

# Federal Reserve Bank of New York

## Quarterly Review

Winter 1991-92 Volume 16 Number 4

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# Rebuilding the Economic and Financial Fundamentals: The Case for Vision and Patience

Once again it is a great pleasure to have the opportunity to address the mid-winter meeting of the New York State Bankers Association. The past year has not been an easy one for the economy or for banks and bankers, not just here in New York but around the nation and around much of the world. My main message today, however, is that despite the current problems, a strong case can be made that many of the painful but necessary adjustments occurring today are laying the foundation for a stronger, a more efficient, and a more competitive national banking system and national economy.

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However, if we are to reap the full measure of those potential gains, we will need vision and patience. We must also learn from our past mistakes, since it is now all too clear that many of the hardships of today reflect excesses of an earlier day.

Nowhere is that more apparent than in the very difficult process of unwinding the explosion of debt built up by governments, businesses, and households over much of the decade of the 1980s. In one sense, the fact

that the economy and the financial system are impaired by debt and debt service burdens should not surprise us since the problem could be seen in the making. For example, in a September 1985 address I asked rhetorically whether it was reasonable—even then—to assume that so much more good-quality debt could be supported by a given GNP than had been the case earlier.

We now know the answer was that such an assumption was not reasonable. A massive amount of the debt accumulated in the 1980s was bad debt. Indeed, if we were to add up all of the losses that have been incurred by banks, thrifts, nonbank financial institutions, bondholders, credit card issuers, and others, it is clear that the bad debts of the 1980s ran well into the hundreds of billions of dollars. For example, if we look at just the fifty largest commercial banking institutions, actual charge-

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offs between year-end 1985 and the third quarter of 1991 aggregate to the astonishing total of almost \$90 billion. And even with these charge-offs, nonperforming and other problem assets are still at postwar record levels.

In these circumstances, I am not surprised that we

Remarks by E. Gerald Corrigan, President of the Federal Reserve Bank of New York, before the 64th Annual Mid-Winter Meeting of the New York State Bankers Association at the Waldorf-Astoria, New York City, January 30, 1992.

have a "credit crunch," but in a way, I am surprised that it did not come sooner, and I am thankful that it has not inflicted even more serious damage on the economy than we have seen. I also believe that the term "credit crunch" as it is widely used and interpreted often misses the point as to the dynamics of the current situation. Allow me to elaborate.

To be sure, all measures of credit growth have slowed dramatically, even when adjusted for the slower pace of economic activity. To be equally sure, lending and underwriting standards have been tightened up across the board. And there are, no doubt, some cases in which creditworthy borrowers find it difficult to obtain credit. Finally, it is certainly the case that there are individual financial institutions that have been forced to curtail lending or otherwise shrink their balance sheets. All of these developments inflict hardship, but they also are symptomatic of a delayed, inevitable, and ultimately healthy response to the excesses of the past.

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To put it more concretely, what we are seeing is the desire of individuals, corporations, and financial institutions to strengthen and rebuild their balance sheets after the debt binge of the 1980s. Looked at in that light, there is an understandable debate as to how much of the credit crunch is due to the desire of debtors to shrink the rate of debt accumulation and how much of the credit crunch is due to the unwillingness or inability of creditors to lend. For my part, I would put more weight on the former but, in a sense, that debate is meaningless. What is meaningful is that balance sheets

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had to be strengthened, capital positions had to be improved, and lending and underwriting standards had to be firmed.

Having said that, I hasten to add that a case can be made that we are further along in that healing process than may be widely appreciated. Let me cite several examples that lead me to that view.

First, it is now clear that the origins of the adjustment

process, as measured, for example, by various measures of inflation-adjusted debt accumulation by corporations and households, predated the mid-1990 business cycle peak by about a year. Given that perspective, the adjustment process has been under way for the better part of two and one half years.

Second, there are now straws in the wind to suggest that the buildup in nonperforming loans in the banking system as a whole may have peaked, even if the level of problem assets remains very high. Needless to say, however, the future course of problem assets in the banking system is not independent of the future course of economic activity.

Third, the combination of the buildup in capital and reserves, as well as rigorous cost containment efforts at major banking institutions, should pay off handsomely over time. For example, the overall capital and reserves at the seven (now six) major New York banking companies is now well in excess of \$60 billion, and the mean tier I and overall risk-based capital ratios for those institutions are now about 5.5 and 9.5 percent, respec-

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tively. At the same time, operating expenses, which in the second half of the 1980s were growing by almost 15 percent per annum, rose by only 5.9 percent over the four quarters ending in September 1991. Indeed, over that four-quarter period, a number of these institutions experienced actual declines in operating expenses. Broadly similar patterns are taking hold in bank and nonbank financial institutions across the country.

Fourth, nonbank corporate restructuring and cost containment efforts—as painful as they are—are paving the way for a leaner and more competitive corporate America, which will be better able to produce truly world-class goods and services, with commensurate returns to shareholders and other investors.

Finally, with nominal interest rates at low levels, debt servicing burdens have been reduced appreciably. In saying that, however, I ask you to keep in mind that nominal interest rates will remain relatively low only so long as inflationary forces in the economy remain in check and recede even further. To put it differently, lenders or borrowers who made the bet during the 1980s that inflation would bail them out were wrong, and

they would be dead wrong to press that bet today.

While I can speak only as one member of the Open Market Committee, I believe I can say with confidence that the U.S. monetary authorities simply will not tolerate a return to the self-destructive process of inflation. Indeed, what we seek are further gradual reductions in the core inflation rate, even as the economy returns to a pattern of moderate growth in the period ahead.

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While I cite these positive developments, don't get me wrong. I am under no illusion. Problems, real problems, remain. The near-term economic outlook is very uncertain. Elements of the financial system are still under considerable strain. It will take a number of years to work off the inventory of excess commercial real estate. Confidence is badly shaken as major corporate restructurings and dire fiscal problems in state and local governments across the nation threaten what were once regarded as the safest and most stable sources of jobs and income.

While we are all mindful of these and other problems and threats, it is important that we not lose sight of the progress that is being made in rebuilding the fundamentals that are capable of ushering in a new age of

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prosperity and global leadership for the U.S. economy and for the U.S. banking system. To gain the full measure of that potential will require vision and it will require patience. Indeed, we are at one of those points when frustration with immediate problems can all too easily give rise to a pell-mell rush to find shortcuts and quick fixes that will serve only to make things worse in the longer term.

Perhaps nowhere is that temptation to find shortcuts more dangerous than in regard to fiscal policy, espe-

cially in an election year. That is not to say that some constructive steps on the fiscal side are wholly beyond our national reach. But it is to say that great care and discipline will have to be exercised in evaluating fiscal

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**A careful and disciplined approach to the evaluation of fiscal options should give important weight to the following considerations: (1) any changes should be surgically neat and clean, (2) any changes should give particular emphasis to the almost desperate need to rebuild the stock of productive plant and equipment in this country, and (3) above all, any changes must not do further damage to the deficit outlook for the intermediate term.**

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options. For my part, a careful and disciplined approach to the evaluation of fiscal options should give important weight to the following considerations: (1) any changes should be surgically neat and clean, (2) any changes should give particular emphasis to the almost desperate need to rebuild the stock of productive plant and equipment in this country, and (3) above all, any changes must not do further damage to the deficit outlook for the intermediate term. Indeed, even under current law, the outlook for the budget deficit by mid-decade is not encouraging, especially since the out-year budget estimates already imply very substantial cuts in defense spending. Perhaps the outcome will be aided somewhat by a rise in the savings rate, but I, for one, would not bet the ranch on that possibility.

Beyond that, it is important to keep in mind that a rise in the savings rate necessarily implies a drop in the consumption rate—an outcome we should welcome if it occurs in a gradual and orderly fashion. We should also keep in mind that even a modest rise in the personal savings rate can be offset by a fall in the savings rate for state and local governments or for the corporate

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sector. To put it differently, the only failsafe way to increase the national savings rate by nearly the amounts that are needed is to reduce sharply the dissavings rate associated with federal budget deficits. Surely, that will require vision and patience.

