Japanese prices than they had been in 1981.

These relative price comparisons, although encouraging, only partially reflect the price competitiveness of U.S. capital goods in international trade. The reason is that domestic capital goods price indexes both in the United States and abroad tend to give relatively low weight to internationally traded goods, such as computers, and relatively high weight to goods not as prominent in international trade, such as power transmission or heating, plumbing, and refrigeration equipment. Moreover, the United States trades capital goods with many other countries besides Germany and Japan. Notable among other trade partners are the Asian NICs. The currencies and, consequently, the prices of capital goods produced in these economies have followed a significantly different path against the dollar than have the currencies and prices of the major industrial countries.

Measuring U.S. price competitiveness in international trade by comparing U.S. export and import price indexes avoids these problems. Computers receive about equally high weight in both indexes and all U.S. trade partners are represented. Chart 4 shows that these indexes reveal a different picture of U.S. price competitiveness for the 1980s.[7] U.S. export prices still

[6] These price comparisons are based on changes in the trade-weighted value of the dollar against the currencies of six other major industrial countries adjusted for movements in wholesale price indexes.

[7] These comparisons are based on fixed-weight price indexes. Fixed-weight indexes are a better measure of price competitiveness than

Table 2

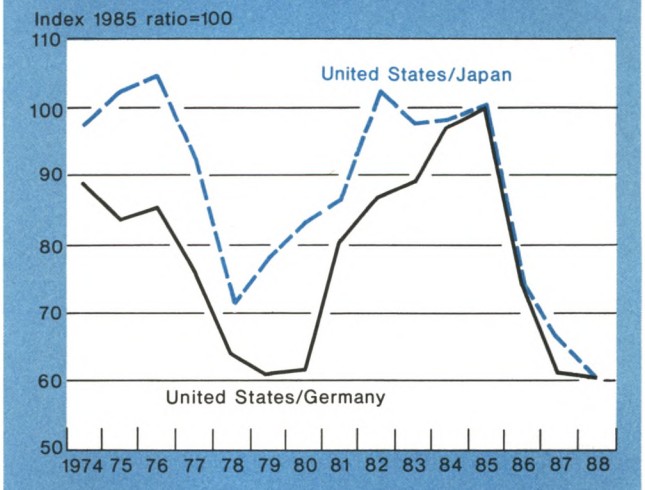
Projected versus Actual Exports and Imports in 1988

(Billions of Dollars)

	Exports	Imports	Balance
Actual level	110	100	10
Projected level	115	95	20
Deviation (actual-projected)	−5	+5	−10

Chart 3

U.S. Capital Goods Price Comparisons: Japan and Germany *



Sources: Japan--Bank of Japan, Monthly Bulletin; Germany--Bundesbank, Monthly Report.

Note: Price indexes are fixed weight.

*U.S. nonresidential fixed investment price index/foreign capital goods WPI.

rise relative to import prices in the early 1980s before they reverse as the dollar starts to decline in 1985. By 1988, however, U.S. export prices have only fallen about 3 percent more than import prices compared to their 1981 levels. In other words, by this measure, the United States only marginally gained price competitiveness over the entire 1982-88 period.

On the basis of these trade price indexes, the 1980s relative price performance, netting its sharp up and down swings, contrasts with the relative price performance in the 1975-81 period. As Chart 4 reveals, on net during the 1975-81 period, the United States actually lost significant price competitiveness, with export prices rising 12 percent faster than import prices. Consequently, the ultimate effect of the trend of relative price movements between 1975-81 and 1982-88, once all transitional adjustments have been completed, is a positive impact on the evolution of the U.S. capital goods trade balance in the 1980s relative to its projected course.

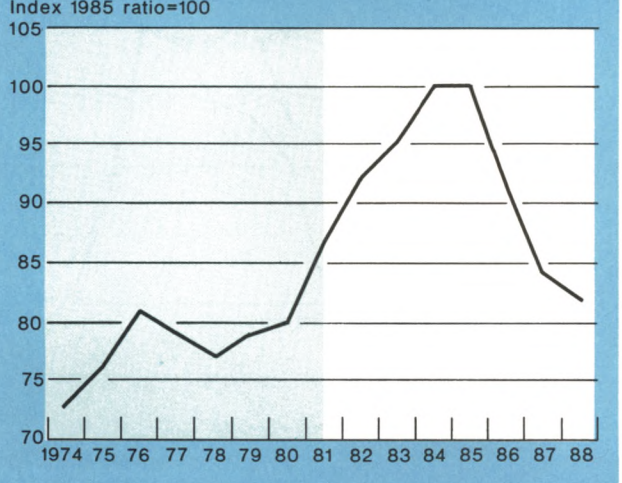
The analysis of the effects of relative price movements assumes that no long-run, permanent effects of the 1982-84 dollar appreciation remain. Permanent effects could result if foreign producers had invested during the 1982-84 period to reorient their factories to meet foreign capital goods specifications or to develop foreign sales and distribution networks. To the extent that such investments occurred, the impact of the 1985-88 dollar depreciation on U.S. exports and imports of capital goods may be weakened.

Estimated price elasticities[8] may be used to judge how much on balance the improved price competitiveness achieved by 1988 benefited us by moving exports and imports away from their projected trend levels. Improved price competitiveness is measured by the relative price declines of U.S. capital goods over the entire 1982-88 period compared to the relative price increases that occurred in the earlier period. The elasticities provide rough estimates of the ultimate effects of dollar movements during the 1980s on U.S. capital goods exports and imports after all adjustments to the dollar appreciation between 1982-84 and to the subsequent depreciation between 1985-88 have been made. These elasticities imply that actual imports in 1988 were roughly $5 billion less than they would have been if relative import and export prices had continued to follow their 1975-81 path. The improved price competitiveness pattern ultimately achieved between 1982 and 1988 can be expected to raise exports in 1988 by roughly $20 billion from what the earlier trend would have suggested.

Footnote 7 continued
price deflators because they are not affected by the changing composition of trade.

Chart 4

Relative Trade Prices of U.S. Capital Goods*



Note: Price indexes are fixed weight.
*U.S. export price/U.S. import price.

Relative economic growth

U.S. exports of capital goods reflect the influence of economic growth abroad. Similarly, U.S. imports of capital goods reflect the influence of economic growth in the United States. A shift in the rate of growth in either area will affect trade.[9]

The pattern of economic growth in the 1980s differed significantly from that in the 1970s both here and abroad. Table 3 shows that, as was the case with exchange rate movements, growth patterns during the early 1980s differed from those later in the period.

[8]Price elasticities state the percentage change in exports and imports that can be expected to arise from a percentage point change in relative prices. Elasticities are normally estimated by regression analysis and can vary significantly depending on the particular model specification, the price and income measures, and the time period used in making the estimates. The elasticities used here were estimated by the author and were 1.4 for exports and 0.6 for imports. Point estimates of the elasticities were used and the resulting changes were rounded to the nearest $5 billion.

[9]There are several ways of measuring economic growth. Two common measures are domestic demand and GNP. These two measures can differ significantly over a short period of time. During the 1970s and 1980s gross fixed nonresidential investment growth in the United States and abroad more closely followed GNP growth than domestic demand growth. Because investment spending is most relevant for trade in capital goods and followed a path more similar to GNP than domestic demand, GNP is used as the measure of economic growth in the present analysis. Gross fixed nonresidential investment itself is not used because timely data are not available for all countries.

However, unlike the net effects of exchange rate movements, the average rate of growth in the 1980s relative to 1975-81 had clearly unfavorable effects on the U.S. capital goods trade balance.

Rough estimates of the effects on balance of the change in relative growth patterns after 1981 on capital goods exports and imports in 1988 may be calculated by applying estimated income elasticities to the differences between the average growth rates in the two periods.[10] Multiplying the 0.5 percent annual deviation in economic growth in the United States between the two periods by the estimated U.S. income elasticity of demand for imports implies that actual imports in 1988 should be roughly $5 billion more than their projected level based on the earlier U.S. trend growth rate. Similarly, the annual 0.1 percent decline in economic growth abroad multiplied by the estimated foreign income elasticity of demand for U.S. exports yields a figure for actual 1988 exports that is roughly $5 billion less than the projected level based on the earlier foreign growth rate.

The combined macroeconomic effects

The macroeconomic environment of the 1980s was characterized by sharp exchange rate swings and changing patterns of economic growth both here and abroad. Table 4 shows the estimated effects on exports and imports of changes in macroeconomic factors that can be expected to occur once all effects of the swings in exchange rates have been completed. The $5 billion decline in exports over projected levels and the $5 billion increase in imports over projected levels due to relative income growth differences worsened the capital goods trade balance by $10 billion relative to its projected trend. On the other hand, improved price competitiveness that emerged on balance from the sharp exchange rate swings of the 1980s raised exports by roughly $20 billion and reduced imports by roughly $5 billion relative to projected amounts based on the eroding price competitiveness of the 1970s. To the extent that capital goods exports and imports respond to price changes only with a lag, the entire effect may not have been realized to date. If full adjustment is assumed, then the combination of exchange rates and economic growth is estimated to have improved the capital goods trade balance over the level predicted by the 1975-81 trend growth pattern by about $15 billion.

Structural factors influencing capital goods trade in the 1980s

U.S. capital goods producers faced growing challenges to their shares of both the U.S. and world markets in the 1980s. Principal among these challenges were the rapid expansion of capital goods production capacity abroad, particularly in the Asian NICs, and relatively poor productivity performance by several U.S. capital goods producers. Both of these factors eroded the competitiveness of U.S. producers in particular segments of the capital goods market and were part of a gradual evolution shifting the locus of production for some types of capital goods away from the United States. Because broad productivity and cost comparisons are not always helpful in examining the changes occurring within the capital goods industry, the analysis of these supply-side effects focuses on their impact on the performance of various sectors of the capital goods industry. Rough estimates of the effects of these longer term changes are made for particular industries and for

[10] Income elasticities measure the percentage change in exports or imports that can be expected from a percentage point change in a nation's income. The use of average growth rates omits the impact of cyclical changes in growth rates in any particular year on capital goods exports and imports. The income elasticities used here were estimated by the author and were 3.0 for U.S. imports and 2.7 for U.S. exports. Point estimates of the elasticities were used and the resulting changes rounded to the nearest $5 billion.

Table 3

Annual Average Percent Change in Real GNP

	United States	Foreign†
1974-81	2.5	2.9
1982-88	3.0	2.8
1982-85	2.9	2.5
1986-88	3.3	3.2

†U.S. export-weighted average GNP growth rate for Canada, France, Germany, Italy, Japan, and the United Kingdom. Data for 1988 are based on first quarter annual averages.

Table 4

Effects of Macroeconomic Factors on Projected Levels of Exports and Imports of Capital Goods

(Billions of Dollars)

	Exports	Imports
Growth in price competitiveness	+20	−5
U.S. economic growth	—	+5
Foreign economic growth	−5	—
Net impact	+15	0

Note: (+) refers to estimated increases, and (−) to estimated decreases, in exports and imports.

the overall capital goods trade balance.

Growth of new suppliers

Imports of capital goods from the Asian NICs increased from slightly below $1 billion in 1974 to roughly $4 billion in 1981 and to over $18 billion by 1988. Marked growth in NIC exports of capital goods, especially in the computer and information-processing equipment category, has been observed throughout the industrialized world. The growth in capital goods exports between 1982 and 1988 occurred in an environment of high Asian economic growth and rapid productivity growth. When combined with relatively low wages, shown in Table 5, these factors have made Asian NICs extremely price competitive.

The gains in the share of U.S. imports by the Asian NICs in virtually all categories of capital goods are shown in Table 6. The greatest gains were in the computer and telecommunications industries, the largest sectors in the information-processing equipment category.[11] These industries had relatively sharp increases in import penetration rates between 1982 and 1988.

A rough estimate of the impact of the exceptionally strong trade growth of the Asian NICs on U.S. capital goods imports in 1988 may be made by comparing the actual level of imports of $18 billion with what imports from the Asian NICs would have been if the 1975-81 growth in their share of total imports had continued at the same rate in the 1982-88 period. This calculation yields a projection of $11 billion for Asian NIC imports, implying actual Asian NIC imports accounted for roughly $5 billion of the overshoot of total U.S. capital goods imports above their projected level.

The growth of the Asian NICs resulted in an increase in their purchases of capital goods from U.S. suppliers, expanding from roughly $2 billion in 1974 to $12 billion by 1988. As a share of total exports, however, the growth that occurred in the 1982-88 period was largely a continuation of the rapid pace set in the 1975-81 period. Although exports to the Asian NICs in 1988 were above this projected trend level, the difference was not substantial enough to warrant an adjustment to the projected growth pattern of capital goods exports. Moreover, export growth to the Asian NICs offset part of the slowdown in U.S. exports of noncomputer machinery and equipment in the 1980s due to the debt problems of developing countries and the decline in oil exploration activity. These latter effects are addressed directly in the discussion of the trade performance of low labor productivity growth industries within the noncomputer machinery and equipment category.

The growth of the Asian NICs did have some adverse effects on U.S. capital goods exports. Declines in the world market share of U.S. producers in several computer and electrical machinery industries between 1981 and 1986 (the latest year for which data are available) coincided with gains in world market shares in these

[11] Imports of telecommunications equipment from the Asian NICs clearly benefited from the deregulation of the U.S. telephone industry and the 1984 divestiture of AT&T.

Table 5

Hourly Compensation Costs for Production Workers in Manufacturing

(U.S. Dollars, Year Average)

	1981	1985	1988†
United States	10.84	12.82	13.44
Germany	10.53	9.60	17.27
Japan	6.18	6.45	12.57
Taiwan	1.18	1.44	2.44
South Korea	1.08	1.46	2.01

Source: Bureau of Labor Statistics

†1987 levels converted at 1988 exchange rates.

Table 6

Regional Source of Supply of Selected Capital Goods Imports

	Import Share (Percent) 1981		
Industry	Asian NICs	Japan	Western Europe
Engines, turbines	0.5	19.5	62.9
Electrical equipment	12.0	27.2	33.3
Farm machinery	0.4	13.5	37.9
Construction machinery	1.3	16.4	40.1
Metalworking machinery†	6.4	38.3	41.6
General industry machinery	13.6	19.4	47.9
Computers†	17.5	37.5	22.9
Telecommunications†	20.4	39.8	5.9

	Import Share (Percent) 1988		
Industry	Asian NICs	Japan	Western Europe
Engines, turbines	1.3	23.9	52.3
Electrical equipment	12.5	31.7	26.3
Farm machinery	1.8	19.7	47.7
Construction machinery	2.5	32.6	44.2
Metalworking machinery†	7.6	46.3	35.6
General industry machinery	12.0	23.5	46.9
Computers†	35.4	44.3	10.4
Telecommunications†	32.9	39.7	7.7

†1988 data may not be strictly comparable to 1981 data due to the reclassification of industries in 1988.

same categories by Asian NIC producers. A rough estimate of the impact of this loss of world market share for U.S. capital goods exports in 1988 may be made by comparing actual U.S. computer and electrical machinery exports in 1986 with what U.S. computer and electrical machinery exports would have been if the U.S. had maintained its 1981 share of the world market.[12] This comparison extrapolated to 1988 suggests U.S. exports were roughly $5 billion below their projected level because of the competitiveness of Asian NIC producers.[13]

Labor productivity and quality influences on performance

Aggregate labor productivity growth trends in the U.S. manufacturing sector between 1982 and 1988 largely reversed their 1975-81 relative decline compared to the productivity trends of major competing capital goods producers — Japan and Germany. This aggregate U.S. productivity improvement is to some extent reflected in relative price movements. To assess the role of labor productivity trends on the competitiveness of U.S. capital goods producers in the 1982-88 period, this analysis focuses on the performance of capital goods industries that exhibited marked differences from the average performance of the manufacturing sector.

High labor productivity growth industries

An examination of the available data on labor productivity trends in industries producing U.S. capital goods suggests that relatively high productivity growth has been seen in the information-processing equipment industries. Data describing the performance of the semiconductor industry show above-average productivity growth over the entire 1975-87 period (Chart 5), although the industry's performance slowed somewhat between 1982 and 1987. The data describing the aggregate category of nonelectrical machinery — a category that includes the computer industry in addition to a broad range of other more traditional factory equipment industries — show that it achieved above-average performance over the 1974-85 period. Productivity trends in the computer industry itself indicate that its performance was well above average and dominated the overall performance of the category (Chart 5).[14] The employment performance of selected U.S. capital goods industries (Table 7) offers still further evidence that industries in the information-processing category

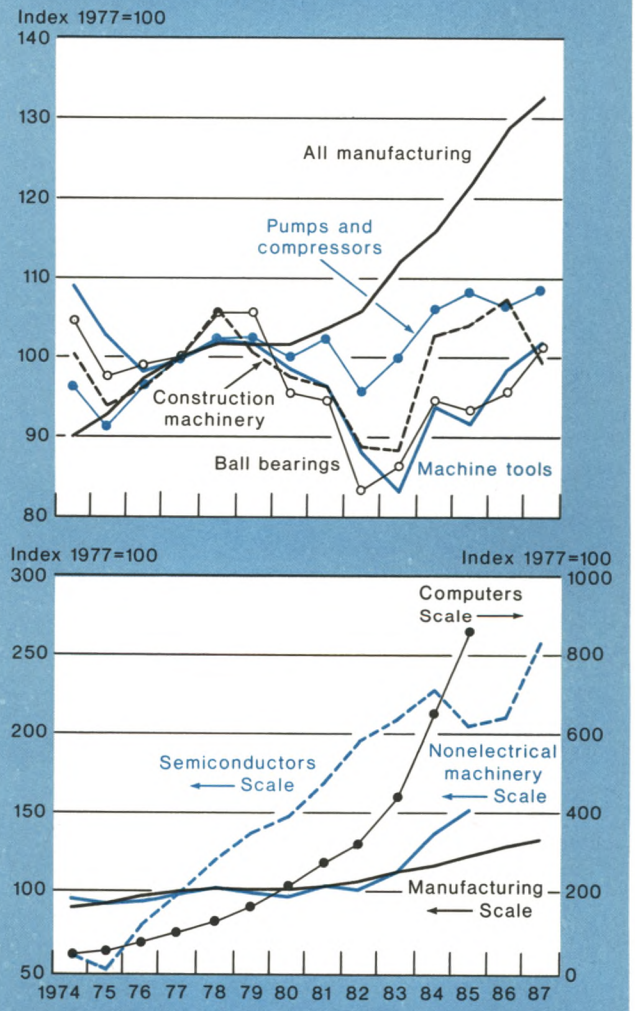
[12]Loss of U.S. market share may, of course, be due to factors other than strong competition from the Asian NICs. Nevertheless, estimates of the loss of U.S. export markets in a limited set of industries where Asian exports have been increasing may be assumed to reflect largely the growth of supply capacity in the NICs. World market share is measured as world exports minus U.S. imports. Data on Taiwanese exports are taken from the *1988 Statistical Yearbook of the Republic of China*.