The full restoration of the financial muscle of the U.S. banking system also will require vision and patience. The call for vision and patience in this specific context might seem so obvious as to be unnecessary. However, experience suggests that it is not. For example, whether it was LDC lending, highly leveraged transactions lending, or real estate lending, there was a point in the cycle when a few bankers or a few regulators said "enough is enough." But when the amber light flashed, it was ignored by most, in part because the loans then on the books looked fine and in part because new and enticing deals kept rolling in. With the passage of time, however, it became clear that enough was enough, but by then it was too late.

Regulation—even the most sophisticated system of so-called early intervention—cannot solve this problem. Indeed, experience tells us in a convincing manner that the only solution is to be found in a system of discipline and prior restraint that is created and maintained by the directors and top management of individual financial institutions.

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Perhaps the progress we are now seeing in the strengthening of the banking system suggests that some hard lessons have been learned. But even if that is true, we still have a very long way to go. It is also true that some of the necessary ingredients of that rebuilding process are not directly controllable by banking institutions or, for that matter, by banking regulators.

The legislative framework within which banks must operate is a case in point. Here, I know most of you share the sense of deep disappointment that I have for the outcome of the banking legislation debate of last year. That is, while there are some distinctly positive aspects to the new legislation, the failure of the Congress to enact any of the badly needed structural reforms, such as the effective repeal of McFadden, Douglas, and Glass-Steagall, must be viewed as a major setback. Let us hope that the Congress will return promptly to these issues this year.

While progressive banking legislation and an improved economic environment will assist the banking industry in restoring the full measure of its strength, the fact remains that the lion's share of the burden for this adjustment lies with banks and bankers themselves.

In some ways the challenges facing individual banks

and the banking system are quite straightforward: namely, individual institutions and the industry as a whole will have to generate the capital and the returns on that capital that are needed to restore the full measure of confidence of the marketplace and to satisfy the

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demands of increasingly selective investors and depositors. For virtually all banking institutions, that challenge will require strong and continuing efforts along several lines, including the following:

First, the large—and in some cases, the truly enormous—drag on income and profits arising from nonperforming and underperforming loans will have to be worked down over time. Among other things, this will require still more effort at structuring workouts and the willingness perhaps to better recognize that fresh credits can be a constructive part of workout strategies for some troubled borrowers. It also is important that all members of loan syndicates—even the smaller participants—behave in a reasonable and responsible fashion in evaluating workout strategies.

Second, operating expenses must be reduced further. That process can be aided and facilitated by mergers and other steps that promote needed consolidation in banking and finance. But even absent such steps, recent experience suggests that further cuts in operating costs—with their powerful implications for the bottom line—are within reach.

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**The historic dictates of (1) knowing your customer, (2) knowing how and when to say no, and (3) seeking strength through diversification must assume a still larger role in the banking marketplace.**

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Third, the emphasis on growth, current earnings, and market share must be further tempered in favor of an even greater premium on capital strength and asset quality. This means that the historic dictates of (1) knowing your customer, (2) knowing how and when to say no, and (3) seeking strength through

diversification must assume a still larger role in the banking marketplace. Part of this may require some fresh and very aggressive thinking about concentrations of credit exposures that takes greater account of the bigger picture. For example, we can all readily think of cases in which an individual real estate project looked fine on a stand-alone basis but proved disastrous when a particular market was later saturated with multiple projects of a similar nature.

Fourth, where it is relevant, you had all better take a very, very hard look at off-balance sheet activities, including the payments, clearance, and settlement risks associated with many of those activities. The growth and complexity of off-balance sheet activities and the nature of the credit, price, and settlement risk they entail should give us all cause for concern, especially when it seems so easy to accept the view that what counts is net, not gross, exposures. That distinction between gross and net may be relevant in some cases, and it may be fine when all else is well, but in the event of a major market disruption, I assure you that it will be the gross, not the net, that will really matter in most segments of the financial marketplace both nationally and internationally.

High-tech banking and finance has its place, but it is not all that it is cracked up to be. For example, the interest rate swap market now totals several trillion dollars. Given the sheer size of the market, I have to ask myself how it is possible that so many holders of fixed or variable rate obligations want to shift those obligations from one form to the other. Since I have a great deal of difficulty in answering that question, I then

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have to ask myself whether some of the specific purposes for which swaps are now being used may be quite at odds with an appropriately conservative view of the purpose of a swap, thereby introducing new elements of risk or distortion into the marketplace—including possible distortions to the balance sheets and income statements of financial and nonfinancial institutions alike.

I hope this sounds like a warning, because it is. Off-balance-sheet activities have a role, but they must be managed and controlled carefully, and they must be understood by top management as well as by traders

and rocket scientists. They also must be understood by supervisors. In that regard, I can assure you that at both the national and the international level we are redoubling our efforts to ensure that supervisory policies for these activities are sensitive to the full range of risks they present to individual institutions and to markets generally.

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**What makes banks truly special is that public confidence in their strength and integrity is their only stock in trade. When that confidence has been shaken—as it clearly has—the banks suffer, but when the banks suffer, the society also suffers.**

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If these are some of the things that strike me as important in coming full circle in the restoration of the strength of the U.S. banking system, allow me to close on a note as to why achieving that goal is so very important. In recent weeks and months we have seen numerous examples—some good but most bad—of how vitally important the confidence factor is to our economic well-being. I point to this in a context in which I have long maintained that banks are special. But I also point to it in a context in which it is all too easy to forget

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**Nothing would please me more than to see the U.S. banking system reemerge from these recent painful years as a true world-class leader in creativity and innovation, yes, but especially as the bedrock of confidence for the national economy and the international banking system.**

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that what makes banks truly special is that public confidence in their strength and integrity is their only stock in trade. When that confidence has been shaken—as it clearly has—the banks suffer, but when the banks suffer, the society also suffers.

As I said earlier, there are some very positive developments taking hold in the economy at large and in the banking system in particular that can be an enormous source of strength to our country and to the world over the intermediate term. As a part of that process, nothing would please me more than to see the U.S. banking system reemerge from these recent painful years as a true world-class leader in creativity and innovation, yes, but especially as the bedrock of confidence for the national economy and the international banking system. That will not be easy, and there surely will be some bumps along the road, but with vision and patience I believe it can be done.

# Changes in the Government Securities Market

by E. Gerald Corrigan

I am pleased to have this opportunity to appear before you this morning to share with you my observations on the *Joint Report on the Government Securities Market*, with particular emphasis on those aspects of the report that relate directly to the activities or responsibilities of the Federal Reserve Bank of New York.

Let me say at the outset that I strongly support the overall thrust of the joint report. Taken as a whole, the changes and legislative recommendations outlined in the report represent a comprehensive yet well-balanced approach to the problems that surfaced in the government securities market last year. Let me quickly add that the changes are at or near the outer threshold of what I believe the market can reasonably absorb in the near term without running undue risks to market efficiency, Treasury debt management practices, or the flexibility of Fed open market operations.

With those general observations in mind, let me turn to the specific aspects of the report that relate directly to the responsibilities of the Federal Reserve Bank of New York. There are three such major areas: first, the changes in the Bank's administration of relationships with primary dealers; second, the Bank's role in the development, testing, and implementation of new automated systems for Treasury auctions and Fed open market operations; and third, the Bank's expanded role with regard to day-to-day surveillance of the government securities market. The statement concludes with a

brief status report from the Fed's standpoint on the Salomon Brothers situation, as requested by the Committee.

## **Administration of relationships with primary dealers**

Attached to this statement is a paper issued late last month by the Federal Reserve Bank of New York outlining revised procedures for the administration of the Bank's relationships with primary dealers (see appendix). While that document itself represents a careful balancing of many considerations and viewpoints, it is based on a number of key and interrelated considerations, including the following.

First, while change was needed, the complete dismantling of the primary dealer system—including the responsibility of dealers to make markets for Fed open market operations and to participate meaningfully in Treasury auctions—would not have been a prudent step.

Second, in part because the existing approach has been viewed as conferring special status on dealer firms that carries with it elements of "franchise" value, and in part because of fairness and equity considerations, it was important to provide for a more "open" system of primary dealers. This has been accomplished by the elimination of the so-called 1 percent market share requirement and the use of straightforward and objective capital standards for eligibility as a primary dealer. Taken together, these changes will substantially increase the potential number of firms that can become primary dealers.

Third, in part because of "moral hazard" considera-

Statement before the Committee on Banking, Finance, and Urban Affairs and the Subcommittee on Domestic Monetary Policy of the House of Representatives, February 6, 1992.

tions and in part because of legal and regulatory realities, it was important that the Federal Reserve Bank of New York make absolutely clear to the marketplace that the New York Fed does *not* regulate the primary dealer firms. For this reason we are disbanding the Bank's *dealer* surveillance unit.

Fourth, for obvious reasons, it was necessary to clarify the reasons and the conditions under which the New York Fed would alter its relationship with a primary dealer firm. Under the new administrative procedures, there are three independent sets of circumstances under which that might occur:

- A dealer firm's status will be altered if the firm fails to meet its responsibilities to make reasonable markets for Fed open market operations or it fails to participate meaningfully in Treasury auctions or it fails to meet its responsibilities to provide the Fed with meaningful market intelligence over time. To the extent a firm's dealer status is altered for any or all of the above reasons, that action by the Fed will reflect considerations relating to the business relationship alone and will carry no implication as to the creditworthiness, financial strength, or managerial competence of the firm.
- A dealer firm's status will be altered if its capital falls below the relevant capital standards and it does not, in the eyes of its primary federal regulator, have a credible plan to restore such capital in a reasonable period of time.
- A dealer firm's status will be altered if the firm is convicted of a felony under U.S. law or pleads guilty or *nolo contendere* to a felony under U.S. law for activities directly or indirectly related to its business relationship with the Federal Reserve. This should create powerful incentives for a firm—when faced with wrongdoing by individual employees—to take immediate and strong actions to root out the source of the problem so as to minimize the risk to that firm.

While major elements of the changes in the administration of the relationships with primary dealers will begin to take place immediately, the full benefits of these changes will occur only as the automation of Treasury auctions and Fed open market operations takes place and as the other changes contemplated by the joint report take hold. Over time, however, the automation efforts may prove particularly important. These initiatives are described below.

#### **Federal Reserve Bank of New York automation efforts**

The design work for the automation of the competitive bidding portion of Treasury auctions based on existing

auction techniques has been under way for some time and should be completed late this year. The software for the automation of the auctions is not particularly difficult to develop. The difficult aspects of this task relate more to its communications system—particularly as the number and nature of prospective direct participants in the auctions change. But what makes this automation effort especially difficult is the need to build into the computer systems and the communications system a very high level of operational integrity, as well as multiple levels of backup for various contingencies.

If the Treasury were to decide to move to a different auction technique, the strategy would be to enhance the system presently being developed to accommodate both types of auctions. While important elements of the work being done for the current auction procedures can be used with a new auction technique, the enhancement of the system being developed to accommodate the new procedures will take some time after the requirements have been defined. This will not, however, delay the planned implementation of automated procedures for the current auction by the end of this year.

In order that the Committee might gain a more useful insight as to exactly how the automated Treasury auction system will work in practice, and at the risk of a great oversimplification, the major characteristics of the system can be thought of in the following terms.

First, each institution that is "eligible" to submit competitive bids in Treasury auctions would have a terminal-based telecommunications link to the Federal Reserve Bank of New York, either directly or through another Federal Reserve Bank. The basic "hardware" used for this purpose will be the FedLine terminal that is presently in use in over 9,000 depository institutions nationwide. The communications network will be the proven and highly reliable Fedwire telecommunications system. Finally, the new auction system will utilize the same security and encryption devices that are currently used for Fedwire operations.

Second, for each such "eligible" bidder, certain data—including any affiliations with other "eligible" bidders—would have to be housed in our data base, as would acceptable methods for making payment for securities and for receiving delivery of securities awarded in the auctions. Since payment and delivery must be made in electronic form, nonbanks would have to have suitable "auto-charge" agreements in place with banks for this purpose.

Third, following electronic announcements of notices of auctions, bidders would be able to submit bids electronically up until the auction cutoff time, which currently is 1:00 p.m. eastern standard time. In order to provide adequate backup for contingencies, however, the system must be designed such that all bids can be

routed to *both* the Federal Reserve Bank of New York's main data processing center in lower Manhattan and its remote backup processing center.

Fourth, the computers would then sort through the bids on the basis of the highest prices (lowest yields) received in much the same fashion as today's manual procedures do. As a part of this process, a number of internal audit and control procedures are planned to ensure compliance with Treasury auction rules and to flag outlier bids, including those resulting from clerical errors in message preparation.

Fifth, once the proper audits have been performed, the information has been sent to the Treasury, and the "awards" have been made, the payment for and delivery of the securities must be initiated and completed. This will be achieved through the Fed's money and securities transfer systems (Fedwire).

Finally, and in the normal course, after the initial delivery and payment for the securities in question are completed, end-of-day verifications and reconcilements must be made as a part of the overall controls on operating systems that often handle more than \$1 trillion of transactions per day.

The full automation of Fed open market operations is an even more complex and time-consuming task, especially since it is impossible to prejudge with any precision the number, location, and other characteristics of potential counterparties for such operations. Moreover, the operating systems and communications systems associated with this effort must be integrated with a number of other highly complex automated systems, including the Fed's existing money and securities transfer systems. Because of this, an extraordinarily high level of reliability and integrity will be needed. To appreciate the concerns I have in mind, just imagine for a moment what might have occurred on the morning of October 20, 1987, had the Fed been unable—due to technical problems with such a system—to furnish substantial liquidity through open market operations as a part of the effort to stabilize financial markets in the wake of the stock market crash.

### **The role of the Federal Reserve Bank of New York in the market surveillance process**

There is little that needs to be added to what is contained in the joint report as it pertains to the expanded role of the Federal Reserve Bank of New York—in cooperation with the other agencies—with regard to day-to-day surveillance of the government securities market except (1) to emphasize that *market* surveillance is quite distinct from *dealer* surveillance, which we are

discontinuing; and (2) to emphasize that it will take some time to put in place the new or altered statistical reporting arrangements that might be agreed upon by the interagency surveillance working group over the period immediately ahead.

As a first step in the overall process of gearing up for this effort, the Federal Reserve Bank of New York expects to have the initial redeployment of key personnel necessary for this effort in place later this month. Final decisions as to the number and mix of personnel needed for this effort will have to await agreement among the agencies as to the precise scope and nature of the statistical reporting and other aspects of the market surveillance effort, which should be essentially completed in a month or two.

### **The Salomon Brothers situation**

Since the official investigation into the Salomon Brothers wrongdoings is still under way, there is very little that can be said at this time regarding the particulars of that situation. The firm, in response to inquiries by the Federal Reserve Bank of New York, has provided the Bank with several reports over the period from September through December 1991. In general, these reports cover (1) the sweeping changes in management and management structure that were put in place following the disclosures made by the firm last August, (2) the major changes in internal control procedures and compliance systems that have been put in place over the period in question, (3) various estimates of the profits associated with the auctions in which irregularities have been acknowledged by the firm, and (4) further details regarding the firm's financing activities in certain of the Treasury issues. Where relevant, all such materials have been made available to the Securities and Exchange Commission and the U.S. Attorney.

It is contemplated that any decision regarding Salomon Brothers' status as a primary dealer by the Federal Reserve Bank of New York will be made in the context of the findings reached by the Securities and Exchange Commission as a result of its ongoing investigation of the matter. This approach, which has the support of the other agencies, is being followed in deference to fairness and due process considerations and in order to minimize uncertainties that might follow from multiple and uncoordinated announcements of this nature. The timing of the Salomon Brothers episode is such that certain Federal Reserve Bank of New York sanctions might apply even if the firm is not convicted of, or pleads guilty or *nolo contendere* to, a felony under U.S. law.