[13]World market shares shifted away from the United States to the Asian NICs in other capital goods categories as well. However, the dollar magnitude of these shifts was relatively small.

[14]The labor productivity measures for both the nonelectrical machinery industry and the computer industry are only available through 1985 and are taken from unpublished data of the Bureau of Labor Statistics.

Chart 5

Labor Productivity in Selected U.S. Capital Goods Industries



Source: Bureau of Labor Statistics. Data for the computer and nonelectrical machinery industries are unpublished.

Note: All indexes calculated by output per hour.

generally performed substantially better than the other capital goods industries between 1981 and 1988.

This favorable performance, however, did not prevent the information-processing equipment industries from experiencing about the same degree of growth in import penetration ratios as the other industries experienced over this period, as shown in Table 7. The apparent reason is that productivity growth in foreign information-processing equipment industries was also high. Support for this explanation is provided by the data on the manufacturing sectors in Japan, South Korea, and Taiwan in Table 8. Although strictly comparable international data are not available, the table presents data describing the performance of the overall manufacturing sector in each of the three Asian countries and the performance of the broad electrical equipment industries, a grouping that in each of these three countries includes the computer industry (in distinct contrast to U.S. classifications). Despite the above-average performance in the U.S. semiconductor and nonelectrical machinery industries, here representing the U.S. information-processing equipment industries, the Japanese electrical machinery industry achieved rates of growth at least as high as those shown by both U.S. industries. Furthermore, high productivity growth in the manufacturing sectors of South Korea and Taiwan was exceeded by growth in those industries representing their information-processing categories.

Table 7

Employment Indexes and Import Penetration Ratios for Selected U.S. Capital Goods Producers

	Employment Index† (1981 = 100)			Import Penetration‡		
Industry	1974	1981	1988	1974	1981	1988
Noncomputer machinery						
Electric transmission equipment	105	100	82	.03	.05	.10
Engines and turbines	95	100	66	.03	.13	.28
Construction, oil-field	86	100	58	.05	.07	.18
Machine tools§	93	100	83	.06	.22	.37
Information processing equipment						
Computers§	66	100	111	.10	.10	.31
Telecommunications§ (telephones)	98	100	75	.03	.04	.16
Electronic components	76	100	119	.14	.20	.31
Instruments	81	100	98	.08	.12	.22
Aircraft	84	100	108	.06	.07	.07

†Used as a proxy for real output.
‡Imports / domestic consumption.
§1988 data may not be strictly comparable to 1981 data due to the reclassification of industries in 1988.

Table 8

Labor Productivity Growth Comparisons: United States, Japan, South Korea, and Taiwan†
(Annual Percent Growth)

	United States			Japan		South Korea		Taiwan	
	Manufacturing	Semi-conductors	Nonelectrical Machinery‡	Manufacturing	Electrical Machinery	Manufacturing	Electrical and Electronic Machinery	Manufacturing	Electrical and Electronic Equipment
1975-81	2.0	15.1	1.0	6.5	15.0	n.a.	n.a.	8.0	8.7
1982-87	4.2	7.2	10.3	4.2	10.1	11.5	19.9	6.7	11.5

Sources: Japan — Statistics Bureau, *Monthly Statistics of Japan;* South Korea — Korea Development Bank, *Monthly Economic Review;* Taiwan — Council for Economic Planning and Development, Industry of Free China, *Monthly Bulletin.* Nonelectrical machinery data for the United States are taken from unpublished data of the Bureau of Labor Statistics.
†U.S. data refer to output per hour. Foreign data refer to output per employee.
‡Includes the computer industry. Data for this category are available only through 1985.

Consequently, the fact that U.S. producers had relatively high labor productivity growth does not appear to warrant an adjustment to 1988 exports or imports relative to their trend projection level.

Low labor productivity growth industries

Labor productivity growth was relatively low in several manufacturing industries in the noncomputer machinery and equipment category (Chart 5). Significant productivity declines in these industries generally began in the early 1980s, a major break from the 1970s trend, and continued through 1987 (the latest data available). Declining output was also observed over the 1982-88 period in several of these low labor productivity growth industries, particularly in the construction machinery industry, and reflected the decline in exports to the indebted countries of Latin America, the decline in oil drilling equipment exports, and the shift in the composition of world investment spending away from noncomputer machinery and equipment (discussed in more detail in the following section). Trade performance in these industries, measured by import penetration rates, also deteriorated, particularly after 1981. Some of these industries, such as construction machinery, have seen companies move production facilities abroad. Mergers and acquisitions have become relatively common in several other industries in the noncomputer category as they seek to adjust to shrinking markets.

Because of the strong association between output and productivity, it is difficult to separate the effects of relatively low productivity growth from other factors in accounting for the decline in output. Therefore, the estimates of the decline in exports in these industries with relatively low labor productivity growth encompass the effects of both lower productivity and the declines in demand that occurred in the 1982-88 period. A rough estimate of the impact of low labor productivity growth on capital goods exports may be based on exports in four representative industries: metalworking machinery; construction machinery; farm machinery; and specialized machinery for the textile, food, paper, and printing industries. If the world market share of U.S. exports in these industries (measured by world exports minus U.S. imports) had evolved in the same way as the U.S. share of the world market for all capital goods over the course of the 1980s, U.S. exports from these low productivity industries would have been about $10 billion greater than they actually were by 1988.[15] Consequently, low labor productivity growth in these industries is associated with a reduction in overall U.S. capital goods exports of roughly $10 billion relative to their projected trend level in 1988.

[15]The above calculations are made on the basis of the evolution of market shares between 1981 and 1986 extrapolated through 1988.

A rough estimate of the effect of the relatively low labor productivity performance in the noncomputer machinery and equipment category on U.S. capital goods imports may be made based on imports in these same four industries. If it is assumed that the share of imports in each of these industries between 1982 and 1988 had grown at the same rate as the share of imports in total capital spending, imports would have been roughly $5 billion less than their actual level in 1988. Relatively low labor productivity is thus associated with an increase in capital goods imports of roughly $5 billion above their projected trend level.

Quality

It is difficult to get information on the changing quality of U.S. capital goods relative to the products of our major competitors. The evidence available suggests that in some capital goods industries, notably aircraft, the United States has maintained a superior quality reputation. In some other, generally less technically-advanced capital goods industries such as textile machinery, the U.S. quality reputation has suffered. In still other industries—for instance, electronic components—anecdotal evidence suggests that U.S. quality deteriorated in the late 1970s and early 1980s before improving as the 1980s progressed.[16] This scattered evidence indicates that overall the United States has had about an average reputation as a capital goods producer relative to that of our competitors. This reputation may have improved recently, but over the entire 1982-88 period the improvement has not been significant enough to warrant a separate adjustment in the explanation of the deviations between actual and projected U.S. capital goods exports and imports.

Shifts in the composition of capital spending

In addition to the shifts affecting the supply side of the capital goods market in the 1980s, important shifts between the major categories of capital goods being purchased can also be observed both in the United States and worldwide. The changing pattern of demand for capital goods has been characterized by an increase in the shares of information-processing equipment and, to a lesser extent, in the shares of aircraft, and a corresponding decline in the share of noncomputer machinery and equipment in total U.S. and world capital goods purchases.

This shift in the U.S. capital goods spending pattern carries implications for capital goods trade because

[16]Susan Hickok, Linda Bell, and Janet Ceglowski provide some quality comparisons in "The Competitiveness of U.S. Manufactured Goods: Recent Changes and Prospects," this *Quarterly Review*, Spring 1988, pp. 20-22.

imports provide a greater share of total U.S. purchases in some capital goods categories than in others. Roughly 25 percent of information-processing equipment purchased in the United States is imported. This exceeds the roughly 20 percent share of noncomputer equipment that is imported and is much larger than the 7 percent share of imports of aircraft and other nonautomotive transportation equipment purchases.

To assess the effects on imports of the shift in the composition of U.S. investment spending between 1982 and 1988, the trend growth rates in the shares of information-processing equipment, noncomputer machinery and equipment, and nonautomotive transportation equipment in total U.S. capital goods expenditure between 1975 and 1981 were computed. The growth rates of these shares were then used to project the composition of total capital goods spending in 1988 that would have been observed had the 1975-81 trends continued. Applying the projected 1988 shares of spending in each category to the actual level of 1988 total spending on capital goods, and then multiplying by the 1988 shares of imports in total spending in each category produced the level of capital goods imports that would have been recorded for each category had there been no deviation from the 1970s trend in overall spending composition. These levels were then compared to the levels of capital goods imports that actually occurred.

The analysis shows that the share of information-processing equipment in total U.S. business spending in 1988 was roughly equal to that predicted by the 1975-81 trend. The share of nonautomotive transportation equipment in total spending, however, increased above its 1975-81 trend while the share of noncomputer machinery and equipment declined relative to its 1975-81 trend. Imports of computers based on trend shares, as a result, would have been roughly equal to their actual levels in 1988. Imports of nonautomotive transportation equipment, however, would have been about $1 billion to $2 billion lower than their actual 1988 level while imports of noncomputer machinery and equipment would have been about $5 billion to $6 billion above their actual 1988 level. The net effect of the changing composition of capital spending was to reduce the level of imports by roughly $5 billion in 1988 below its projected level.

Although data for total world capital goods demand are not available, total world exports excluding U.S. imports may be used as a proxy to trace the outlines of worldwide shifts in capital spending.[17] These data, available only through 1986, suggest that the shift in the composition of demand toward information-processing equipment that was observed in the United States is occurring worldwide. World spending on information-processing equipment (represented by trade in the computer and telecommunications industries) increased as a share of capital spending from 9.5 percent in 1974 to 13.4 percent by 1986. The share of nonautomotive transportation equipment, however, decreased slightly, from 12.3 percent in 1974 to 10 percent by 1986. The share of noncomputer machinery and equipment fell from 78.2 percent in 1974 to 76.6 percent in 1986. Since U.S. producers had roughly a 40 percent share of the world market in 1986 in both computers and nonautomotive transportation equipment, compared to a 10 percent share in noncomputer machinery, this shift in demand suggests a stimulus to the exports of U.S. capital goods producers in the 1982-88 period.

A method similar to that used to estimate the effects on U.S. imports of the shifting composition of U.S. capital goods spending was used to estimate the effects of the changing composition of world capital goods spending on U.S. exports. That is, projected shares of total world demand (using world exports minus U.S. imports as a proxy for world demand) in each category of spending in 1986 were calculated by assuming that the 1975-81 growth pattern in the shares of world demand in each category continued through 1986. Applying the 1986 U.S. share of world exports in each category to the projected level of world demand in each category yields a projected level of U.S. exports. Deviation of the actual from projected levels is then attributed to the changing composition of world demand.

This calculation suggests that U.S. exports in 1986 would have been roughly $10 billion greater than the level projected by assuming that the composition of spending in 1986 followed its earlier growth pattern. Increases in computer exports of roughly $11 billion were offset by a decrease in exports of noncomputer machinery and nonautomotive transportation equipment of roughly $3 billion.

The combined structural effects

Table 9 shows the estimated effects of the 1980s structural changes in the capital goods industries on the projected levels of capital goods exports and imports. The shift in the sources of supply of capital goods toward the Asian NICs had the effect of raising imports by $5 billion and reducing exports by $5 billion relative to their projected levels and worsening the capital goods trade balance by $10 billion. Exports were further reduced by roughly $10 billion as a result of poor productivity performance, which also raised imports by

[17]Data on world exports of capital goods are taken from the United Nations, *International Yearbook of Statistics*, 1977, 1981, and 1986.

$5 billion. Shifts in U.S. investment spending away from the noncomputer machinery and equipment category in the 1982-88 period compared with the 1974-81 period resulted in a $5 billion decrease in imports in 1988 while the worldwide demand shifts raised U.S. exports by $10 billion, again relative to their projected level. The net impact of the structural changes in the 1980s was to reduce exports by $5 billion and raise imports by $5 billion relative to what the trend projections would have suggested.

Summing up

The net effects of the macroeconomic and structural factors on capital goods exports and imports are presented in Table 10. Macroeconomic developments in the 1980s compared to the 1975-81 trend period on balance are estimated to ultimately raise exports by $15 billion relative to their projected trend level while leaving imports unchanged, and thus to improve the net surplus by $15 billion. Structural changes, in contrast, hurt the performance of the U.S. capital goods industry in the 1980s. The estimated $5 billion reduction in exports due to these changes partially offset the estimated improvement in exports due to the changes in macroeconomic conditions. Adverse structural changes also contributed $5 billion to import growth. On net, the macroeconomic developments and structural shifts suggest that the actual 1988 capital goods trade surplus should have exceeded its projected level by roughly $5 billion. But the actual 1988 balance fell short of its projected level by $10 billion, leaving a $15 billion gap unexplained.

If imports are considered separately from exports, the combined macroeconomic and structural changes largely account for the excess of actual imports over projected levels. These changes leave unexplained, however, a shortfall of roughly $15 billion in actual exports compared to projected exports. Part of this gap may be traced to the assumption that the full impact of the macroeconomic and structural changes has been realized. If adjustment to the sharp price changes that occurred in the 1980s has not yet been completed, some of the $20 billion boost to exports estimated to have been provided by the net price developments of the 1980s compared to the 1970s price trend deterioration may be still to come. Consequently, the calculated overall macroeconomic effect on exports of $15 billion shown in Table 5 may significantly overstate the macroeconomic effect experienced to date. A substantial decrease in the unexplained gap on the export side would result if the macroeconomic effect actually realized so far has provided significantly less strength to exports than the $15 billion estimate.

Full adjustment of exports to the net result of the 1980s relative price swings may not have occurred yet for several reasons. The unprecedented runup of the dollar between 1981 and early 1985 greatly reduced the competitiveness of U.S. capital goods producers. With foreign purchasers turning away from U.S. products during this period, U.S. distribution networks languished abroad. Foreign manufacturing assembly lines also became geared to foreign capital goods specifications, while familiarity with U.S. products declined. The sharp fall in the dollar beginning in mid-1985 made U.S. capital goods much more price competitive. Substantial time is needed, however, for U.S. capital goods producers to rebuild and expand foreign distribution networks, reestablish foreign market awareness, and regear to meet foreign product specifications. Moreover, many U.S. companies started to produce abroad the capital goods they sold abroad as the dollar rose.

Table 9

Effects of Structural Factors on Projected Levels of Exports and Imports of Capital Goods

(Billions of Dollars)

	Exports	Imports
Demand shifts	+10	−5
Growth of Asian NIC suppliers	− 5	+5
Productivity performance	−10	+5
Net impact	− 5	+5

Note: (+) refers to increases, (−) refers to decreases, in projected levels of exports and imports.

Table 10

Combined Effects of Macroeconomic and Structural Factors on Projected Levels of Exports and Imports

(Billions of Dollars)

	Exports	Imports	Balance†
Actual 1988 level	$110	$100	$10
Projected 1988 level	$115	$95	$20
Deviation (actual−projected)	−$5	+$5	−$10
Macroeconomic factors	+15	0	+15
Structural factors	−5	+5	−10
Net impact	+10	+5	+5
Unexplained gap	−15	0	−15

†Exports minus imports.

This outward movement of production will also take time to reverse.

These delayed adjustment factors are somewhat less important on the U.S. import side. U.S. purchasers could more easily switch back to purchasing U.S. capital goods as the dollar fell in the mid-1980s because U.S. distribution systems, acceptability of U.S. product specifications, and U.S. market familiarity never disappeared. Similarly, U.S. capital goods production abroad (with the exception of manufacturing operations in the Asian NICs, which have explicitly been taken into account in the structural shift calculations) primarily substituted for U.S. exports rather than becoming a source of supply of U.S. capital goods imports. The analysis has largely accounted for capital goods imports in 1988 and has left little room for further delayed adjustment.

Conclusion

A trend projection of the 1975-81 growth patterns of capital goods exports and imports implies that a narrowing should have occurred over time in the $40 billion to $45 billion capital goods trade surplus of the early 1980s. In fact, the 1975-81 trend projection suggests that the U.S. capital goods trade balance should have been only about half of its 1981 value in 1988. Adjusting this trend projection to take account of the effects of the structural changes and macroeconomic developments of the 1980s relative to the 1975-81 trend period implies that the 1988 capital goods surplus should have equalled roughly $25 billion. The actual 1988 capital goods surplus of $10 billion was, however, $15 billion below this expected level, with the difference attributable entirely to a shortfall in exports relative to their expected level. A considerable part of this shortfall may be ascribed to delayed adjustment, that is, the fact that the positive effects of the sharp improvement in price competitiveness starting in 1985 may not have been fully realized to date.