## Appendix: Administration of Relationships with Primary Dealers

The Federal Reserve Bank of New York (FRBNY) is adopting certain changes in the administration of its relationship with primary dealers in U.S. Government securities. The primary dealer system has been developed for the purpose of selecting trading counterparties for the Federal Reserve in its execution of market operations to carry out U.S. monetary policy. The designation of primary dealers has also involved the selection of firms for statistical reporting purposes in compiling data on activity in the U.S. Government securities market. These changes in the administration of these relationships have been developed after consultation with the Federal Reserve Board, the Federal Open Market Committee, the Treasury and the Securities and Exchange Commission.

The changes announced today have been prompted by two related factors:

First, decisions have been made to accelerate the automation of Treasury auctions and Federal Reserve open market operations with a view toward increasing the efficiency of the auction process and open market operations, and providing the potential for further broadening the base of direct participation in these operations. These automation initiatives are major undertakings, as they must be planned and executed with extreme care to ensure operating and communications systems of the highest level of reliability and integrity. They will require back-up systems comparable to those now in place for the Fed's funds and securities transfer systems. Planning for automation of the existing Treasury auction format is well under way and automation is scheduled for completion by the end of this year. Automation planning for Federal Reserve open market operations is just getting started, and completion of this automation will probably take about two years.

Second, and more important, while the system of designating primary dealers on the whole has served the Federal Reserve, the Treasury, and the nation well for many years, there also have been some drawbacks to the existing arrangements. Prominent among these is the public impression that, because of the Federal Reserve Bank's standards for selecting and maintaining these relationships, the Fed is in effect the regulator of the primary dealer firms. Moreover the primary dealer designation has been viewed as conferring a special status on these firms that carries with it elements of "franchise value" for the dealer operation and possibly for other aspects of the firm's standing in the marketplace.

The net result of these interrelated factors is that the Federal Reserve is amending its dealer selection criteria to begin providing for a more open system of trading relationships, while still exercising the discretion that any

responsible market participant would demand to assure itself of creditworthy counterparties who are prepared to serve its needs.

For the most part, the changes in the administration of the primary dealer relationships will have no immediate effect on existing primary dealers—recognizing, of course, that they will, over time, be subject to the requirements noted below for maintaining a counterparty relationship with the Fed. However, existing as well as any new primary dealers will *no longer be required* to maintain a one percent share of the total customer activity reported by all primary dealers in the aggregate; this requirement is no longer deemed necessary given the active and liquid state of development now achieved in the U.S. Government securities market, and its retention could be an obstacle to achieving more open trading desk relationships. In addition, while continuing to seek creditworthy counterparties, and while continuing to exercise market surveillance, the FRBNY will discontinue its own *dealer surveillance* activities relating to primary dealer firms' financial characteristics.

New firms will be added on the basis of criteria listed below. As in the past, all primary dealers will be expected to (1) make reasonably good markets in their trading relationships with the Fed's trading desk; (2) participate meaningfully in Treasury auctions; and (3) provide the trading desk with market information and analysis that may be useful to the Federal Reserve in the formulation and implementation of monetary policy. Primary dealers that fail to meet these standards in a meaningful way over time will have their designation as a primary dealer *discontinued* by the FRBNY. It is contemplated that each dealer firm's performance relative to these requirements will be reviewed on an ongoing basis and evaluated annually beginning in June 1993. If a firm's relationship with the FRBNY is discontinued because of shortfalls in meeting these standards, the action by the FRBNY will be made strictly on a business relationship basis. As such, any decision by the FRBNY will carry no implication as to the creditworthiness, financial strength or managerial competence of the firm.

In evaluating a firm's market-making performance with the trading desk, the FRBNY will look to the amount of business of various types actually transacted and the quality of the firm's market-making and market commentary. Dealers that do little business with the Fed over a period of time, that repeatedly provide propositions that are not reasonably competitive, and that fail to provide useful market information and commentary add little to the Fed's ability to operate effectively and will be dropped as counterparties for at least six months.

In evaluating participation in Treasury auctions, the Fed will expect a dealer to bid in reasonable relationship

## Appendix: Administration of Relationships with Primary Dealers (continued)

to that dealer's scale of operations relative to the market, and in reasonable price relationship to the range of bidding by other auction participants. Any decision to suspend a primary dealer designation because of inadequate auction bidding will be taken in close consultation with the Treasury.

Finally, consistent with the Omnibus Trade & Competitiveness Act of 1988, a foreign-owned primary dealer may not be newly designated, or continue to be designated, in cases where the Federal Reserve concludes that the country in which a foreign parent is domiciled does not provide the same competitive opportunities to U.S. companies as it does to domestic firms in the underwriting and distribution of Government debt.

### Criteria for accepting new dealers

New primary dealers must be commercial banking organizations that are subject to official supervision by U.S. Federal bank supervisors or broker/dealers registered with the Securities and Exchange Commission. The dealer firms or the entities controlling the dealer firms must meet certain capital standards as follows:

- Commercial banking institutions must—taking account of relevant transition rules—meet the minimum Tier I and Tier II capital standards under the Basle Capital Accord. *In addition*, commercial banks must have at least \$100 million of Tier I capital as defined in the Basle Capital Accord.
- Registered broker/dealers must have capital in excess of the SEC's or Treasury's regulatory "warning levels" and have at least \$50 million in regulatory capital. Where such capital standards do not apply to a consolidated entity controlling a primary dealer—consistent with the treatment of banks under the Basle Accord—the FRBNY will also look to the capital adequacy of the parent organization.

The minimum absolute levels of capital specified above (i.e., \$100 million for commercial banks and \$50 million for broker/dealers) are designed to help insure that primary dealers are able to enter into transactions with the Fed in sufficient size to maintain the efficiency of trading desk operations.

A bank or a broker/dealer wishing to become a primary dealer must inform the FRBNY in writing. As a part of that notification a prospective dealer must also provide appropriate financial data demonstrating that it meets the capital standards outlined above. The FRBNY will consult with the applicable supervisory body to ensure that the firm in question is in compliance with the appropriate capital standards. When new firms are accepted as primary dealers, the nature and extent of the Bank's trading relationship with the firm will, as under current practices, evolve over time. As a result of this change and the

elimination of the one percent market share criterion, there will no longer be any need for individual firms to be considered by the market as "aspiring dealers."

Of necessity, at least for the time being, the number of additional primary dealers will be relatively limited because of resource constraints on trading desk operations. The selection of this limited number will be dependent on how many can be added without adverse impact on the efficiency of Federal Reserve trading desk operations. Applications received by March 31, 1992, will be evaluated in relation to the foregoing capital standards. If it is not feasible to add all of the qualifying firms as primary dealers, a selection will be made among those firms in a manner that gives primary consideration to their relative capital positions. Following the implementation of automated communications for trading purposes, further expansion in the number of primary dealers will be feasible, and further changes in the criteria for selection also could be considered, although there is no pre-conception at this time as to what, if any, further changes would be made.

### Maintenance of capital standards

As a result of the adoption of the capital standards for accepting primary dealers, all primary dealers will be expected to maintain capital positions that meet the standards described above on an ongoing basis. Should a firm's capital position fall below these minimum standards, the FRBNY may suspend its trading relationship until the firm's capital position is restored to levels corresponding to these minimum standards. In making such determinations, the FRBNY will look to the firm's primary Federal regulator for guidance as to whether the firm has in place an acceptable plan to restore its capital position in a reasonable period of time. However, in no circumstances will the Bank maintain a trading relationship with a primary dealer that is unable to restore its capital position to the stipulated minimum level within a year. Over time, the maximum grace period of one year may be shortened and would not apply in any event if a firm's capital position were seriously impaired.

### Elimination of dealer surveillance

While the Federal Reserve Bank of New York will continue to seek creditworthy counterparties—and will continue, or enhance, its *market* surveillance—it is planning to discontinue the "dealer surveillance" now exercised over primary dealers through the monitoring of specific Federal Reserve standards and through regular on-site inspection visits by Federal Reserve dealer surveillance staff. Rather, the FRBNY will seek to act as any reasonably well-informed and responsible firm might behave in evaluating the creditworthiness of its counter-

## Appendix: Administration of Relationships with Primary Dealers (continued)

behave in evaluating the creditworthiness of its counterparties. Accordingly, the Federal Reserve will expect to receive periodic reports on the capital adequacy of primary dealers, just as any other responsible market participant should expect to receive such reports.

The elimination of the Bank's dealer surveillance activities should be viewed merely as confirmation of the long-standing reality that the Bank does not have—nor has it ever had—formal regulatory authority over the Government securities market or authority over the primary dealers in their capacity as such. The Bank is satisfied that the existing regulatory apparatus over the market and the regulatory apparatus as it applies to dealer firms are adequate—especially in light of changes outlined in the joint Treasury-SEC-Federal Reserve study—and it is satisfied that it can protect itself against financial loss without reliance on formal dealer surveillance.

### Sanctions of primary dealers for wrongdoing

The Federal Reserve Bank of New York does not have civil or criminal enforcement authority over primary dealers in their capacity as primary dealers. This consideration and the dictates of fairness and due process require that the disposition of allegations of wrongdoing lies with the Government bodies having such authority—including the U.S. Treasury, the Federal bank supervisor, the Securities and Exchange Commission and the U.S. Department of Justice.

In the future, if a primary dealer firm itself is convicted of a felony under U.S. law or pleads guilty or *nolo contendere* to felony charges under U.S. law for activities that relate directly or indirectly to its business relationship with the Federal Reserve, the firm will be subject to

punitive action, possibly including suspension as a primary dealer for six months. Depending on the nature of the wrongdoing the penalty could be more severe, including permanent revocation of a trading relationship.

### Statistical reports on government securities activities

The current statistical reporting program is expected to continue unchanged for the time being, but a review is being undertaken to determine how best to adapt this program to an environment in which market surveillance is receiving greater emphasis and a statistical reporting relationship is not necessarily tied to a trading relationship with the Federal Reserve. This review will take into account the needs of the Federal Reserve, the Treasury and the SEC as well as the burden of statistical reporting on dealer firms.

### Summary

Taken as a whole, these changes are designed to facilitate an orderly and gradual move to a more open system of primary dealer relationships with the FRBNY while at the same time preserving certain key characteristics of the current system that have been beneficial to the Federal Reserve and the Treasury over the years. Over time, the successful implementation of highly automated systems for Treasury auctions and Federal Reserve open market operations will provide the room and the opportunity for still further changes. However, the desirability of further changes will have to be evaluated against the experience with these modest changes and the need to preserve both the efficiency and flexibility of Federal Reserve monetary policy operations, and the liquidity and efficiency of the market for U.S. Government securities.

# Determinants of Long-Term Interest Rates: An Empirical Study of Several Industrial Countries

*by Howard Howe and Charles Pigott*

Real interest rates on long-term financial assets play a central role in linking financial markets to the economy at large. Long-term real interest rates are a key determinant of business and housing investment as well as household spending on automobiles and other durables. As such, the rates are an important influence on the business cycle and on capital formation and a key link in the transmission of macroeconomic policies. The extensive debate over the reasons for and implications of the apparently high level of real long-term rates worldwide during much of the 1980s attests to their practical economic significance—and the importance of trying to improve understanding of their behavior.

This article examines the principal influences on long-term real interest rates over the last fifteen years in the United States and four major foreign countries: Japan, Germany, the United Kingdom, and France. Our goal is to identify the macroeconomic and other factors that have shaped the broader movements of the real rates over the period as well as their shorter term fluctuations.<sup>1</sup>

We begin by examining several important features of the behavior of long-term real interest rates since the mid-1970s. This analysis yields two key findings: first,

the countries' real rates have shown a persistent rise since the mid-1970s, reaching levels in the 1980s that seem unusually high by historical standards; second, the movements in the real rates appear to reflect, at least in part, shifts in their long-run, or "equilibrium," levels. This second finding suggests that any adequate explanation of the evolution of the real rates must allow for determinants with relatively lasting effects as well as factors leading mainly to short- and medium-term fluctuations in those rates. We apply such a framework in evaluating the empirical importance of several potential influences, including macroeconomic policies, the rate of return to capital, and the effects of risk and other factors arising in part from changes in financial structure and regulation.

Overall, the evidence developed here suggests two important if very tentative conclusions. The first, and probably firmer, is that much, perhaps the dominant portion, of the observed movement in long-term real interest rates reflects relatively permanent changes in their long-run equilibria. In particular, the increase in real rates from the 1970s to the 1980s, which occurred to some degree in all the countries (and for short-term rates as well), appears to stem largely from such a change in equilibria. There is also some evidence, although mixed and highly tentative, that rising debt levels relative to GNP along with increases in the return to physical capital are at least partly responsible for the increase in real rates.

Our second conclusion is that macroeconomic policies have been an important, but clearly not exclusive, influence on the evolution of the long real rates over the last fifteen years. In particular, monetary policy appears

<sup>1</sup>Our approach complements that of most studies on long-term interest rates over the last decade, which have focused on more specific and technical issues such as the degree to which long-term rates are determined by expectations of future short rates. Our analysis is similar in spirit to two earlier studies of real interest rates that attempted to explain the evolution of real rates over time: Robert J. Barro and Xavier Sala i Martin, "World Real Interest Rates," National Bureau of Economic Research, Working Paper no. 3317, April 1990; and Olivier J. Blanchard and Lawrence H. Summers, "Perspectives on High World Real Interest Rates," Brookings Papers on Economic Activity, 2: 1984.



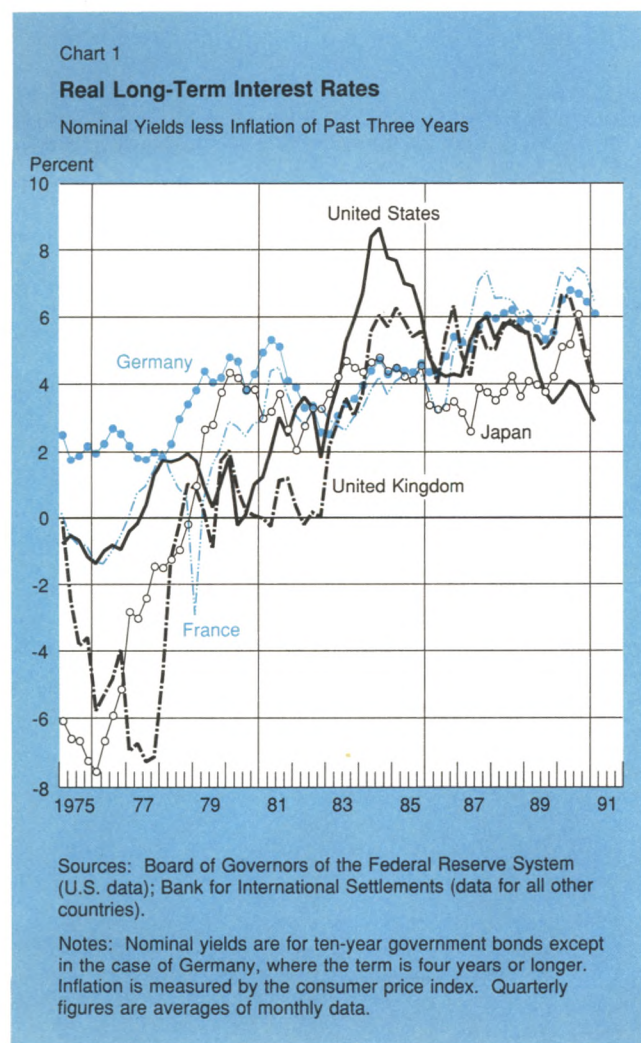
to have contributed significantly to the rise in real rates abroad at the end of 1970s and to the increase in U.S. real rates in the early 1980s. On the whole, however, monetary policy was not responsible for *persistently* high real rates during the last decade. Likewise, changes in government budget deficits appear to have affected real rate movements in certain periods, but to a degree (apart from their effect on debt levels) that is fairly modest compared with the overall trend in the real rates. On balance, the two conclusions suggest that macro policies have affected real long-term interest rates but, given the importance of other influences, have not exercised a high degree of "control" over those rates in any economically meaningful sense.