Even if a trade surplus of as much as $25 billion is achieved after delayed adjustment is completed, the capital goods trade balance would of course remain significantly below the surpluses achieved in the early 1980s. This gap represents the declining trend already present in the capital goods trade balance in the 1970s due in significant part to the influence of structural factors. Moreover, a further decline in the surplus will likely result if structural developments in the 1990s follow their adverse 1980s pattern. This outcome appears probable although the pace of deterioration from structural developments may slow. New foreign suppliers such as Thailand, Malaysia, and other emerging Asia-Pacific countries could pose an increasing competitive challenge, and U.S. capital goods producers will have to contend with productivity advances by foreign manufacturers of capital goods. The growth of supply capacity in the four traditional Asian NICs, however, may slacken in coming years, and recent currency appreciation in some of the NICs may reduce competitive pressure on U.S. capital goods producers. Nevertheless, given the growing competitiveness of new foreign suppliers, these favorable developments will at best only slow the decline in the U.S. capital goods trade balance.

Consequently, macroeconomic changes are likely to be necessary to stem the capital goods trade deterioration. Some improvement could come from the foreign side if growth rates compensate over the next several years for the below-average 1982-88 performance. On the U.S. side, however, a continuation of relatively high recent economic growth rates would reduce the improvement in the capital goods trade balance arising from faster foreign growth. To go beyond stemming the deterioration and recapture some of the trade surpluses of the early 1980s may require not only stronger foreign growth and moderate U.S. growth but also some slowing of the adverse structural trends in the capital goods industry.

James Orr

Monetary Policy and Open Market Operations during 1988

Overview

Monetary policy in 1988 sought to contain inflationary pressures while sustaining the longest recorded economic expansion in U.S. peacetime history. Initial concerns about the fragility of the economy and financial markets in the aftermath of the October 1987 stock market crash gave way to a realization that economic activity was still strong and potential price pressures were building. As the balance of perceptions shifted, the Federal Open Market Committee (FOMC) began in March to increase the degree of reserve pressure from the minimal levels that had prevailed after the stock market break. Concerns about inflation intensified during the year as various sectors of the economy appeared to approach constraints on physical capacity and as declining rates of unemployment suggested increasing wage pressures. These concerns were confirmed by the release of price and compensation data that showed a significant pickup in inflation and labor costs, although the increases were not as large as some observers had feared. The incremental firming of reserve pressures, which was augmented by the August 9 increase in the discount rate to 6½ percent, continued through the year's end.

Over the early months of 1988, the FOMC directed the Trading Desk to return gradually to the pursuit of reserve objectives characterized by specified levels of discount window borrowing, after a period of heightened sensitivity to money market conditions that followed the stock market break. At various times during the year, however, depository institutions appeared unusually reluctant to borrow, even when spreads of the federal funds rate over the discount rate were relatively large. The continued reluctance to use the discount window complicated the reserve management procedures that depended on a reasonably predictable relationship between borrowing and the spread between the federal funds rate and the discount rate. The Trading Desk dealt with this complication by pursuing the borrowing objective with added flexibility in order to avoid appreciably firmer money market conditions than the FOMC desired.

The economy proved surprisingly resilient as real GNP advanced at a 2.8 percent rate in 1988 (fourth quarter over fourth quarter), despite the potentially destabilizing effect of the stock market crash and a severe drought in the spring and summer. Growth was fueled by consumer spending, business fixed investment, and a pickup in net exports that was encouraged by the sharp decline in the foreign exchange value of the dollar in previous years. As the economy expanded, employment rose rapidly and the unemployment rate fell to 5.3 percent in December 1988. While the labor market tightened and labor costs accelerated, signs of physical capacity constraints also emerged as the capacity utilization rate rose to its highest level since

Adapted from a report submitted to the Federal Open Market Committee by Peter D. Sternlight, Executive Vice President of the Bank and Manager for Domestic Operations of the System Open Market Account. Jeremy Gluck, Senior Economist, Open Market Analysis Division, and Cheryl Edwards, an economist in the Division, were primarily responsible for the preparation of this report under the guidance of Ann-Marie Meulendyke, Manager, Open Market Operations Department. Other members of the Open Market Analysis Division assisting in the preparation were Robert Van Wicklen, John Krafcheck, Debra Chrapaty, and Carlton Francis. George Sofianos, an economist from the Financial Studies Department, also assisted.

1979. Most price measures reflected these pressures, especially the Producer Price Index, which showed its sharpest increase since 1981.

The yield curve flattened, particularly in the latter part of 1988, as short-term interest rates rose in response to the growth of economic activity and prices, and to the actual and expected firming of policy. Market participants focused closely on incoming economic data, especially the monthly payroll employment survey, for signs of continuing growth that could bolster inflation and induce further policy moves. Long-term yields finished the year little changed, partly for technical reasons, but also because of the expectation that the gradual firming of policy would ultimately contain inflation. The steadiness of the dollar in the foreign exchange markets through much of the year lent support to fixed-income security prices.

Following sluggish growth in 1987, expansion of the broader monetary aggregates accelerated modestly in 1988 as M2 advanced 5.4 percent and M3 rose 6.4 percent (fourth quarter over fourth quarter), leaving M2 somewhat below and M3 slightly above the midpoints of their respective growth ranges.[1] Total debt expanded 8.7 percent, close to the middle of its monitoring range, and M1 grew 4.2 percent. Monetary growth was moderate over the first half of the year, then decelerated over the second half as rising market interest rates lifted the opportunity costs of holding money.[2]

Policy implementation was made more difficult in 1988 by the apparent shifts in the demand for borrowed reserves. Over much of the year, various levels of discount window borrowing tended to be associated with firmer-than-expected money market rates. During the months that followed the stock market break, when concerns about financial market stability lingered, the preference of depository institutions to conserve their borrowing privileges was not surprising. However, even after it became clear that economic activity was expanding and that a serious banking and financial crisis was unlikely, the reluctance to borrow persisted. Part of the tendency for borrowing to run below anticipated levels, given market interest rates, appeared to be the product of market expectations of firmer policy over the spring and summer. The August discount rate hike and subsequent economic reports that suggested a moderation of growth seemed to restore a more customary relationship between borrowed reserves and federal funds rates. Nevertheless, a greater discrepancy in the relationship between rate spreads and borrowing resurfaced in the fall after seasonal borrowing fell off sharply from unusually high levels. The Desk again responded by interpreting the allowance for discount window borrowing flexibly. Finally, in November, a downward adjustment to the borrowing allowance was made to reflect the apparent downward shifts in the willingness to borrow. At the same time, policy was tightened further in response to strength in economic activity.

The economy and domestic financial markets

The economy

The longest U.S. peacetime expansion since at least the middle of the nineteenth century continued in 1988 as real economic activity grew at a moderate rate, despite the stock market crash in October 1987 and a severe drought in many areas of the country. Real GNP increased 2.8 percent in 1988 after its inventory-fueled rise of 5.0 percent in 1987.[3] The U.S. Department of Commerce estimated that in the absence of the drought, real GNP would have grown 3.5 percent. Consumer spending accounted for much of the advance in real growth, with business fixed investment and net exports providing the rest. Real final sales grew 3.9 percent, compared with 3.0 percent in 1987. Meanwhile, labor markets tightened as the total unemployment rate fell to a 14-year low of 5.3 percent in the fourth quarter of 1988, a one-half percentage point decline from the fourth quarter of 1987. Total employment rose by 1.9 percent, somewhat below its 1987 pace; nonfarm payroll growth in export-related industries was strong. Physical capacity also constrained growth in some sectors of the economy, as the capacity utilization rate climbed to 84.5 percent in December, compared with 82.6 percent one year earlier.

The declining unemployment rate and growing relevance of capacity constraints led to a significant pickup of inflation in 1988, with the price acceleration more evident at the early stages of production than at the consumer level. For example, the employment cost index for private industry rose 4.9 percent for the year

[1] All money growth rates cited in this report are based on the data available before the benchmark and seasonal revisions in February 1989. The debt figures reflect revisions through February 16. The earlier data are used because they represent the information available to the FOMC members at the time that they made their decisions. The revisions were minor overall. Over the four quarters of 1988, the revisions lowered the growth rates of M2 and M3 by one-tenth percentage point and two-tenths percentage point, respectively, and raised the growth rate of M1 by one-tenth percentage point.

[2] The February 1989 revisions did produce some leveling of the pattern of growth over the year. The growth of M2 was revised downward in the first half of the year and raised in the second, while the growth of M3 was revised downward over the first three quarters and raised in the fourth.

[3] All growth rates in this section are expressed on a fourth quarter over fourth quarter basis unless otherwise specified.

ending December 1988, exceeding its 3.3 percent increase in 1987. The Producer Price Index rose 4.0 percent from December of 1987 to December of 1988, an increase markedly higher than the 2.2 percent rise in 1987. More broadly, the rate of inflation as measured by the GNP implicit price deflator accelerated one and two-tenths percentage points to 4.3 percent. Meanwhile, the growth rate of the Consumer Price Index remained unchanged at 4.4 percent (December to December). Energy costs were basically unchanged, while food prices increased two and a half times faster over the last nine months of the year than they had over the first three months, reflecting the impact of the drought. Excluding these often volatile components, consumer prices rose 4.7 percent, up from 4.2 percent in 1987.

Real personal consumption expenditures grew at about twice their 1987 rate, while real disposable personal income rose modestly faster than in 1987.[4] Consumption, especially its durable goods component, revived in the first quarter of 1988 as consumer confidence appeared to overcome the stock market break. Consumption expanded steadily over the remainder of the year.

Real private domestic investment fell 1.0 percent in 1988, after a sizable 17.5 percent advance in 1987. Most of the 1987 rise in investment, however, had come from a bulge in inventories in the fourth quarter, a result of the drop in consumption after the stock market break. In 1988, in contrast, expansion of real nonresidential fixed investment, especially producers' durable equipment, played a large role in investment expansion as companies invested heavily in office and computer equipment. Inventory accumulation was high in the first quarter of 1988 but slowed over the final three quarters in lagged response to the rebound in consumption and continued strength in exports. Meanwhile, spending on nonresidential structures fell in response to high vacancy rates in many locales and perhaps to rising interest rates.

The merchandise trade deficit, measured in current dollars, narrowed by about $30 billion to $128 billion in 1988, while the real merchandise trade deficit shrank by about the same amount. These declines largely reflected the lagged effect of the 1985-87 dollar depreciation and productivity gains in manufacturing, both of which enhanced the competitiveness of U.S. products. Exports grew robustly again in 1988, led by exports of capital goods. Import growth decelerated slightly from its 1987 pace because of slower growth in capital goods imports. Nevertheless, as the value of the dollar stabilized in 1988, the rate of reduction of the trade deficit slowed in the latter part of the year. Overall, the trade-weighted value of the dollar appreciated 3.6 percent from December 1987 to December 1988.

The remaining component of GNP, real government purchases of goods and services, was about unchanged in 1988 because fiscal restraint at the federal level was offset by increased purchases at the state and local levels. Real nondefense purchases by the federal government declined as a result of a drought-induced decline in the purchases of crops by the Commodity Credit Corporation. Real defense spending fell for the first time since 1978. For fiscal year 1988, the federal budget deficit increased to $155.1 billion from $144.7 billion in 1987, mainly reflecting higher interest payments on public debt and significantly larger outlays by the Federal Savings and Loan Insurance Corporation (FSLIC) to close insolvent thrift institutions. Receipts grew at about half of their 1987 pace, which had been buoyed by special one-time factors related to the Tax Reform Act of 1986.

The severe drought had a significant impact on real economic growth. Total losses of crops and livestock reduced real agricultural output by an estimated $12.1 billion over the year and trimmed about seven-tenths percentage point from real GNP growth. The drought also distorted the growth pattern of real GNP. The unadjusted numbers suggest a weakening between the first and second halves of the year. When real growth is adjusted for the drought, however, the slowdown between the two halves of the year is less pronounced.[5]

The pace of economic expansion in 1988 surprised many observers who had anticipated that the collapse of stock market prices in October 1987 would lead to a significant slowdown. Real consumption was expected to be damped because the crash wiped out an estimated $800 billion of household wealth held in corporate equities, both directly and indirectly through pension funds. Real investment was also expected to slow because the crash raised the cost of equity capital for firms.

A number of factors appear to have accounted for the muted impact of the crash on the real economy. First, the crash only erased the capital gains that had accumulated since the beginning of 1987. The erasure of the rapidly accumulated capital gains earned in the

[4]Consumer spending fell in the fourth quarter of 1987 in response to the expiration of automobile sales incentives and the stock market break. Recovery from this decline tended to boost growth over the four quarters of 1988.

[5]The drought is estimated to have reduced real GNP growth by nine-tenths percentage point, one-half percentage point, and one and one-tenth percentage points in the second, third, and fourth quarters, respectively. The "drought-adjusted" growth rates are 3.4, 3.9, 3.0, and 3.5 percent for the four quarters of 1988.

stock market would have affected consumption only to the extent that these gains had been incorporated into consumer spending behavior. Since temporary increases in wealth are typically not immediately translated into consumption, and since stock holdings are concentrated in the hands of wealthy individuals who are less likely to tap capital gains for consumption purposes, the impact on consumption was mitigated. Furthermore, bond market capital gains earned in the days following the stock crash offset some of the losses in the equity market.

In addition, the dramatic decline in interest rates that followed the stock market break, a product of the Federal Reserve's sizable provision of liquidity to financial institutions and revised expectations of future inflation, had important effects on the real economy. The Federal Reserve's prompt provision of liquidity and its assurances that it stood ready to manage future strains on the financial system to limit systemic risk helped to preserve essentially normal banking and financial market operations. Lower interest rates in late 1987 likely contributed to further declines in the foreign exchange value of the dollar and also offset the rise in firms' cost of equity capital. Exports rose because U.S. goods became more competitive in world markets; in turn, the increase in exports promoted investment and raised consumer incomes. Although noninventory investment may not have immediately responded to lower interest rates in the uncertain postcrash environment, the drop in rates probably contributed to the growth of fixed investment in 1988.

Domestic financial markets

The yield curve flattened considerably in 1988 as short-term interest rates rose sharply, while long-term rates finished the year about unchanged (Chart 1). Both short- and long-term rates declined over the first two months of the year (Chart 2). Short-term rates climbed steadily from March through the end of the year. Long-term rates also began to climb in early March, but the rate increases abated in June; long-term rates then fluctuated in a narrow range for the rest of the year, with a brief spike in August. Over the year as a whole, yield increases on Treasury coupon securities, as measured by the constant maturity series, ranged from about 190 basis points for securities with one year to maturity to only 5 basis points for those with 30 years to maturity. Treasury bill rates increased 170 to 220 basis points. Meanwhile, yields on highly rated corporate and municipal bonds actually fell around 40 and 10 basis points, respectively, as measured by Moody's Aaa bond indexes, which have average maturities of 20 years.

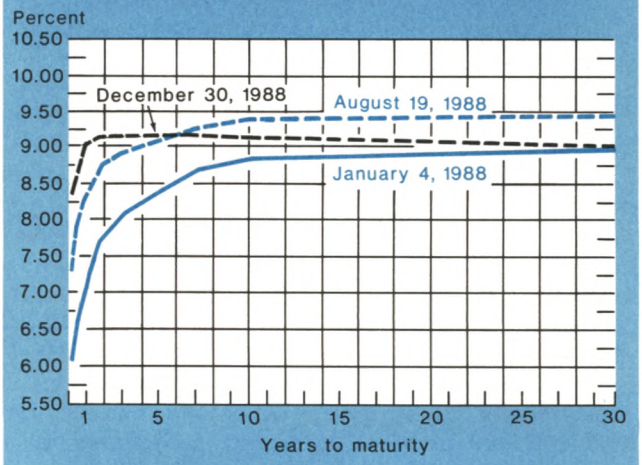
The major influences on financial markets in 1988 were the outlook for economic activity and inflation, and the expected and actual policy responses to economic and price developments. Market participants watched the regular releases of economic data with extreme care, especially the monthly report on payroll employment. Yields would rise in anticipation of strong gains and in response to job gains that exceeded expectations, as strong gains touched off fears of higher inflation and possible Federal Reserve tightening. Other economic reports were scrutinized for evidence that supported these views. The monthly release of the merchandise trade deficit was watched closely, in part because it affected the value of the dollar on foreign exchange markets, and also because strong export growth might intensify inflationary pressures. A falling dollar would raise yields because of concerns about inflation through rising import prices and the potential reluctance of foreign investors to participate in the U.S. bond market. On a day-to-day basis, market participants also followed the behavior of oil prices, various commodity price indexes, and the federal funds rate.

Treasury securities

Yields on all maturities of Treasury securities fell over the first two months of the year in response to the System's slight easing of monetary policy, which was confirmed in late February by Chairman Greenspan in his Humphrey-Hawkins testimony. Yields also fell because

Chart 1

Yield Curves for Selected U.S. Treasury Securities



Note: Treasury bill yields are on a bond-equivalent basis, while coupon yields are constant maturity values.

economic releases suggested that the economy might be slowing and that inflationary pressures were low. In mid-January, the November trade deficit was reported to have narrowed as exports increased and imports decreased. Later, reports of an inventory-led rise in GNP in the fourth quarter of 1987 and the third consecutive monthly decline in the Index of Leading Indicators reinforced views that the economy had slowed after the stock market break. In addition, monthly price data showed only small increases. A stable dollar and a quarter-point cut in the prime rate to 8.5 percent in early February also added to the market's favorable tone. In mid-February, the narrowing of the December merchandise trade deficit initially supported expectations of lower interest rates, although many observers noted that the modest decline in imports (later revised to an increase) suggested that consumption might not be slowing much after all.