### The evolution of long-term real interest rates

Conceptually, the real interest rate on a financial asset

is equal to its nominal yield minus the inflation that a typical investor expects to prevail over the holding period. Because the anticipated inflation rate cannot be directly measured, any empirical measure of real interest rates inevitably is only a rough proxy.<sup>2</sup> In this study, we approximate the long-term real interest rate as the nominal rate minus the average of consumer price inflation over the past three years. (For the nominal rates we use the yields to maturity on government bonds, since these bonds are the primary fixed income instruments in the countries we are considering.<sup>3</sup>) Our real rate measure is very rough and not necessarily the best that might be constructed. But given the considerable evidence that inflation expectations tend to be strongly influenced by past trends, the measure should reasonably reflect the broad movements in actual real rates over time that are our main concern here.<sup>4</sup>

Chart 1 shows the movements in the real long-term interest rate proxies since the mid-1970s, and Table 1 presents the corresponding averages. Movements in nominal long-term rates appear in Chart 2. Three features of these movements are noteworthy. First, long-term real rates have varied considerably over time, indeed, by nearly as much as their nominal counterparts. This observation implies that nominal rates have not varied just to offset movements in inflation, as a simplified Fisherian model of interest rate determination



<sup>2</sup>There are, of course, other significant measurement problems—for example, the accounting for taxation of bond returns.

<sup>3</sup>Maturities on the instruments considered are ten years for all countries except Germany, where the term is four years or longer. Government bonds are generally the most widely held and actively traded long-term fixed income instruments in all the countries.

<sup>4</sup>That is, in some long-run or average sense, the proxy used here should equal the actual real rate, since investor expectations of future inflation should (at least if they are "rational") ultimately coincide with its actual trend.

Table 1

#### Average Real Long-Term Interest Rates

Nominal Yields less Past Three Years' Inflation

	Japan	Germany	France	United Kingdom	United States
1975-90	1.8	4.1	3.2	1.7	3.1
1975-82	-0.5	3.2	1.2	-1.7	0.9
1983-90	4.2	5.0	5.1	5.1	5.4
Memo:					
1963-69	2.0 <sup>†</sup>	4.1	2.8	3.2	2.7

<sup>†</sup>1965-69.



would suggest. Moreover, the behavior of the real rates has often been quite different from that of their nominal counterparts; in particular, real rates have tended to rise over time, while the nominal rates, reflecting the general decline in inflation rates from the 1970s to the 1980s, have fallen over the period as a whole.

Second, although the average levels of the real rate have differed significantly across countries, both the overall trend in real rates and their behavior from the late 1970s to the early 1980s and again at the end of the 1980s have been remarkably similar across countries. The coincidence of the broad movements in the countries' real rates suggests that their underlying determinants may have behaved in very similar ways.

The third and perhaps most striking feature of the real rate movements is their general rise after 1975 to levels in the 1980s that appear unusually high in comparison with the past.<sup>5</sup> Admittedly, the first portion of this rise, in the latter 1970s, represents the recovery of real rates

from the exceptionally low, indeed generally negative, levels to which they had fallen during the first half of the decade (in all the countries but Germany). (Because much of the rapid rise in inflation during the mid-1970s was probably unanticipated by markets, our measure may significantly understate the true level of real interest rates during this period.) The surge in real rates over 1979-81, to levels somewhat above past averages (except in the United Kingdom), is similar to that seen in several of the countries in 1973-74. The sustained increase in real rates after 1982, however, marks a clear departure from past historical patterns. Although real rates abroad, at least during 1982-85, did not rise nearly as much as in the United States, the average level of the rates in all five countries after 1982 was noticeably higher than during the 1960s or the first half of the 1970s. Thus, by postwar standards, real long-term interest rates have been quite high *internationally* during the last decade.

The persistent rise in real long-term interest rates<sup>6</sup>

<sup>5</sup>The persistently high level of both short- and long-term real interest rates during the 1980s has been widely noted and discussed. (See in particular Paul Atkinson and Jean-Claude Chouraqui, "The Origins of High Real Interest Rates," Organization for Economic Cooperation and Development, OECD Economic Studies, no. 5,

Footnote 5 continued

Autumn 1985, pp. 7-55.) Commentators have attributed it to a wide range of factors, including government budget deficits and, more recently, a worldwide "shortage of capital."

<sup>6</sup>This rise is also displayed by several alternative definitions based on other inflation indexes and measures of expected long-term inflation. In particular, real rate proxies based on a "forward-looking" measure of anticipated inflation, calculated as the average of inflation rates one year in the future and two years in the past,

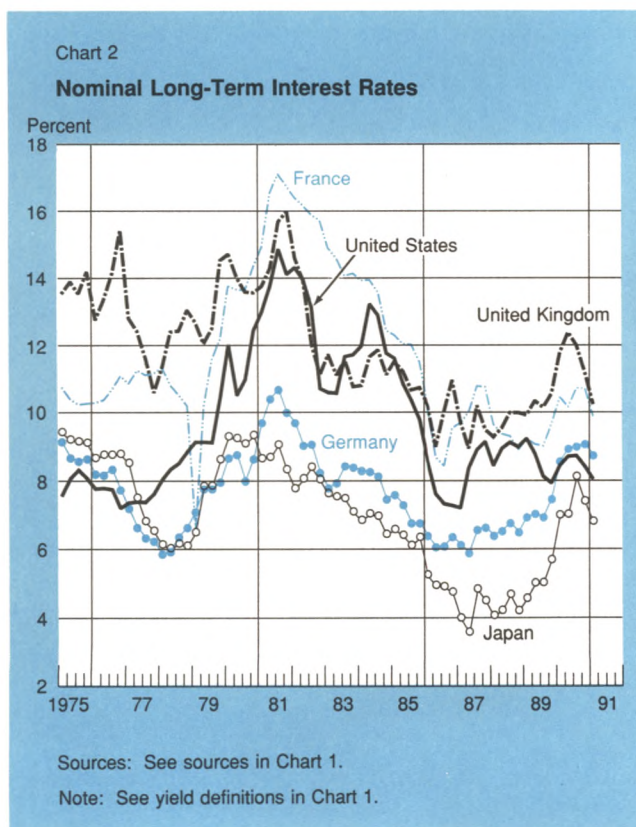


Table 2

### Tests for Varying Equilibrium of Long Rates

	Japan	Germany	France	United Kingdom	United States
Real long rate (1973-III to 1990-IV)	-1.77	-1.06	-.49	-1.79	-1.75
Long-short spread (1973-III to 1990-IV)	-4.00*	-3.21*	-3.92*	-2.09†	-2.45

Notes: Figures are augmented Dickey-Fuller test statistics on the coefficient  $b$  in the equation

$$x(t) = bx(t-1) + \sum_{i=1}^4 c_i \Delta x(t-i) + e_{xt}$$

where four lagged autocorrelation terms are used. A significant value indicates that the hypothesis that the equilibrium (long-term or unconditional mean) is changing can be rejected. None of the values for tests of constant equilibrium real long rates are statistically significant. Tests of constant long-short spread are statistically significant at the 5 percent (\*) level for Japan, Germany, and France. Critical values for the Dickey-Fuller statistic are obtained from W.A. Fuller, *Introduction to Statistical Time Series*, 1976, p. 373.