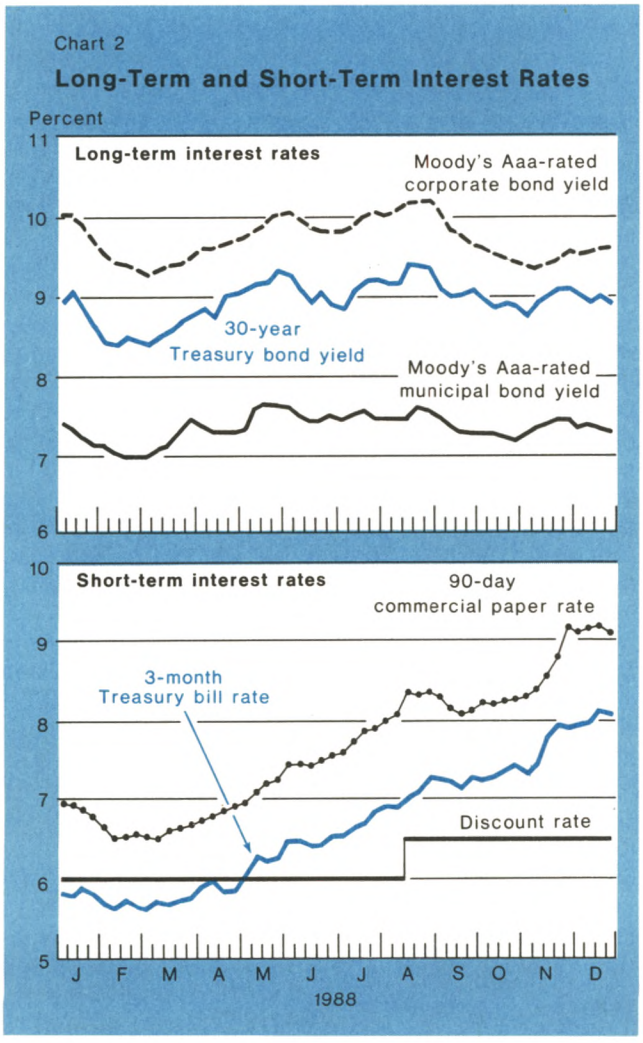
Yields firmed in early March and rose through late May, with long-term yields moving first. A surge in February nonfarm payrolls, reported in early March, jolted the market and cast doubt on the view that the economy was weak. Expectations of solid growth were later reinforced by substantial advances in personal consumption and income. Two more strong employment reports helped to fuel upward pressure on yields. Robust advances in inflation indicators and rising commodity prices, especially the price of oil, contributed to fears about higher future inflation. Yields were also pressured higher by the mid-April release of a wider February trade deficit and later by the March deficit, which was narrower but showed strong export and import gains. Treasury bill rates were driven higher by expectations that the System would tighten policy in response to the perceived strength of economic activity and the worsening outlook for inflation. Rates moved higher in May after a System move to increase pressures on reserves and a half-point increase in the prime rate to 9 percent. The upward pressure on bill rates persisted because speculation continued about further policy moves and the possibility of a hike in the discount rate.

Over the remainder of the year, yields on Treasury coupon securities, especially longer maturity issues, moved within a fairly narrow range. Generally, yields rose on stronger-than-expected employment reports, such as those released in July, August, November, and December, and fell on weaker-than-expected reports, such as those released in June, September, and October. With the exception of the June trade deficit, which was released in mid-August, the trade reports released over the remainder of the year were in line with expectations and had little impact on yields. Yields jumped after the Federal Reserve Board approved an increase in the discount rate on August 9 and remained firm for the rest of the month until signs of a moderation of economic activity emerged in September.

Meanwhile, after the May refunding, the Treasury had about exhausted its authority to issue bonds with coupon rates above 4.25 percent. Market participants anticipated that a 30-year bond might not be feasible in the August refunding auctions; indeed, none was offered. The limited supply kept yields on the 30-year bond under downward pressure throughout the summer and most of the fall. Congress finally removed interest rate restrictions on Treasury bonds in November, but the action was too late for the regular refunding to include a bond; the Treasury did sell a 30-year bond in late November. Demand for outstanding 30-year bonds

Chart 2

Long-Term and Short-Term Interest Rates



for STRIPS,[6] especially late in the year, also limited yield increases because it reduced the floating supplies of whole bonds. Nonetheless, longer term yields moved higher during November and December on signs of renewed economic growth and finished the year around 9 percent, little changed from the start of the year.

Unlike Treasury bonds, rates on Treasury bills and shorter term notes generally climbed from late May through the end of the year, with a sharp runup over the final two months. This progression caused the Treasury yield curve to flatten appreciably in the latter part of the year. At times, sections of the yield curve were inverted, particularly in December. Short-term rates were quite sensitive to market participants' expectations about tighter monetary policy and to manifestations of firmer policy. These expectations were heightened over the summer months by reports of strong employment growth and by expectations of the discount rate hike that was announced in August. Bill rates also were pressured higher in August (and again in November) by large increases in the supply of bills, as a result of the Treasury's issuance of cash management bills, rather than 30-year bonds, in the midquarter refunding auctions. Rates leveled off in September and October on signs of moderate economic growth and subdued inflation, and then rose sharply in early November in response to a much higher-than-expected payroll employment report. Rates climbed throughout November and December, buoyed by persistently firm federal funds rates and rumors of a possible discount rate hike.

U.S. government-sponsored agency securities

The focus of the agency market in 1988 was the insolvency of many thrift institutions. The Federal Home Loan Bank Board liquidated, took over, or merged 222 thrift institutions during the year at an estimated cost of $38.6 billion. The cost of closing the remaining 400 or so insolvent institutions is believed to be considerably more. Despite the continued difficulties of the thrift industry, spreads between yields on Treasury securities and those on the debt of the Federal Home Loan banks (FHLB) narrowed slightly from their levels at the end of 1987; investors apparently had confidence in FHLB securities, even though such securities do not have a formal government guarantee.

The Financing Corporation (FICO), the entity formed to help recapitalize FSLIC, offered $4.4 billion of 30-year bonds during 1988. Nonetheless, FSLIC remained technically insolvent. The spread of FICO over Treasury yields widened from about 90 basis points at the end of 1987 to around 115 basis points by the end of July because investors were concerned that FICO's $10.8 billion authorization would have to be expanded. The spread subsequently narrowed to roughly 70 basis points by the end of 1988. This narrowing reflected the widespread belief that the government would bail out the thrift industry and would ensure that FICO debt obligations would be met. (Currently, principal payments on FICO debt are backed by zero-coupon Treasury bonds, while the interest payments are secured by a first lien on insurance premia paid to FSLIC.) The extension of the congressional ban on thrift departures from FSLIC until August 1989, which ensured continued inflows of insurance premia to the insurance fund, also contributed to the narrowing of the spread. Moreover, the near equivalence of FICO principal payments to the principal portion of 30-year Treasury bonds encouraged market participants to create FICO strips amid a scarcity of strippable Treasury issues. In December, the spread between yields on FICO principal strips and yields on comparable Treasury STRIPS was about 30 basis points, while the spread between the yields on FICO interest strips and comparable Treasury STRIPS ranged from 40 basis points for maturities within one year to 80 basis points for maturities of seven or more years.

The financial health of the Farm Credit System (FCS) improved somewhat during 1988, even though one of its member banks was placed in receivership in May. Legislation to assist the FCS authorized the creation of the FCS Funding Assistance Corporation (FCSFAC) at the start of the year. The FCSFAC issues U.S. government-guaranteed 15-year bonds, up to an authorized limit of $4 billion; in 1988, it issued $690 million in bonds at an average spread of about 40 basis points over the yield on 10-year Treasury notes. The System also continued to issue debt that was not government-guaranteed. The spreads over comparable Treasury securities for these issues narrowed during 1988 but remained above the levels that prevailed before the System's troubles began. This narrowing was attributed in part to the improved financial condition of the FCS — the drought pushed agricultural commodity prices higher, enabling some farmers to resume loan payments to the FCS.

Corporate bonds

Public debt offered by U.S. corporations in the domestic bond market fell to $199 billion in 1988 from $209 billion in 1987, though issuance by foreign corporations rose somewhat.[7] Offerings of collateralized

[6]STRIPS refers to Separate Trading of Registered Interest and Principal of Securities. This program permits separation of the interest payments of a Treasury security from the principal payment for issues held in book-entry form.

[7]The data on corporate debt issuance come from IDD Information Services and the Federal Reserve Board.

securities, such as those backed by mortgages or other assets, jumped by 23 percent and accounted for almost half of the new-issue volume. The spread between yields on Aaa-rated corporate securities and 10-year Treasury notes narrowed during the March through May period as corporate yields lagged rising Treasury yields. The spread widened briefly in June, when new corporate issuance bulged, before narrowing steadily over the rest of the year.

The corporate bond market was rattled in late October when a fight for control of RJR Nabisco broke out after management announced an offer to take the company private through a leveraged buyout (LBO). RJR Nabisco had been considered too large to be taken private or taken over. By the time Kohlberg Kravis Roberts & Co. won the bidding at a price of $25 billion, prices of outstanding RJR Nabisco bonds had fallen considerably and yield spreads over Treasury issues had widened by 200 to 245 basis points because the LBO would be financed by issuing a substantial amount of additional debt. The spreads between yields on financial and utility bonds over industrial corporate bonds narrowed briefly (Chart 3) and activity in the industrial sector came to a standstill because investors were concerned that other firms previously believed to be immune to takeover attempts were now subject to such "event risk." Moreover, new issuance in this sector was virtually halted until late in the year when two issues came to market that contained "poison-put" provisions. Purchasers of these bonds can put, or resell, their bonds to the issuer at a specified price in the event of a corporate takeover, merger, or restructuring that results in the bonds losing their investment-grade status.

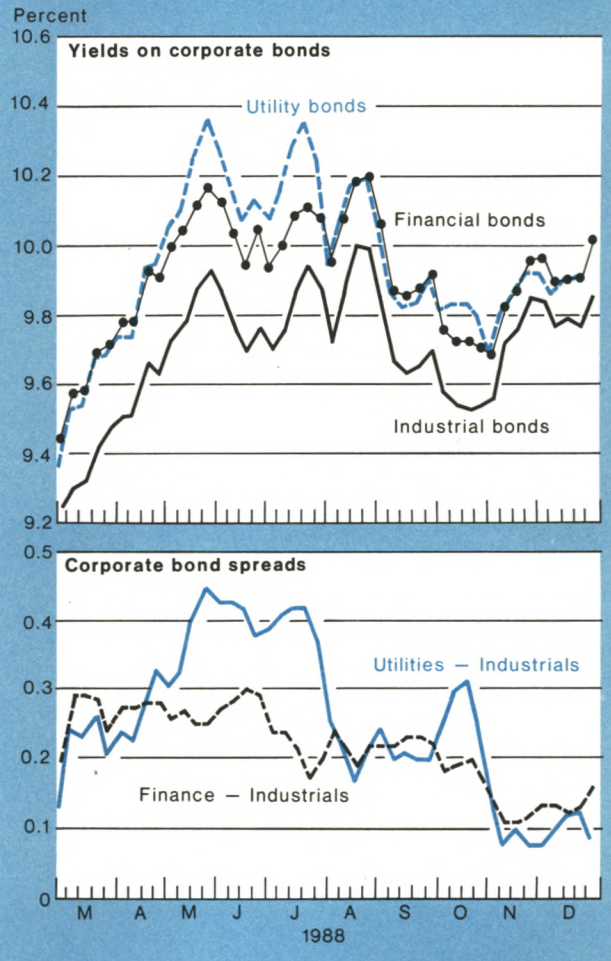
Issuance of below-investment-grade bonds, also known as "high-yield" or "junk" bonds, reached about $28 billion, slightly below its 1987 level. On balance, yields on these bonds relative to those on Treasuries narrowed by about 50 basis points. The market seemed to shrug off the Chapter 11 bankruptcy filing by Revco DS, Inc. on July 28 and the formal charges brought against Drexel Burnham Lambert, Inc., the largest underwriter of high-yield securities, in September. Revco, which had gone private in 1986 in a $1.25 billion LBO, defaulted on $700 million of interest payments to become the largest LBO failure to date. Drexel was charged by the Securities and Exchange Commission (SEC) with insider trading and other violations of securities laws. Just before the year's end, Drexel agreed with the Justice Department to plead guilty to criminal charges of securities fraud and other violations and to pay $650 million in fines and restitution. The agreement was contingent upon Drexel's settlement of the SEC charges.

In developments affecting major bank holding company (BHC) debt, the Supreme Court ruled in June that the Federal Reserve Board had correctly interpreted the Glass-Steagall Act in granting its limited approval for BHCs to underwrite and deal in securities backed by consumer receivables, municipal revenue bonds, private mortgage-related securities, and commercial paper. A district court judge, however, overturned the Comptroller of Currency's decision that national banks may issue securities backed by their own loans. Finally, 1988 saw the first hostile takeover of a BHC when the Bank of New York Company acquired Irving Bank Cor-

Chart 3

Corporate Bond Yields and Spreads

(Weekly Averages)



Source: Merrill Lynch Bond Indexes.

Note: Data not available before March 1988.

poration to form the twelfth largest BHC.

Municipal bonds

The municipal bond market was relatively quiet in 1988 after two years of turbulence caused, in part, by the Tax Reform Act of 1986. Investor demand for municipal bonds was generally strong during 1988 because municipal bonds were among the few remaining tax-sheltered investments available. According to the *Bond Buyer,* new issuance rose 4 percent to around $106 billion. With the increase in supply modest, most municipal bond yields declined, causing spreads below Treasuries to widen. The decline was not sufficient to encourage a large volume of refundings; refunding issues fell to about $29 billion, from $39 billion in the previous year.

Some new rules had an impact on the municipal bond market in 1988. In April, the Supreme Court ruled that Congress has the power to tax interest earned on municipal securities. Prices were sent sharply lower on fears that municipal bonds would lose their tax-advantaged status. Nevertheless, such fears were soon allayed because existing statutes were not altered by the decision and participants anticipated that outstanding issues would be "grandfathered" if new legislation were enacted. In late September, the SEC issued an interpretive release stating that underwriters must have a "reasonable basis for believing in the accuracy of key representations" made in issuers' bond documents before they bid on or sign deals.

The monetary aggregates

Growth of the broader monetary aggregates, M2 and M3, accelerated slightly in 1988, while growth of M1 and the debt aggregate slowed from their 1987 paces (Chart 4). The patterns of growth for M1, M2, and M3 show a sharp acceleration over the first half of the year relative to the sluggish rates of late 1987, and then a marked deceleration over the final half. Overall, M2 and M3 grew 5.4 and 6.4 percent, respectively, from the fourth quarter of 1987 to the fourth quarter of 1988. M1 advanced 4.2 percent, while debt expanded 8.7 percent, well within its monitoring range. The rates of monetary expansion over the year were within the Committee's growth cones.

In February, the FOMC reviewed the target ranges for the growth of M2 and M3 that it had tentatively set the preceding July. To focus attention on the need to restrain the expansion of domestic demand and to underscore its commitment to price stability over time, the Committee reduced the lower bound of the growth ranges for M2 and M3 to 4 percent, compared with the tentative lower bound of 5 percent for 1988 and the actual lower bound of 5.5 percent for 1987. The FOMC also voted to retain the upper bound of 8 percent growth for M2 and M3 tentatively set in July 1987. This upper bound was one-half percentage point below that used for 1987. The Committee widened the growth ranges in light of the increased volatility of the relationship between money growth and ultimate policy objectives, such as prices and output. It expected growth of the broader aggregates to accelerate to rates around the midpoints of the target ranges after the slow growth in 1987.

The FOMC also reviewed the tentative monitoring range for total domestic nonfinancial debt and its 1987 decision not to establish a numerical range for M1 growth. The Committee anticipated that the growth of nonfinancial debt would slow in 1988 because government borrowing was expected to decline. The Committee also widened the monitoring range for debt growth by one percentage point to a range of 7 to 11 percent, compared with a range of 8 to 11 percent in 1987. No growth range was specified for M1 because the relationship between M1 growth and the performance of the economy remained difficult to predict and interpret; M1 demand continued to be very sensitive to changes in interest rates. The Committee agreed to evaluate the growth of M1 in light of developments in the economy and financial markets, and the nature of emerging price pressures.

The aggregates grew briskly over the first half of the year in response to relatively narrow spreads between the rates on market instruments, such as Treasury securities, and those on monetary assets; such spreads can be interpreted as the opportunity costs of holding monetary assets. Through March, rates on Treasury securities continued around the reduced levels reached after the October 1987 stock market crash when investors sought the safe haven of Treasury securities. Since the rates on M2 deposits did not fall as quickly as market rates, the opportunity costs of holding monetary assets declined, thereby spurring the demand for these assets. In particular, the attractive rate spreads for consumer certificates of deposit (CDs) and money market mutual funds bolstered these categories of M2 through April. M2 growth may also have been helped by investor uncertainties about the outlook for the equity and bond markets. M1 growth, which stemmed from the expansion of other checkable deposits and currency, also contributed to the strength in M2. The vigorous expansion of M2 buoyed the growth of M3, while the non-M2 component of M3 grew modestly. Funds from M2 deposits were sufficient to finance most of the expansion of bank credit, allowing banks to rely less heavily on the managed liabilities in M3 and outside of the aggregates.

The growth of the aggregates, especially M2, mod-

Chart 4A

M2: Levels and Target Ranges

Cones and Tunnels

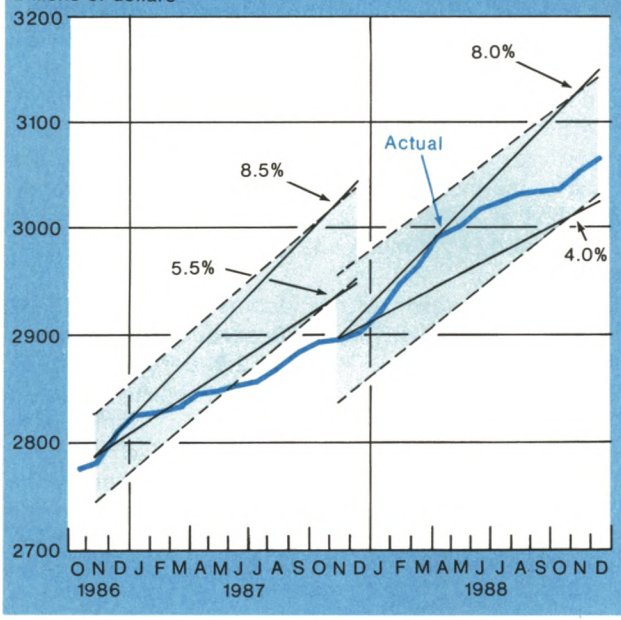


Chart 4B

M3: Levels and Target Ranges

Cones and Tunnels

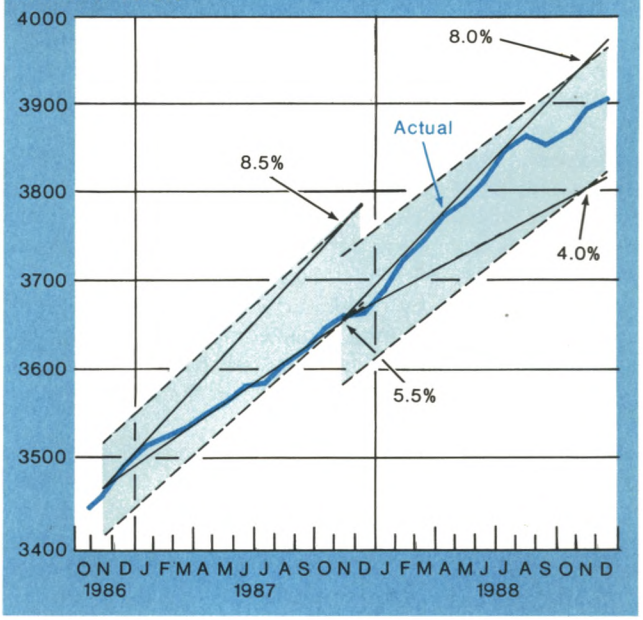


Chart 4C

Total Domestic Nonfinancial Debt Levels and Monitoring Ranges

Cones and Tunnels

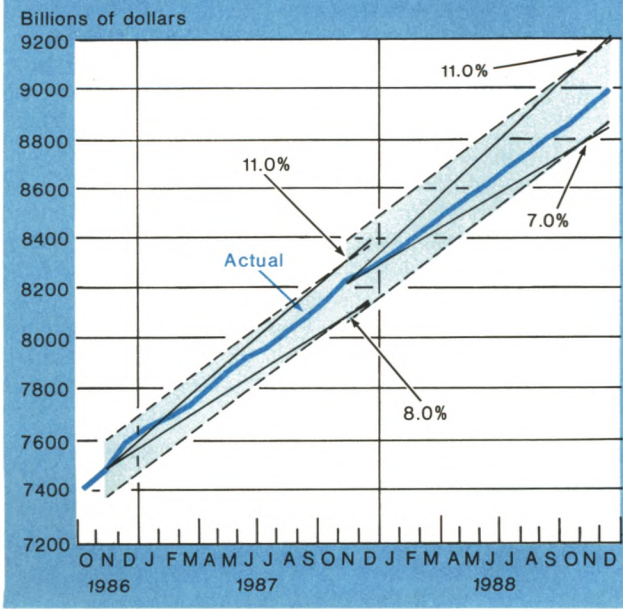
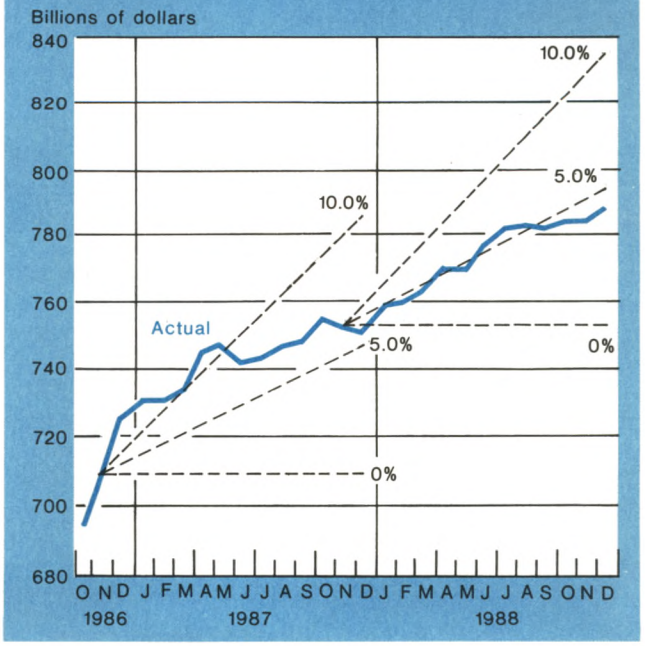


Chart 4D

M1 Levels and Growth Rates



erated in May and June. The moderation in May stemmed in part from an unwinding of the April buildup in transactions balances that accompanied the payment of taxes. Seasonal adjustment factors typically take account of such behavior; however, both the buildup and the runoff were larger than allowed for by these factors, thereby boosting the growth of these deposits in April and depressing their growth in May. In addition, growth in M2 was depressed by rising opportunity costs, which were precipitated by faster increases in market rates than in rates on M2 deposits. Meanwhile, bank credit expansion remained brisk. The expansion was financed by a modest rise in the issuance of the managed liabilities in M3 and by nondeposit sources of funds. However, M3 growth was slightly depressed by continued declines in institution-only money market funds. This component of M3 typically falls quickly when institutional investors observe a general rise in rates since yields on these funds tend to lag those on market instruments.

Even with this moderation, both M2 and M3 were still above the midpoints of their target ranges in June. M1 had expanded at a 5.1 percent rate over the first two quarters while total nonfinancial debt had increased at a rate of 8.5 percent, well within its monitoring range. In its midyear review, the Committee took account of a staff analysis that pointed to a slowing of M2 growth to around the middle of the target range as a result of slower income growth and in lagged response to increases in the opportunity costs of holding deposits. Furthermore, credit demands were projected to grow at a robust rate so that M3 would grow at a faster rate than M2 but would remain within its target range. Debt was projected to remain near the midpoint of its monitoring range. Accordingly, the Committee affirmed the 1988 ranges for growth in the monetary and debt aggregates.

Over the second half of the year, the growth of the aggregates decelerated especially sharply in response to the continued rise in market interest rates and in the opportunity costs of holding monetary assets. These increases had their most pronounced effect on the demand for liquid deposits (those that can be withdrawn on short notice without penalty but whose offering rates change relatively slowly). M1 growth slowed to a 2.7 percent rate over the June-to-October period. M2 growth was also dragged down by the weak expansion of savings deposits and money market mutual funds and by declines in money market deposit accounts, although small time deposits advanced as their rates were relatively more attractive. The pace of bank credit expansion from June to October was about half the rate experienced over the first half of the year. This slowdown, in conjunction with the weakness in M2, depressed M3 growth.

M2 and M3 growth picked up over the last two months of the year despite further increases in the opportunity costs of holding liquid deposits. The strengthening of M2 growth stemmed from steady increases in small time deposits and from strong inflows into money market mutual funds. Rates on these funds followed market rates more closely than the deposit rates on other liquid components of M2. Since the modest expansion of bank credit over these months was funded primarily with M2 deposits, the growth of the managed liabilities in M3 was very weak. At the end of 1988, M2 was slightly below and M3 was modestly above the midpoints of their respective target ranges.

In 1988, the growth of the income velocities[8] of M2 and M3 slowed to 1.7 and 0.8 percent, respectively, after having jumped to 4.1 and 2.7 percent in 1987 (Chart 5). M1 velocity growth increased modestly to 2.9 percent, while the income velocity of nonfinancial debt fell 1.4 percent, a bit more than its 1987 decline.

Over extended periods, most of the variation in the velocity of M2 can be explained by movements in the opportunity cost of holding M2 (Chart 6).[9] Such movements are also important for explaining the short-run behavior of M2 demand. According to a simple model, the rise in the opportunity cost of holding M2 deposits played a major role in the slowdown in M2 growth in the latter half of 1988. Nearly 85 percent of the variation in the velocity of M2 is explained by movements in its opportunity cost (and a dummy variable for the introduction of money market deposit accounts in December 1982). In 1988, the nearly one percentage point increase in the two-quarter moving average of the opportunity cost largely accounted for the four percentage point slowdown in M2 growth between the first and second halves of the year.

Policy implementation

Policy developments over the year

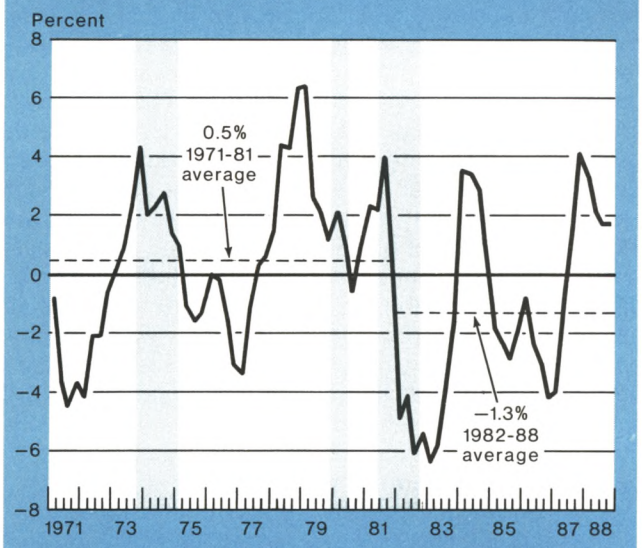
During the early months of 1988, discount window borrowing gradually resumed its role as the primary short-term policy guide. In order to calm market anxieties immediately after the October 1987 stock market crash, the FOMC—and the Desk—had relied heavily

[8] The income velocity of an aggregate is the ratio of nominal GNP to the level of the aggregate.

[9] The opportunity cost in the chart is the two-quarter moving average of a money market rate (defined here as the average of the bond-equivalent yield of the three-month Treasury bill, the 90-day commercial paper rate, and the large denomination CD rate in the secondary market) less the rate paid on M2 deposits. The rate paid on M2 is defined as a weighted average of the rates paid on each component of M2, where the weight is that component's share of M2 in the previous quarter.

Chart 5A

M2 Velocity Growth*

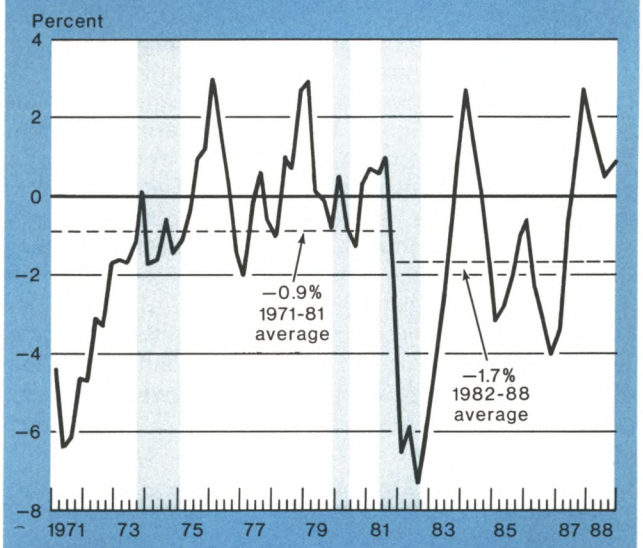


*Growth from four quarters earlier.

Shaded areas represent periods of recession as defined by the National Bureau of Economic Research.

Chart 5B

M3 Velocity Growth*

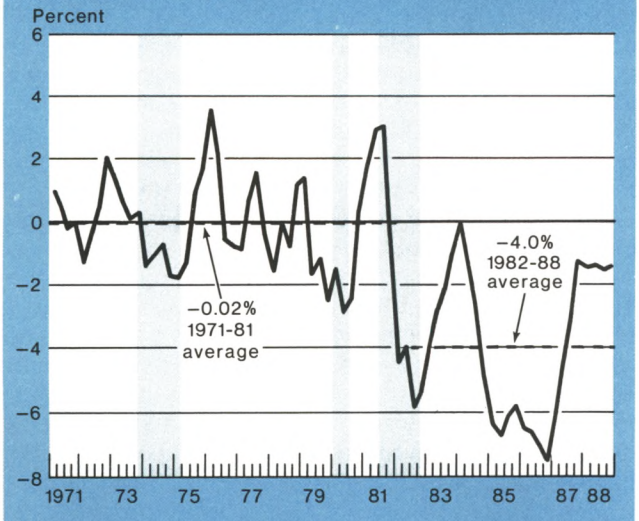


*Growth from four quarters earlier.

Shaded areas represent periods of recession as defined by the National Bureau of Economic Research.

Chart 5C

Total Domestic Nonfinancial Debt Velocity Growth*

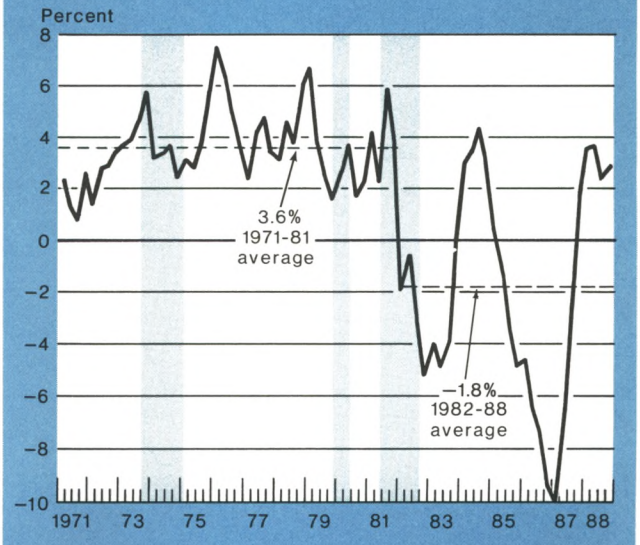


*Growth from four quarters earlier.

Shaded areas represent periods of recession as defined by the National Bureau of Economic Research.

Chart 5D

M1 Velocity Growth*



*Growth from four quarters earlier.

Shaded areas represent periods of recession as defined by the National Bureau of Economic Research.

on the federal funds rate for guidance. The transition back to a borrowed reserve approach began in December 1987, as the sense of fragility in the financial markets diminished. Then, in the spring of 1988, data began to suggest that economic activity was more robust than it had appeared in preceding months. For a while, policy implementation retained some increased sensitivity to the potential for adverse market reactions to financial developments, but borrowed reserves regained much of their earlier weight. The FOMC formally completed its return to the precrash borrowed reserve operating procedure at its mid-May meeting, when it eliminated the sentence in the policy directive that called for special flexibility in view of the fragile state of the financial markets. Later in the year, the Desk was again particularly alert to the behavior of the funds rate when the demand for borrowed reserves appeared to shift. (Notes on the FOMC directives and the assumptions used in constructing the reserve paths are in Table 1.)

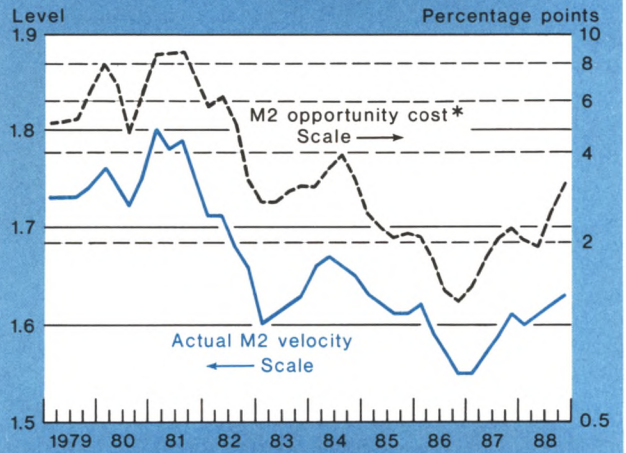
The borrowed reserve approach to policy implementation was embodied in the procedures followed, with some modifications, since 1983. The Desk has targeted average levels of nonborrowed reserves (NBR) to be held over two-week reserve maintenance periods. The NBR levels were chosen to be consistent with the degree of reserve pressure sought by the FOMC. Specifically, the Desk formulated its NBR objective by first estimating the total demand for reserves, consisting of the demands for required and excess reserves, and then subtracting from that demand an assumed level of discount window borrowing set by the FOMC. The remainder was the NBR objective. The Desk would attempt to achieve the NBR objective through its open market operations, subject to uncertainties about reserve demand and the impact of various "operating factors" on the availability of NBR. The assumed amount of borrowing was expected to be consistent with a particular range of money market firmness. Because the Federal Reserve discourages banks from engaging in heavy or frequent discount window borrowing, a higher level of borrowing has tended to be associated with firmer money market rates: The reduction in the supply of NBR that corresponded to a higher assumed level of borrowed reserves would cause banks to bid more aggressively for reserves in the federal funds market, driving up the funds rate. With NBR scarcer, some of the banks would be unable to satisfy their needs in the funds market, and would ultimately be forced to come to the window.[10]

Thus, borrowing and the spread of the funds rate over the discount rate have tended to move up and down together, except when there has been a shift in the willingness of banks to approach the discount window. Banks appeared to be more reluctant to borrow after the stock collapse; that is, they would not borrow a given aggregate amount at the window unless money market conditions were firmer than would have been necessary to induce that level of borrowing before October 1987. As a consequence, strict adherence to the NBR objective implied by a given anticipated borrowing level would have forced federal funds to trade above the range anticipated by the FOMC, making it less desirable to follow the standard borrowed reserve procedure. Given this shift in the relationship between discount window borrowing and money market firmness, special flexibility was needed to enable the Desk to steer a course that more closely reflected the degree of restraint sought by the Committee.