†The United Kingdom spread appears to have a negative time trend but to be otherwise stable (that is, around the trend): when a time trend is included, the critical value of the test statistic for significance at the 5 percent level is -3.41.



strongly suggests that their long-run (conditional) mean values have changed over time. We will refer to such changes as shifts in the "equilibria" of the real interest rates since the means represent the levels to which the real rates will eventually converge in the absence of any further disturbance to their values.<sup>7</sup> The supposition that the equilibria have changed periodically is supported by formal statistical tests, reported in Table 2,

*Footnote 6 continued*

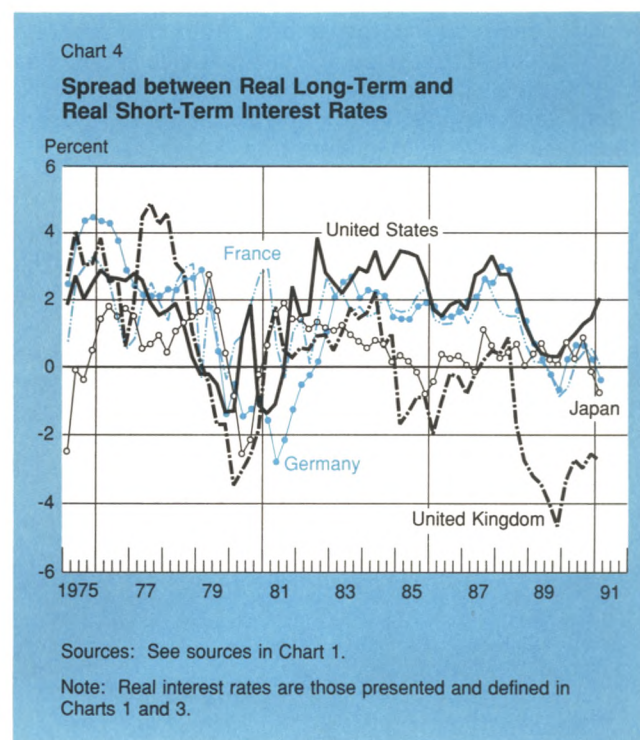
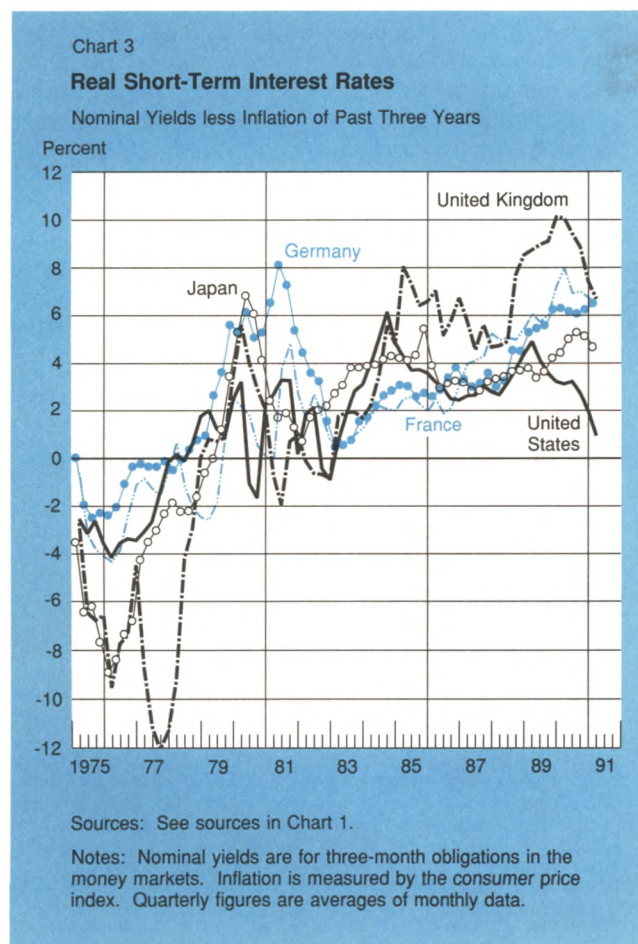
also display a considerable rise between the mid-1970s and the 1980s, although somewhat more modest than that shown in Chart 1. The same is true of proxies calculated by discounting considerably (for example, by smoothing over a longer period) the sharp surge in our inflation measure in the mid-1970s and of proxies based on the GNP deflator or the consumer price index excluding food and energy. Comparisons of the 1980s with the 1960s are also fairly robust to alternative measures.

<sup>7</sup>Thus, "equilibrium" as defined here is inherently subject to change over time, in contrast to the very long-run "steady-state" equilibria referred to in classical growth theories and much other literature. The economic meaning of the real rate equilibrium is discussed below.

which evaluate whether the long-term real rate is "stationary" in the sense of having a constant mean value toward which it tends to return. As the table indicates, the hypothesis that the long-run mean values of the real rates have varied over time cannot be rejected at any reasonable confidence interval.<sup>8</sup>

The most plausible interpretation of these statistical results is that the equilibrium values of the long-run rates have changed significantly over time rather than that the real rates are simply "unstable" in the sense of having no true equilibrium. The implication is that the observed evolution of real long-term rates reflects not only fluctuations about a given equilibrium but also changes in the equilibria themselves. Note too that the average level of real interest rates on short-term financial assets has also increased noticeably (Chart 3).

<sup>8</sup>Tests over a longer period (beginning in the mid-1960s, or late 1960s for Japan) support this conclusion even more decisively than the tests reported in the table. Furthermore, a more general regression relating the long-term nominal rate to inflation (allowing the real rate to vary systematically with inflation) also appears to have an "unstable" mean. It is, of course, possible that the shifts in the mean real long rate have occurred at a few discrete points during the period, rather than more or less continuously, as a literal reading of the statistical results underlying Table 2 would imply. Nevertheless, the hypothesis that a single mean shift occurred after 1981, or at mid-sample, is effectively rejected by the test statistics (at the 5 percent, and generally the 10 percent level) for all countries but the United States.



However, the relation between long- and short-term rates, as measured by the difference in their values, appears to have remained fairly stable over time (Chart 4). This latter observation is supported by statistical tests analogous to those applied to the real long rates; here the tests suggest that the long-short spread does have a constant mean in most cases (Table 2, bottom row).<sup>9</sup> Thus we may also conclude, if equally tentatively, that the rise in equilibrium long-term real rates appears to reflect forces affecting financial instruments generally, not simply forces specific to long-term instruments.

The finding that equilibrium real rates have varied does not itself, of course, cast light on the specific economic factors responsible. Nevertheless, the finding does help us to determine the factors we will consider and the approach we will take in our empirical analysis of the behavior of long-term real rates—the analysis to which we now turn.

### Fundamental determinants of long-term real interest rates

In this section we attempt to identify and quantify the importance of the fundamental economic forces behind the evolution of the real long-term interest rates examined above. The evidence presented in the first section implies that any adequate framework for this analysis must consider forces leading to persistent changes in the equilibria of the real rates as well as forces producing fluctuations about those equilibria. Such a framework is provided by the approach to interest rate determination formulated by the Swedish economist Knut Wicksell in the late 19th century.<sup>10</sup> The “Wicksellian” approach is the prototype for much modern theoretical analysis of interest rate determination.

#### *The Wicksellian framework*

Fundamental to Wicksellian frameworks is the distinction between the “natural” real rate of interest and the market rate. The first corresponds to what we have called the long-run equilibrium real interest rate: it is the rate toward which actual real rates will eventually tend over time in the absence of any further disturbances. Fundamentally, the equilibrium real rate represents the

future return in forgoing current consumption.<sup>11</sup> This equilibrium real rate can, and generally will, change over time as its underlying determinants vary; these changes will be reflected in the broader, longer term movements in actual real rates.

The framework recognizes, however, that actual interest rates generally adjust only gradually to shifts in their underlying equilibria. Asset supplies and demands may respond slowly to altered conditions, and certain forces may temporarily push interest rates away from equilibrium without altering the equilibrium itself. Accordingly, the actual market rate of interest at any given time (which Wicksell called the “financial” rate) will generally differ from its equilibrium. Virtually any of the factors affecting supplies of or demand for financial assets could lead to such deviations, but two are widely believed to be of special importance: monetary policy and fiscal policy.