This flexibility was demonstrated, for example, in the January 27 and February 10 maintenance periods. With daily borrowing consistently running below the intended level and the money markets unexpectedly firm, the Desk accommodated the low borrowing by supplying NBR in excess of the objective. (Actual reserve data appear in Table 2.) This discrepancy between the behavior of the money market and discount window borrowing temporarily disappeared after the two-stage reduction in the assumed level of bor-

Chart 6

M2 Velocity and Opportunity Cost



*Two-quarter moving average, calculated from an average of Treasury bill, commercial paper, and large CD rates.

[10]For a more detailed description of the borrowed reserve procedure, see Brian F. Madigan and Warren T. Trepeta, "Implementation of U.S. Monetary Policy," in *Changes in Money-Market Instruments and Procedures: Objectives and Implications*, Bank for International Settlements, March 1986.

Table 1

Specifications from Directives of the Federal Open Market Committee and Related Information

Date of Meeting	Specified Short-Term Growth Rates† M2	M3	Borrowing Assumption for Deriving NBR Path	Discount Rate	Committee Preference	Prospective Reserve Restraint Modifications: Guidelines for Modifying Reserve Pressure	Factors to Consider for Modifications (In Order Listed) 1	2	3	4	5
	(Percent)		(Millions of Dollars)	(Percent)							
12/15 to 12/16/87	November to March 5	6	300 250 on 1/28	6.00	‡Sought to maintain the existing degree of pressure on reserve positions	A somewhat lesser or somewhat greater degree would be acceptable	Conditions in financial markets	Strength of the business expansion	Indications of inflationary pressure	Developments in foreign exchange markets	Behavior of the monetary aggregates
2/9 to 2/10/88	November to March 6 to 7	6 to 7	250 200 on 2/11	6.00	‡Sought to maintain the slightly reduced degree of pressure on reserve positions adopted in recent days	A somewhat lesser or somewhat greater degree would be acceptable	Conditions in financial markets	Strength of the business expansion	Indications of inflationary pressure	Developments in foreign exchange markets	Behavior of the monetary aggregates
3/29/88	March to June 6 to 7	6 to 7	200 300 on 3/30 400 on 5/9	6.00	‡Sought to increase slightly the degree of pressure on reserve positions	A somewhat greater or somewhat lesser degree would be acceptable	Conditions in financial markets	Strength of the business expansion	Indications of inflationary pressure	Developments in foreign exchange markets	Behavior of the monetary aggregates
5/17/88	March to June 6 to 7	6 to 7	400 500 on 5/25 550 on 6/22	6.00	Sought initially to maintain the existing degree of reserve pressure but anticipated that a slight increase would be appropriate in weeks ahead, depending on factors cited	Later in intermeeting period, a somewhat greater degree would be acceptable; a slightly lesser degree might be acceptable	Conditions in financial markets	Strength of the business expansion	Indications of inflationary pressure	Developments in foreign exchange markets	Behavior of the monetary aggregates
6/29 to 6/30/88	June to September 5 1/2	7	550 600 on 7/1§	6.00 6.50 on Aug. 9	Sought to increase slightly the existing degee of pressure on reserve positions	A somewhat greater degree would be acceptable; a slightly lesser degree might be acceptable	Indications of inflationary pressure	Strength of the business expansion	Developments in foreign exchange and domestic financial markets	Behavior of the monetary aggregates	
8/16/88	June to September 3 1/2	5 1/2	600	6.50	Sought to maintain the existing degree of pressure on reserve positions	A somewhat greater degree would be acceptable; a slightly lesser degree might be acceptable	Indications of inflationary pressure	Strength of the business expansion	Behavior of the monetary aggregates	Developments in foreign exchange and domestic financial markets	
9/20/88	August to December 3	5	600	6.50	Sought to maintain the existing degree of pressure on reserve positions	A somewhat greater degree would be acceptable; a slightly lesser degree might be acceptable	Indications of inflationary pressure	Strength of the business expansion	Behavior of the monetary aggregates	Developments in foreign exchange and domestic financial markets	

†No specific targets were established for M1 in 1988.
‡Factors calling for special flexibility:
— Sensitive conditions in financial markets.
— Uncertainties in the economic outlook.
§On August 8, the borrowing assumption was increased to $700 million, but it was returned to $600 million the next day when the discount rate was raised.

Table 1

Specifications from Directives of the Federal Open Market Committee and Related Information *(continued)*

Date of Meeting	Specified Short-Term Growth Rates M2	M3	Borrowing Assumption for Deriving NBR Path	Discount Rate	Committee Preference	Prospective Reserve Restraint Modifications: Guidelines for Modifying Reserve Pressure	Factors to Consider for Modifications (In Order Listed) 1	2	3	4	5
	(Percent)		(Millions of Dollars)	(Percent)							
11/1/88	September to December 2 1/2	6	600 400 on 11/22	6.50	Sought to maintain the existing degree of pressure on reserve positions	A somewhat greater degree would be acceptable; a slightly lesser degree might be acceptable	Indications of inflationary pressure	Strength of the business expansion	Behavior of the monetary aggregates	Developments in foreign exchange and domestic financial markets	
12/13 to 12/14/88	November to March 3	6 1/2	400 500 on 12/15	6.50	Sought to increase somewhat the existing degree of pressure on reserve positions	A somewhat greater degree would be acceptable; a slightly lesser degree might be acceptable	Indications of inflationary pressure	Strength of the business expansion	Behavior of the monetary aggregates	Developments in foreign exchange and domestic financial markets	

rowing from $300 million to $200 million in late January and early February. Though the reduction was partly in recognition of the tendency for borrowing to fall short of its allowance, it also reflected concerns that the economy could still be fragile.

However, the preponderance of economic data received in March tended to support the view that growth was being sustained. It also showed a rebound in the monetary aggregates from the sluggish rates of late 1987. Responding to potential pressures on capacity and prices, the FOMC embarked on a series of modest increases in the degree of reserve restraint that continued, with some pauses, through the end of the year. From a level of $200 million just prior to the March meeting, the assumed level of borrowing was raised in five steps to $600 million after the June meeting. This incremental firming of reserve pressures was punctuated by the August 9 increase in the discount rate from 6 to 6½ percent.

Once again during these episodes of firming in spring and summer, the relationship between the level of borrowing specified by the FOMC and the behavior of the federal funds rate deviated somewhat from expectations. As in the period immediately after the stock market collapse, firmer-than-expected money market conditions emerged even when borrowing was lower than intended. The discrepancy was attributed, in part, to the role of market interest rate expectations. Participants observed economic data releases that suggested robust growth and, on the basis of their understanding of Federal Reserve policy, anticipated further restraint by the FOMC and wider spreads between the federal funds rate and the discount rate. Consequently, they conserved their borrowing privileges and pressured rates higher even before monetary policy was changed. As they drove up the current funds rates, the perceived advantage of postponing borrowing tended to disappear. Even if a discount rate increase were anticipated, banks might extend the maturity of their market borrowing, forcing up rates on term federal funds, term repurchase agreements (RPs), and CDs, with some feedback to overnight rates. This tendency for market expectations to send rates above the range anticipated by the Desk was particularly evident in June and July.

In part, the Desk responded to these expectations-driven increases in money market rates by meeting reserve needs promptly within each maintenance period, while still attempting to achieve the NBR path. By aggressively providing reserves within the borrowed reserve framework, the Desk could deflate some of the money market pressures and thus avoid fostering misperceptions of the stance of policy. Beginning with the May meeting, when the Committee completed its shift in focus from financial market to economic conditions, the Desk pursued the borrowed reserve objectives while resisting less vigorously the pressures lifting money market rates. Subsequent decisions to firm policy tended to validate the upward pull of market psychology on rates. The anticipated degree of money market firmness did not catch up to actual market rates until the August 9 increase in the discount rate.

For a time after the discount rate hike, consistent behavior of money market rates and bank borrowing appeared to have been restored. However, as the seasonal component of discount window borrowing waned in the fall (somewhat later than in recent years), banks again appeared to be reluctant to approach the discount window. Indeed with hindsight, the apparent restoration of the historical borrowing-funds rate relationship after the discount rate increase may have been attributable to the heavy use of the seasonal borrowing facility. At its peak in the October 5 maintenance period, seasonal borrowing averaged $433 million per day, compared with peak period averages of $298 million in 1987 and $152 million in 1986, when spreads were lower.[11] For the year, seasonal borrowing averaged $235 million per day, compared with $164 million in 1987 and $87 million in 1986. As seasonal borrowing fell off its unusually high levels by the fall, the pattern of light adjustment borrowing came to dominate adjustment and seasonal borrowing.

By late October, the difference between the level of the federal funds rate that would have been expected to correspond to a given level of borrowing and the observed federal funds rate grew too large for the Desk to reconcile by "front loading" reserves within each maintenance period. Hence in the October 19, November 2, and November 16 periods, the Desk accepted borrowing somewhat below the $600 million allowance, believing the lower levels to be more consistent with the degree of restraint sought by the FOMC.[12]

[11]Seasonal borrowing tends to increase as the federal funds-discount rate spread rises, though it is not as responsive to spread changes as adjustment borrowing.

[12]Adjustment and seasonal borrowing averaged $523 million and $422 million, respectively, in the October 19 and November 2

Table 2

1988 Reserve Levels

(In Millions of Dollars, Not Seasonally Adjusted)

Period Ended	Required Reserves (Current)	Required Reserves (First Published)	Excess Reserves (Current)	Excess Reserves (First Published)	Total Reserves	Adjustment & Seasonal Borrowed Reserves	Nonborrowed Reserves plus Extended Credit Borrowed Reserves (Current)	Nonborrowed Reserves plus Extended Credit Borrowed Reserves (First Published)	Nonborrowed Reserves Interim Objective†	Extended Credit Borrowed Reserves
Jan. 13	62,805	62,932	1,307	1,156	64,112	1,460	62,653	62,629	63,516	485
27	60,554	60,581	1,288	1,362	61,842	176	61,666	61,768	61,192	332
Feb. 10	59,366	59,452	1,282	1,302	60,648	143	60,505	60,611	60,008	144
24	58,700	58,771	1,087	1,060	59,787	193	59,594	59,638	59,421	232
Mar. 9	58,607	58,636	966	897	59,573	282	59,291	59,251	59,286	255
23	59,182	59,139	911	985	60,093	239	59,854	59,886	59,807	1,685
Apr. 6	59,696	59,679	917	884	60,613	323	60,290	60,241	60,229	2,494
20	62,145	62,040	686	798	62,831	341	62,490	62,497	62,587	3,278
May 4	60,796	60,711	1,067	1,215	61,862	437	61,425	61,489	61,361	1,787
18	59,959	59,962	901	961	60,859	377	60,482	60,546	60,459	1,798
June 1	58,943	58,992	1,182	1,229	60,125	582	59,543	59,639	59,438	2,538
15	61,563	61,635	696	686	62,258	479	61,780	61,843	62,120	2,986
29	60,692	60,663	1,060	1,105	61,752	520	61,233	61,249	61,041	2,138
July 13	62,599	62,685	861	754	63,460	1,316	62,144	62,123	63,082	2,340
27	61,085	61,105	1,203	1,293	62,288	605	61,683	61,793	61,453	2,663
Aug. 10	61,309	61,408	796	715	62,104	591	61,513	61,532	61,758	2,749
24	60,954	61,015	981	1,025	61,935	574	61,361	61,466	61,421	2,671
Sept. 7	60,705	60,744	1,123	1,049	61,827	611	61,216	61,182	61,265	2,482
21	61,896	61,921	783	795	62,679	896	61,783	61,819	62,269	2,075
Oct. 5	60,442	60,372	1,148	1,310	61,590	734	60,856	60,947	60,704	1,704
19	61,509	61,461	975	1,050	62,484	523	61,961	61,988	61,775	1,681
Nov. 2	60,260	60,263	1,128	1,149	61,387	422	60,966	60,990	60,546	1,931
16	61,562	61,487	1,603	1,741	63,165	395	62,770	62,833	61,834	2,838
30	61,160	61,238	635	555	61,795	699	61,096	61,093	61,843	1,863
Dec. 14	62,515	62,473	976	1,099	63,491	485	63,006	63,087	63,096	1,529
28	62,550	62,549	1,081	1,162	63,631	379	63,252	63,332	63,078	968

†As of final Wednesday of reserve period.

In recognition of the Desk's difficulty in reconciling the assumed level of borrowing with money market rates, the Committee resolved in its November 22 telephone consultation call to adapt to the shift in the borrowing relationship by allowing for just $400 million of borrowing. But because some reports suggested the economic expansion retained considerable strength after an apparent moderation of growth, the Committee chose the new borrowing level with the view that it would be associated with a slightly firmer money market than anticipated before the change. Against a background of strong economic reports, the degree of reserve restraint was again notched upwards in December. Once more, however, it was difficult to anticipate the interest rate levels that would likely be associated with a particular allowance for discount window borrowing. On top of uncertainties about the basic relationship, end-of-year pressures tended to force money market rates higher.

The uncertain borrowing-federal funds rate relationship

Empirical evidence suggests that the changes in the borrowing relationship did not begin in 1988. Examination of the relationship back to 1984 shows that a series of shifts has, on balance, resulted in reduced discount window borrowing for given spreads of the funds rate over the discount rate. The first downward shift occurred in conjunction with the crisis at Continental Illinois Bank in the spring and summer of 1984 and lasted several months.[13] Estimates of the magnitude of this shift, which proved to be temporary, suggest that at a particular value of the spread, the willingness of other banks to borrow declined by roughly $350 million to $450 million. The borrowing relationship appeared to return to normal that fall as Continental's funding needs stabilized. The next downward shift, with an estimated magnitude of $200 million to $350 million, appears to have occurred early in 1986 and has not been satisfactorily explained. A further $100 million to $125 million downward shift followed the October 1987 stock market crash. Though that shift initially appeared to be a product of the temporarily unsettled financial conditions following the crash, it persisted and was followed by yet another sizable downward shift in the second half of 1988.

Indicative of cumulative changes in the relationship, the spread between the funds rate and the discount rate averaged 134 basis points in 1988, compared with an average spread of 84 basis points over the previous four years. At the same time, adjustment and seasonal borrowing averaged only $531 million in 1988, less than the $550 million average of the 1984-87 period (Chart 7). To date, the downward shifts in borrowing apparently have been concentrated in the adjustment component, which averaged $294 million in 1988, well below the $401 million average over the 1984-87 period. Disaggregating adjustment borrowing by size of depository institution reveals shifts in the relationships for all classes. However, the 1988 shift was most pronounced at commercial banks with less than $1 billion of deposits. The shift in borrowing at small banks was particularly surprising because small-bank behavior had been relatively predictable before 1988. Through 1988, commercial banks generally have accounted for almost all of the adjustment and seasonal borrowing.[14]

In the past, some shifts in the borrowing relationship have been easy to understand. For example, during the Continental Illinois crisis in 1984, other banks avoided the window, fearing that any borrowing might become public and taint their reputations.[15] More recently, the stock market crash created a general feeling of unease in the financial system. Nevertheless, it is not clear why the ensuing shift in the borrowing relationship persisted once the sense of crisis abated, or why a further change occurred late in 1988. Banks may have felt vulnerable to financial shocks, but this hypothesis is not totally convincing. The commercial bank failure rate was high in 1988, but only modestly above the 1987 pace, and the failure rate did not suddenly increase toward year's end. Though failures of thrift institutions soared in 1988, particularly in the last half of the year, the problems of the thrift industry did not appear to

Footnote 12 continued
periods. In the November 16 period, borrowing averaged just $395 million despite a computer problem at a major money center bank that caused borrowing to bulge to $2 billion on one day.

[13]For the purpose of developing the estimates referred to in this section, adjustment borrowing by Continental Illinois during the spring of 1984 has been excluded. The borrowing by the Bank of New York in November 1985 that resulted from an operational problem has also been excluded. In some of the econometric exercises, other special situation borrowing was removed.

[14]Savings and loans have traditionally turned first to their district Home Loan banks. Credit unions have not borrowed significant amounts. There was some thrift institution borrowing in 1985 during the crises of confidence affecting privately insured Ohio and Maryland thrifts.

[15]As it faced a growing crisis of confidence in May 1984, Continental Illinois made heavy use of the discount window. Because of the size of the borrowing and the news stories reporting that the bank was facing deposit outflows, the public surmised that Continental was responsible for the bulge. Once its borrowing was transferred to extended credit in June, the bank provided daily reports on what it had borrowed to a group of "safety-net" banks. Other banks with publicized problem loans avoided going to the window for several months thereafter for fear that such an action would be interpreted as a sign of trouble. The Federal Reserve does not reveal the identity of borrowers, but banks do worry that the public might guess the identity of a large borrower or learn it through some other means.

weaken confidence in commercial banks.[16] It is possible that banks in the Southwest felt a particular reluctance to borrow even if they were in reasonable financial condition. The economic stresses in the region stemming from weakness in the oil and real estate sectors, as well as the problems of both banks and thrifts, were widely publicized.

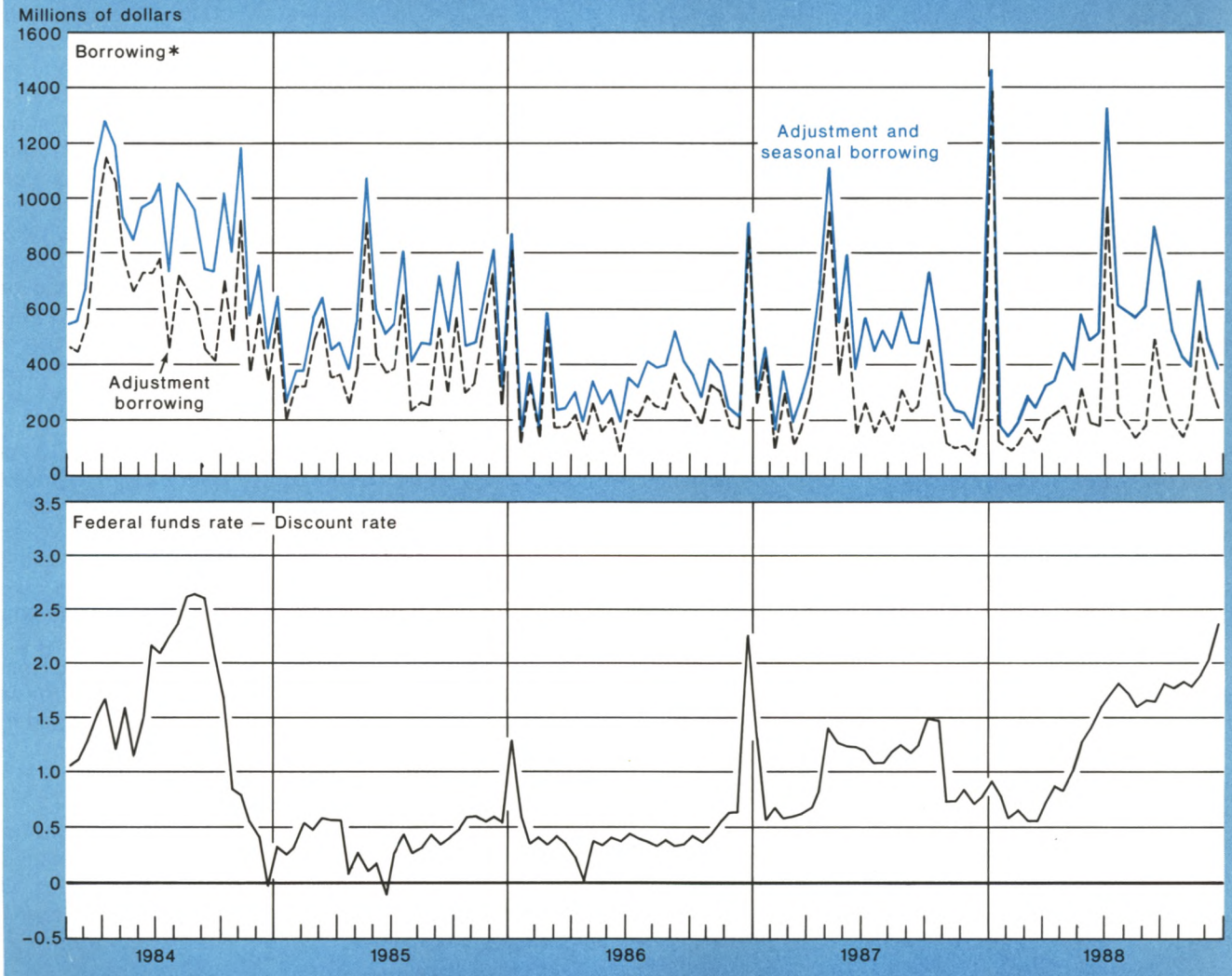
[16]The spread between the prices of Treasury and Eurodollar futures contracts (TED), which tends to widen when concerns about commercial bank solvency intensify, narrowed somewhat during 1988.

Open market operations and reserve management

As in previous years, the Desk took account of both the expected duration and the day-to-day pattern of reserve needs in its implementation of the NBR objectives. It considered the projected reserve needs for the maintenance period in progress and a few subsequent periods in choosing between permanent and temporary reserve operations. If a sizable need to add (or, conversely, to drain) reserves was projected for a few consecutive maintenance periods, the Desk would typically

Chart 7

Borrowing and Federal Funds — Discount Rate Spread



*Excludes special situation borrowing by Continental Illinois in the maintenance periods ended May 9, May 23, and June 6, 1984 and by Bank of New York in the period ended December 4, 1985.

opt to make a portion of the adjustment with outright purchases or sales of securities.

When the Desk made outright purchases of Treasury securities in 1988, it leaned toward coupon issues, rather than bills, though the tilt was less pronounced than in 1987. In both years, operations departed from the previous pattern of relatively heavy bill purchases. Two of the three coupon purchases were made in the first half of the year when there was a technical shortage of bills in the market because the Treasury was paying them down in most of its weekly auctions. (Over the year as a whole, the Treasury increased the net supply of bills.) On net, the Desk added $9.7 billion of Treasury coupon issues and $5.4 billion of bills to its portfolio. Meantime, holdings of federally sponsored agency issues decreased by about $600 million.[17] The average maturity of System holdings continued to shorten in 1988, as the Desk's purchases tended to be concentrated in shorter maturity coupon issues, both in the market and in refunding operations.

The $14.5 billion increase in the portfolio, which brought the year-end level to $245.8 billion, was nearly a third less than the record increase of 1987. The need for permanent reserve additions was reduced by a smaller net drain of reserves from operating factors and a smaller annual increase in required reserves. As usual, the rise in currency absorbed the largest quantity of reserves, but the $17.2 billion increase in 1988 (December over December) drained fewer reserves than the $18.1 billion increase in 1987. Since net foreign currency intervention took the form of dollar sales in 1988 (that is, purchases of foreign currencies), foreign exchange holdings added $2.2 billion of reserves, in contrast with a $1.9 billion drain of reserves in 1987 when intervention was generally in support of the dollar. The financial troubles of depository institutions in the Southwest prompted an increase in extended credit borrowing in 1988 that added $760 million to reserves, in contrast with just $180 million in 1987.[18] Required reserves rose by $1.6 billion, after increasing by $2.9 billion in 1987.[19]

When the Desk chose to meet reserve needs through temporary transactions, the timing of its operations depended on the intraperiod distribution of needs. The Desk sought to avoid extraordinary reserve surpluses or deficiencies on individual days since both held the potential to induce movements in the funds rate that could give misleading signals about the intent of policy. Moreover, a sizable daily reserve deficiency might leave the banking system with inadequate reserves for transactions clearing purposes and force spikes in discount window borrowing that could preclude achieving the path level. The holding of these Federal Reserve balances for use in handling funds transfers was motivated by the requirement that banks avoid overnight overdrafts and keep "daylight" overdrafts below levels specified by the Federal Reserve.

The Desk made comparatively heavy use of temporary transactions during the year, and favored those for one, rather than several, business days.[20] Operations frequently responded to large day-to-day variations in reserve availability. It was also recognized that short-term transactions might at times help provide clearer policy guidance to financial market participants. Early in the year, the Desk was sensitive to residual financial market fragility after the October 1987 crash. Later, uncertainties sometimes attended a change in the policy stance. Market participants often interpreted the use — or eschewance — of short-term transactions as evidence in judging whether the policy stance had changed. Toward the year's end, the active use of overnight RPs helped alleviate pressures associated with the increased reluctance to borrow.

Over the year, the Desk arranged System RP transactions on 51 occasions for a total of $210 billion. In addition, it arranged 85 rounds of customer-related RPs, totaling $143 billion. Comparable figures for 1987 were 68 rounds of System RPs, for $395 billion, and 85 rounds of customer RPs, for $155 billion. The Desk relied more heavily on temporary transactions to withdraw reserves in 1988 than in 1987, when a sale of Treasury bills in the market had met some of the need to drain reserves early in the year. The Desk arranged 22 rounds of matched sale-purchase agreements in the market, for a total of $63 billion.

Forecasting reserves and operating factors

As the Desk formulated a strategy for meeting reserve needs, it took account of potential revisions to the estimated demand for and supply of reserves. On the demand side, these revisions could take the form of changes in estimated required reserve levels or in the

[17]The Desk normally rolls over maturing federally sponsored agency issues. Its holdings declined when issues were called, or when they matured and no eligible replacement was available.

[18]The extended credit facility is provided to institutions facing financial difficulties. It is treated as nonborrowed, rather than borrowed, reserves for policy implementation purposes since it is not undertaken in response to general conditions of reserve availability established by the Federal Reserve.

[19]The phasing in of requirements on nonmember depository institutions, which added to required reserves over the 1980-87 period, was completed in September 1987. Annual indexing of the zero and 3 percent reserve tranches continues to reduce reserve requirements — by an estimated $750 million in 1988.

[20]The volume of temporary market transactions was substantially below the extraordinary level of 1987 that had been swollen by heavy use of System RPs after the larger-than-expected inflow of taxes in late April and early May and again after the stock market crash.

banking system's desired excess reserve balances. On the supply side, revisions to estimated sources and uses of nonborrowed reserves other than open market operations, or "operating factors," could change the reserve outlook. In both cases, revisions late in a maintenance period were especially difficult to deal with since they could necessitate very large reserve injections or drains.

The accuracy of required reserve forecasts improved in 1988 relative to the previous year. The mean absolute error in forecasting required reserves for each maintenance period on the first day of the period was around $300 million in 1988, compared with roughly $400 million in 1987.[21] This improvement came despite roughly equal mean absolute period-to-period changes in required reserves during the two years. Forecasts became more accurate during maintenance periods as deposit data became more complete; the mean absolute prediction error fell to about $150 million to $200 million by the middle of each period, and to around $70 million by the last day. Still, sizable revisions occasionally took place after a maintenance period ended and were particularly troublesome because their impacts could not be offset by open market operations.

Though positive and negative beginning-of-period forecast errors roughly offset each other, there was some tendency to underestimate required reserves in June and July and a pronounced tendency to overestimate required reserves from the second half of July until the first half of November. Since estimates of required reserves were formed by applying a reserve ratio to estimated levels of transactions deposits, these errors reflected under- and overestimates of transactions deposits.

Excess reserves were also somewhat more predictable in 1988; both sets of beginning-of-period mean absolute forecast errors were about $160 million in 1988, compared with around $180 million to $240 million in 1987. In part, this improvement may have been attributable to a roughly 25 percent decline in the mean absolute period-to-period change in excess reserves in 1988. Had the error calculations excluded the November 16 period, in which a major bank's wire transfer problem caused excess reserves to soar to $1.6 billion, the average absolute error would have been about $20 million lower. The other particularly large forecast errors occurred in the first two periods of the year, when excess reserves ran well above expectations, and in the November 30 period, when excess reserves fell far short of the expected level. On average, there was a modest tendency to underestimate excess reserves.[22]

Unlike the preceding several years, 1988 saw little significant growth in the annual average level of excess reserves. Two factors appear to explain the leveling off of excess reserves. First, the phase-in of reserve requirements for nonmember institutions was completed in 1987. The extension of requirements to nonmembers forced those institutions that could not meet all of their requirements with vault cash to hold Federal Reserve balances. Since most of these nonmembers do not closely monitor reserves, the holding of these balances tended to boost aggregate excess reserves. Second, as transactions flows have increased since the late 1970s, institutions have held larger balances at the Federal Reserve in order to avoid end-of-day overdrafts; this precautionary component of reserve balances also tended to raise excess reserves. In 1988, the volume of transactions over the Fedwire system grew much more slowly than in recent years.

Since large banks tend to monitor their reserve balances closely in order to avoid holding non-interest-bearing excess reserves, their average holdings of excess reserves over a year are typically close to zero. These banks generally make use of the carryover privilege, under which banks can apply a portion of the excess reserves held in one period to their requirements in the following period; carryovers tended to produce a sawtooth pattern of excess reserve holdings at large banks. On the other hand, smaller institutions generally do not have the resources to monitor their reserve positions accurately and usually hold positive levels of excess reserves. Thus in 1988, as in previous years, events that tended to shift the distribution of reserves toward smaller banks often raised the aggregate level of excess reserves. The usual pattern of high excess reserves in the early part of the year held true as small banks failed to adjust their reserve holdings adequately to the seasonal decline in required reserves. Furthermore, vault cash held in December 1987 boosted maintained reserves in early 1988, since there is a delay of several weeks between the time when vault cash is held and when it is applied to meeting reserve requirements.

The task of forecasting the impacts of operating fac-

[21]The Trading Desk uses forecasts of required reserves, excess reserves, and operating factors made by both the Federal Reserve Bank of New York (FRBNY) and Board staffs. When a range of forecast errors is given in the following discussion, it reflects varying degrees of success in forecasting reserve measures by the two staffs. A single figure indicates that the errors were similar for both sets of forecasts. Forecast errors of operating factors reflect only FRBNY estimates.

[22]These reported forecast errors overstate the degree of uncertainty about excess reserves. The Desk supplements beginning-of-period and midperiod forecasts with informal adjustments that are based on the observed pattern of estimated excess reserve holdings as each maintenance period unfolds.

tors on reserve availability was also more manageable in 1988 than in 1987. The improvement in forecast accuracy mainly reflected the more predictable behavior of the Treasury's Federal Reserve balance. The Treasury's balance had been particularly difficult to forecast in 1987 because of the uncertain impact of the Tax Reform Act of 1986 on tax flows and of debt ceiling crises on the timing of the Treasury's debt offerings. Some of the largest forecast errors in 1988 were associated with uncertainty about tax collections in April, June, and September, but the mean absolute error in predicting the average level of the Treasury balance over each two-week maintenance period, based on the beginning-of-period forecast, fell to $710 million in 1988, compared with an unusually high $965 million in 1987. However, after allowing for the diminished period-to-period variation in the Treasury balance, the forecast error was proportionately larger in 1988 than in 1987.

One possible consequence of the unpredictability of the Treasury's balance is that an unexpectedly large net outflow of funds could result in an overdraft by the Treasury of its Federal Reserve account. Because the Federal Reserve has no legal authority to lend directly to the Treasury, such an overdraft would be impermissible. But as Treasury flows have increased over the years, the likelihood of such overdrafts has grown. To reduce the possibility of an inadvertent overdraft, the Treasury raised the "target" level of its Federal Reserve working balance from $3 billion to $5 billion in October. If the Treasury anticipates that its Federal Reserve balance will fall below the $5 billion level, it can "call" funds from the Treasury Tax and Loan (TT&L) accounts at depository institutions to bring the balance up to the target level. Similarly, if the Federal Reserve balance were projected to exceed $5 billion, the Treasury could directly invest funds into the TT&L accounts, providing that these accounts were not already at their capacity.[23]

Forecast errors for other operating factors were fairly typical of those in recent years. Among the more important sources of uncertainty, the mean absolute beginning-of-period error in predicting Federal Reserve float (including "as-of" adjustments to correct errors made on earlier transactions) was about $270 million in 1988, somewhat below the 1987 figure. The mean error in forecasting currency in circulation was also around $270 million, again a bit below the 1987 level. One factor, extended credit borrowing, proved significantly more difficult to forecast in 1988 than in recent years. As the daily average level of extended credit borrowing rose from $305 million in 1987 to $1.8 billion in 1988, the mean absolute forecast error rose from just $55 million to $350 million. Overall, the beginning-of-period mean absolute error in predicting the impact of all operating factors on each maintenance period was $1.0 billion in 1988, compared with $1.3 billion in 1987. However, if one considers the mean absolute error as a proportion of the mean absolute period-to-period change in market factors, then forecast accuracy was quite similar in the two years, and similar to the record of most recent years. By the last day of each period, when the Desk could still incorporate estimates of the impact of operating factors on reserve availability in its decisions, the mean absolute forecast error in predicting the total contribution of market factors was roughly $50 million, down from about $90 million in 1987.

[23]Since depository institutions (DIs) must pay interest on and fully collateralize TT&L funds, DIs set limits on total capacity based on their profitable use of the funds and the availability of collateral. DIs that receive funds in excess of their capacity limits remit those funds to the Treasury's Federal Reserve balance. In 1988, the Treasury's Federal Reserve balance rose above its targeted level because TT&L accounts were at their roughly $30 billion capacity on about 45 business days.

Treasury and Federal Reserve Foreign Exchange Operations

November 1988-January 1989

The dollar moved lower in November, continuing the decline against most major currencies that had begun in late September. The dollar then gradually found support at the end of November and recovered through most of December and January to return to levels that had prevailed in the autumn (Chart 1). The U.S. monetary authorities intervened to resist the dollar's decline in November and early December and to resist the dollar's rise in January.

The reversal of the dollar's downward momentum during the period reflected shifts in the market's assessment of the strength of the U.S. economy, of the prospects for exchange rate and monetary policies in the United States and elsewhere, and of the effectiveness of the new U.S. Administration in dealing promptly with pressing economic issues.

The dollar's decline in November

When the three-month period opened in November, market sentiment toward the dollar was decidedly negative. With statistics released in October suggesting that U.S. economic expansion might be moderating, market participants assumed that U.S. monetary policy would not be tightened further. They expected that the interest differentials that had attracted inflows into dollar-denominated assets might not continue to be so favorable. Moreover, concerns about the pace of international adjustment had been aroused by recent trade figures. Not only had the trade surpluses of Germany and Japan showed renewed strength, but also the U.S. trade figures released in mid-October showed that the U.S. trade deficit had widened in August. Market participants began to doubt that the substantial trade improvement the United States had experienced during early 1988 would continue. In addition, market participants expressed growing impatience with the lack of progress being made in reducing the U.S. fiscal deficit and with what seemed to be a lack of urgency given to the issue during the 1988 election campaign.

The dollar's decline through October gained momentum late in the month, especially against the yen. Some Japanese investors sold dollars in order to protect the yen value of their assets against a further drop in the dollar, and many Japanese exporters hedged their dollar receivables well into 1989. The Japanese currency benefited, too, from a favorable market assessment of the ease with which the Japanese economy had shifted from an emphasis on external demand to one on domestic demand, as well as from Japan's ability as a major oil importer to benefit from declining oil prices.

By the beginning of November, the dollar had given up most of its mid-year gain against the yen to trade at ¥125.65. The U.S. monetary authorities continued the intervention operations started at the end of October to counter the downward pressure on the dollar. These operations involved purchases totaling $350 million against yen during the first two days of November.

At the time of the Presidential election in the United States, sentiment toward the dollar became even more negative after comments by foreign officials brought the U.S. budget deficit issue back onto center stage.

A report presented by Sam Y. Cross, Executive Vice President in charge of the Foreign Group at the Federal Reserve Bank of New York and Manager of Foreign Operations for the System Open Market Account. Christopher Rude was primarily responsible for preparation of the report.

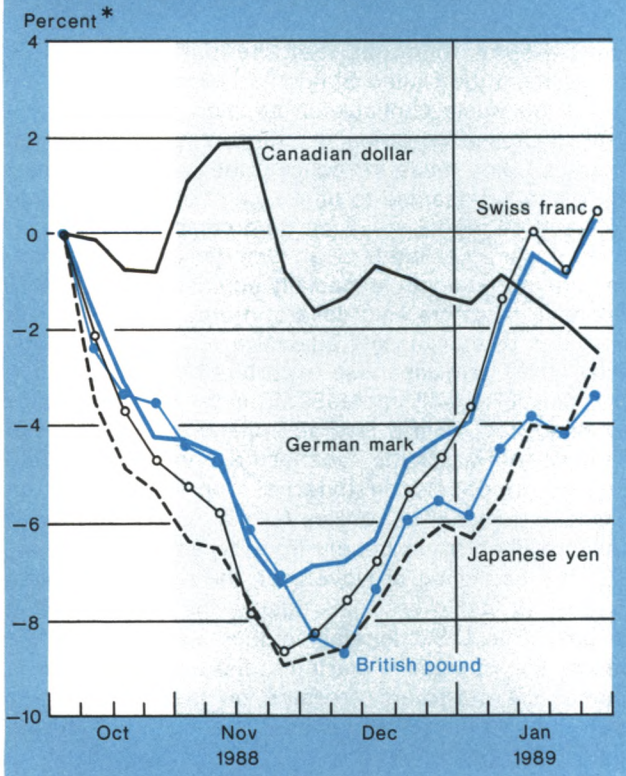
Market participants questioned whether a new Administration could successfully negotiate a budget compromise with a Congress controlled even more than before by the opposition party. Market participants were also skeptical that the Group of Seven (G-7) countries would remain committed to exchange rate stability after additional comments from abroad indicated that other countries' intervention operations to support the dollar might come into conflict with their efforts to keep their own domestic inflation rates under control. The dollar continued to come under selling pressure and, in the period from November 9 through November 16, the U.S. monetary authorities purchased another $625 million against yen in coordination with the Bank of Japan. U.S. and other G-7 officials also made statements expressing continuing official commitment to exchange rate stability.

Although the dollar benefited temporarily from these actions, it remained under pressure during the rest of November. The release of October U.S. retail sales and industrial production figures indicating that economic growth in the United States continued to be strong, as well as a rise in short-term dollar interest rates (Chart 2), had little positive impact on market sentiment. The U.S. trade report on November 16, showing that the trade deficit had narrowed in September and suggesting that the market's earlier concerns about the pace of international adjustment might have been exaggerated, was also largely ignored.

Near the middle of the month, the selling pressure on the dollar intensified, and the U.S. monetary authorities broadened their intervention operations to include the mark. Between November 17 and December 2, the U.S. authorities purchased a total of $630 million against marks and a further $795 million against yen in a series of intervention operations that were conducted in cooperation with the Bank of Japan, the Bundesbank, and other foreign central banks. The dollar reached its lows of the reporting period on November 25 at ¥120.65 against the yen and DM 1.7085 against the mark. At these levels, the dollar was more than 4 percent lower against the yen and the mark from its level at the beginning of November and roughly 11½ percent lower than its autumn highs. Although the dol-

Chart 1

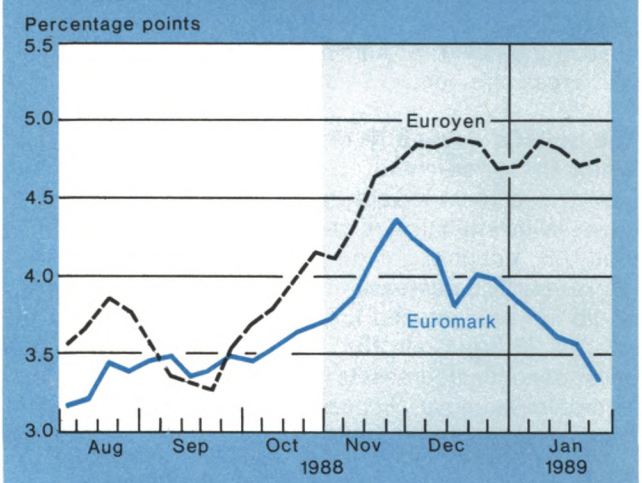
The dollar continued to decline early in the period, then recovered.



*Percent change of weekly average rates for dollars from the week ending October 7, 1988. All figures are calculated from noon New York quotations.

Chart 2

The sharp rise in short-term interest differentials favoring the dollar in November initially had little positive effect on exchange rates.



The chart shows weekly average interest rate differentials between three-month Eurodollar rates and three-month Euromarket deposit rates for marks and yen.

lar had declined by comparable amounts against both currencies, against the yen it was only marginally higher than its record low of ¥120.20, reached on January 4, 1988.

Stabilization and recovery in December

Market participants gradually came to believe that the G-7 monetary authorites were still committed to exchange rate stability. The authorities were seen as showing a consistent presence in the exchange market.

At the same time, market participants sensed from policy decisions taken by foreign central banks—including a one percentage point increase in base lending rates in the United Kingdom on Novemer 25—that containing potential inflationary pressures worldwide was a policy priority. Against this background, U.S. economic statistics that had been released earlier and that revealed unexpected strength in the economy were seen in a different light. Market participants were also impressed by the strong labor market statistics for November released in early December (Chart 3). Noting that short-term dollar interest rates had firmed during November, they came to believe that the Federal Reserve might soon tighten its stance again, either via money market operations or by raising the discount rate.

In addition, market participants were impressed with the extent to which the dollar rallied when a speech by Soviet General Secretary Gorbachev, at the United Nations on December 7, proposing Soviet arms reductions, was temporarily seen as providing scope for the United States to reduce its budget deficit through defense spending cuts. Even though the euphoria of the moment quickly passed, the episode created a renewed sense of two-way market risk.

Under these circumstances, the foreign exchange market slowly shed its negative view of the dollar during the rest of December. Many market participants, who during October and November had postponed purchasing dollars for commercial and investment purposes, began to reenter the market. At the same time, investors who had previously increased their hedging of dollar exposures now lowered their hedge ratios, taking note of the widening of interest rate differentials favoring dollar assets and the increased costs of hedging. The dollar's gradual recovery did not waiver in mid-December when the Bundesbank increased its Lombard rate by one-half percentage point and several

Table 1

Federal Reserve Reciprocal Currency Arrangements

In Millions of Dollars

Institution	Amount of Facility January 31, 1989
Austrian National Bank	250
National Bank of Belgium	1,000
Bank of Canada	2,000
National Bank of Denmark	250
Bank of England	3,000
Bank of France	2,000
Deutsche Bundesbank	6,000
Bank of Italy	3,000
Bank of Japan	5,000
Bank of Mexico	700
Netherlands Bank	500
Bank of Norway	250
Bank of Sweden	300
Swiss National Bank	4,000
Bank for International Settlements:	
Dollars against Swiss francs	600
Dollars against other authorized European currencies	1,250
Total	30,100

Table 2

Drawings and Repayments by Foreign Central Banks under Special Swap Arrangements with the U.S. Treasury

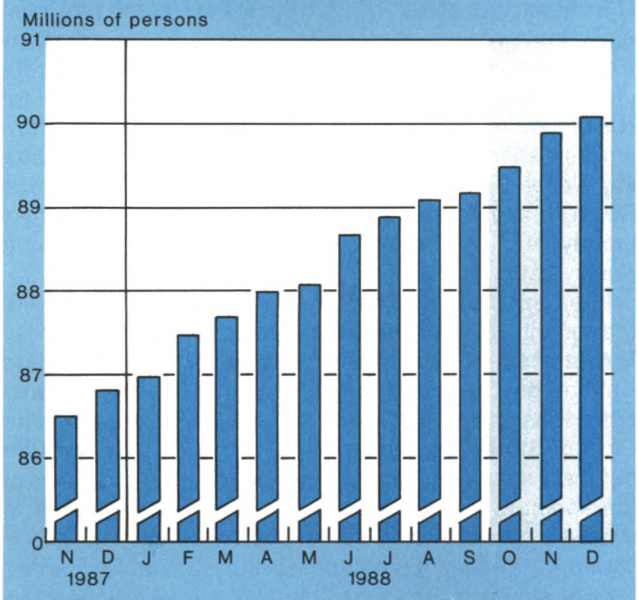
In Millions of Dollars; Drawings (+) or Repayments (−)

Central Bank Drawing on the U.S. Treasury	Amount of Facility	Outstanding as of October 31, 1988	November	December	January	Outstanding as of January 31, 1989
Central Bank of the Argentine Republic	265.0	0	+47.7	0	−46.9	0.8
National Bank of Yugoslavia	50.0	0	*	—	—	—
Central Bank of Brazil	250.0	0	*	—	—	—

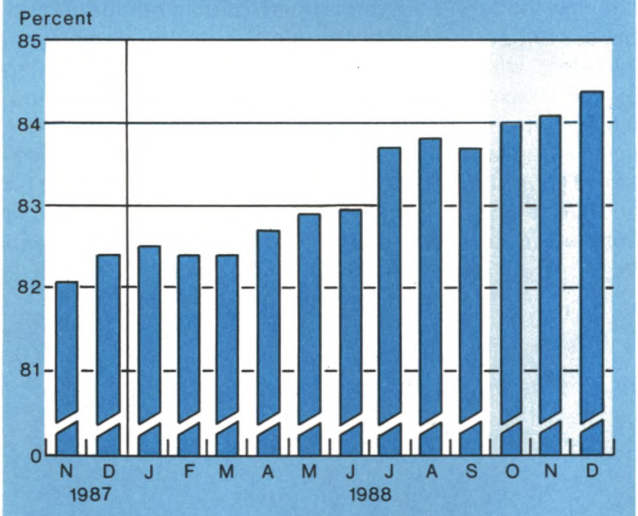
Data are on a value-date basis.
*Facilities expired on November 30, 1988.

Chart 3

Data reported during the period, showing continuing rapid employment gains in the United States . . .



and rising levels of capacity utilization in U.S. industry, . . .

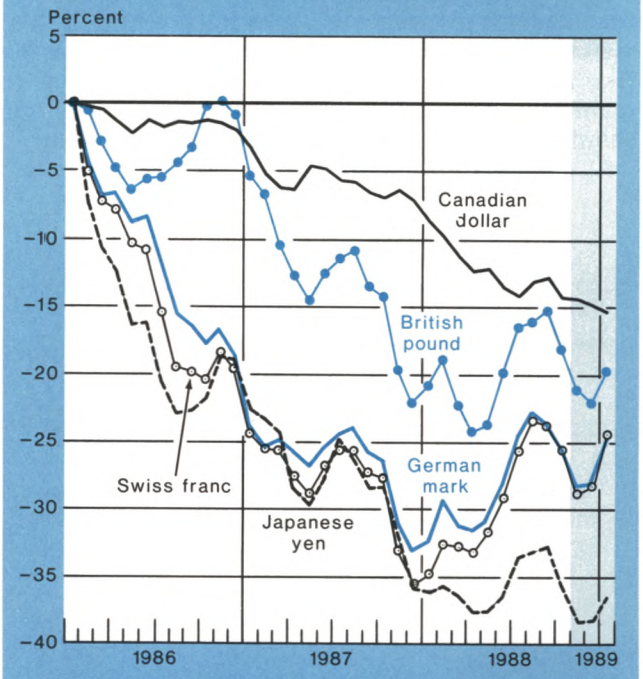


gradually dispelled belief that inflationary pressures were moderating.

The top chart shows monthly total U.S. nonfarm payrolls. The bottom chart shows the degree of capacity utilization in U.S. industry. The figures for October-December 1988 were released during the period.

Chart 4

In January 1989 market participants were impressed by the dollar's relatively good performance in the previous year.



The chart shows the percent change of monthly average dollar exchange rates from January 1986. All figures are calculated from noon New York quotations.

Table 3

Net Profits (+) or Losses (−) on United States Treasury and Federal Reserve Foreign Exchange Operations

In Millions of Dollars

November 1, 1988 to January 31, 1989	Federal Reserve	United States Treasury Exchange Stabilization Fund
Realized	+155.3	+155.4
Valuation profits and losses on outstanding assets and liabilities as of January 31, 1989	+1,004.8	+789.4

Data are on value-date basis.

other European central banks also announced increases in their key lending rates. Instead, with the year-end approaching, demand for dollars from bank customers, and by bank dealers themselves who moved to square positions in increasingly thin markets, kept the dollar relatively well bid. Although dealers were skeptical that the dollar's firmer tone would carry over into the new year, the dollar closed the year at DM 1.7725 against the mark and ¥124.85 against the yen, 3½ percent higher than its lows of late November.

The dollar's rise in January

In January, sentiment toward the dollar grew bullish. Actions and statements in the political sphere contributed to a sense of optimism about the new Administration. Signs of Federal Reserve tightening early in the month added to the dollar's upward momentum. As January progressed, several reports showing continued strength in the U.S. economy, together with Chairman Greenspan's reiteration in congressional testimony of the Federal Reserve's concern about the dangers of inflation, supported expectations that dollar interest rates would continue to firm. Also, the market interpreted certain statements by foreign officials as implying a readiness of the G-7 industrial nations to tolerate a further appreciation of the dollar. In this atmosphere, market participants shrugged off the report on January 18 of a sharp rise in the U.S trade deficit in November.

As the dollar moved up through levels not seen for several months, market participants continued to reduce their dollar hedges and reverse commercial leads and lags. Moreover, investors noted the relatively good performance of the dollar throughout 1988 (Chart 4), and reports circulated of widespread Japanese and European interest in buying dollar-denominated securities. In the process, bidding for dollars became at times quite strong. The force of the dollar's rise was directed particularly against the German mark and other European currencies.

By mid-January the dollar had moved up to DM 1.8713 against the mark and ¥128.52 against the yen. On January 19, the Bundesbank announced a further one-half percentage point increase in its Lombard rate and a similar increase in its discount rate. Several other European central banks also raised key lending rates. The rate increases, supported by coordinated intervention, injected a note of caution to the market, and, for a time, the dollar's upward momentum stalled. But the dollar soon resumed its rise to reach its period highs of DM 1.8795 against the mark and ¥130.55 against the yen on January 31. It thus closed the three-month reporting period 5 percent higher against the mark and 3½ percent higher against the yen relative to its levels at the start of November. On a trade-weighted basis, as measured by the staff of the Federal Reserve Board, it was 4 percent higher on balance.

As the dollar moved up in January, the U.S. monetary authorities intervened to counter the rise. From January 6 to January 27, the U.S. authorities intervened on 12 days to sell a total of $1,880 million against marks in coordination with the Bundesbank and other foreign central banks.

In summary, for the period as a whole, the U.S. monetary authorities purchased a total of $2,400 million during November and December—$1,770 million against Japanese yen and $630 million against German marks—and sold $1,880 million against German marks during January. The U.S. Treasury, through the Exchange Stabilization Fund (ESF), and Federal Reserve participated equally in the financing of all intervention operations.

The ESF also received $62.2 million equivalent of Japanese yen in principal repayments and interest payments under the Supplementary Financing Facility of the International Monetary Fund.

For the November-January period, the Federal Reserve and Treasury realized profits of $155.3 million and $155.4 million, respectively. As of the end of January 1989, cumulative bookkeeping or valuation gains on outstanding foreign currency balances were $1,004.8 million for the Federal Reserve and $789.4 million for the ESF. These valuation gains represent the increase in the dollar value of outstanding currency assets valued at end-of-period exchange rates, compared with the rates prevailing at the time the foreign currencies were acquired.

The Federal Reserve and the ESF regularly invest their foreign currency balances in a variety of instruments that yield market-related rates of return and that have a high degree of quality and liquidity. A portion of the balances is invested in securities issued by foreign governments. As of the end of January 1989, holdings of such securities by the Federal Reserve amounted to $1,457.9 million equivalent, and holdings by the ESF amounted to the equivalent of $1,821.3 million.

In other operations, on November 22, 1988, the Central Bank of the Argentine Republic drew $79.5 million from a $265 million swap facility with the ESF. This facility was provided as part of a $500 million short-term financing package arranged in October 1988 by a number of monetary institutions. Argentina repaid $31.8 million on November 23, 1988, and $46.9 million on January 26, 1989.

ESF short-term facilities with the Central Bank of Brazil and the National Bank of Yugoslavia expired in November 1988. There was no activity in either facility during the period.

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