From this perspective, the evolution of long-term real interest rates over any substantial period reflects both changes in their long-run equilibria and fluctuations about those equilibria. In practice, however, forecasting and other empirical models of real interest rates have tended to focus mainly on the latter, with little or no explicit consideration of changes in real-rate equilibria. The models most often view long-term real interest rates as reflecting actual and expected movements in short-term nominal interest rates and inflation, movements that are largely determined by macroeconomic policies.<sup>12</sup>

In such models, monetary policy induces fluctuations in short- and therefore long-term real interest rates through its effects on the supply and demand for liquidity but does not (to a first approximation) affect the long-run equilibrium real rate.<sup>13</sup> Real interest rate vari-

<sup>11</sup>The natural rate was originally identified with the real rate level compatible with a constant (nonaccelerating or decelerating) inflation rate. As originally formulated, the Wicksellian framework was meant to apply to the general level of interest rates within a given country, rather than to individual assets or even classes of assets. Risks affecting the general level of rates are most likely to arise from fundamental technological factors, business cycle fluctuations, or other forces affecting all assets. The framework can be applied to particular types of assets, as here, but then it must allow for their individual risks.

<sup>12</sup>Fairly typical in this respect are the interest rate relations embedded in the MPS, DRI, and other large econometric models. These models generally relate long-term nominal interest rates to a distributed lag on past short-term rates; in some cases, the models also relate the long-term rates to inflation and other variables. Short-term (nominal) rates are then usually modeled as a function of some measure of the money stock, the level of prices, and real activity. However, in a reduced-form model, macroeconomic policies tend to be the main *explicit* driving forces of prices and income. In any case, the determination of real interest rates is largely implicit in such models.

<sup>13</sup>For example, expansionary monetary policy initially tends to lower short-term nominal and real interest rates by increasing liquidity.

<sup>9</sup>The spread for the United States is just below the 10 percent critical value that would indicate “acceptance” of the hypothesis of a constant mean. But evidence from earlier work using a longer sample period (for example, Robert F. Engle and C.W. Granger, “Cointegration and Error Correction: Representation, Estimation, and Testing,” *Econometrica*, vol. 55, no. 2 [March 1987], pp. 251-76) indicates that the U.S. spread is in fact stationary, and we will so regard it in our statistical analysis.

<sup>10</sup>Wicksell’s approach was developed in his treatise, *Interest and Prices* (1898).



ations about equilibrium can also arise from cyclical fluctuations in real growth caused by fiscal stimulus or contraction. In principle, fiscal policy may alter the real rate equilibrium through its effect on government debt levels (see below) or other channels, but such effects are normally not considered, at least not explicitly, in standard models.

Models focusing on changes in interest rates around some equilibrium have proved useful in analyzing interest rate movements over moderate intervals such as the business cycle. But they can be expected to provide only a very incomplete explanation of the movements over longer periods. Here we consider extended intervals for the reason emphasized previously: long-term real interest rate movements appear to be too persistent to be attributed simply to business cycle fluctua-

*Footnote 13 continued*

Long-term rates are thus likely to fall at first, both in nominal terms and relative to prevailing inflation trends (that is, in real terms according to our measure). Over time, however, as the policy increases inflation and stimulates real growth, interest rates will tend to rise, with real rates returning to their original equilibrium. Nominal rates, of course, are likely to end up higher than they were originally because of the increased inflation.

tions caused by macroeconomic policies. Examination of the pattern of monetary and fiscal policies over the last fifteen years further supports this conclusion.

No single measure can fully capture the stance of monetary policy. Chart 5 provides one measure of the stance of the five countries' monetary policies, namely, central bank money market intervention rates or inter-bank rates. The movements in short-term real interest rates and in the spread between long and short rates in Charts 3 and 4 provide additional indicators of the policy stance. Collectively, these measures suggest that monetary policy was relatively expansionary during 1975-78, the years following the first oil shock (note especially the sharp declines in the central bank rates), but then tightened fairly markedly beginning around 1979-80, partly in response to the second oil shock. Policy next seems to have relaxed—as early as 1980 in Japan, about 1982 in Germany and the United Kingdom, and somewhat later in the United States—and showed only moderate changes through much of the decade until about 1988, when it began to tighten in most countries. As judged by money market intervention rates, monetary policy eased after 1989 in the United States, relaxed in the United Kingdom a bit later, and in the other three countries either tightened or showed no significant change.

These patterns suggest that monetary policies influenced the relatively low level of real long-term interest rates over 1975-79 and contributed significantly to the surge in real rates in the early 1980s.<sup>14</sup> It seems quite unlikely, however, that monetary policy could have been responsible for the persistence of relatively high long-term interest rates after 1982. These rates remained nearly as high as in 1980-81 despite a considerable easing of monetary policy.

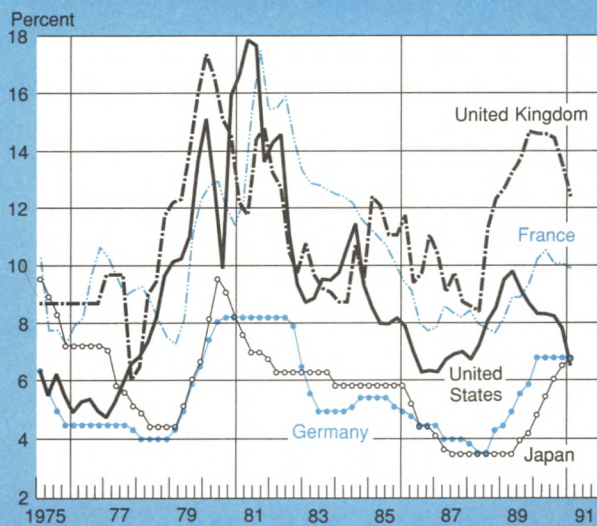
Fiscal deficits are widely believed to have been a major contributor to high real interest rates during the 1980s. In the United States, the persistence of a high deficit throughout the decade (Chart 6) seems at least consistent with this view. In the foreign countries, however, the deficits were highest in the 1970s and early 1980s, and fell substantially thereafter; foreign deficit-to-GNP ratios after 1983 were noticeably lower on average than in the latter half of the 1970s. Hence fiscal deficit movements, which appear to have reinforced the effects of monetary easing after 1982, would seem unable to explain the high level of real rates abroad during that period.

These observations do not mean, of course, that

<sup>14</sup>Comparison of individual country experiences also supports the conclusion that monetary policy was substantially responsible for the sharp rise in foreign real long-term rates at the beginning of the 1980s. The rate increases were greatest in Britain, and most sustained there and in Germany, the two countries that appear to have undergone the most severe and prolonged tightening.

Chart 5

**Money Market Intervention Rates**



Sources: See sources in Chart 1.

Note: Money market intervention rates differ among countries: for the United States, we use the federal funds rate; for Japan, the call money rate; for Germany, the repurchase rate on short-term Treasury bills; for the United Kingdom, the base rate on sales of commercial and eligible bank bills; and for France, the repurchase rate on short-term private paper.



macroeconomic policies have had little or no impact on the long-term real interest rates. The observations do confirm, however, that analysis of the real rates must account for shifts in equilibria and consider fundamental factors in addition to standard macroeconomic policies.

#### *Determinants of the equilibrium real long-term interest rate*

The equilibrium level of a country's real interest rates can be viewed as the product of three factors. The first is the rate of return to physical capital, which represents the rate at which current savings are transformed into future output. Chart 7 shows one very crude summary measure of this return, namely the gross profit rate (including depreciation) on business capital as estimated by the Organization for Economic Cooperation and Development. Because this measure reflects only the current earnings of capital, it can only indirectly indicate the prospective return to new investment. Nonetheless, it is interesting that the gross profit rates have increased over time and were on average 1 to 2 percentage points greater over 1983-89 than during the preceding economic expansion of the latter 1970s (although not generally higher than in the 1960s).<sup>15</sup> To

<sup>15</sup>Of course, the return to capital may be measured in several ways, but all have serious defects. For alternative measures and

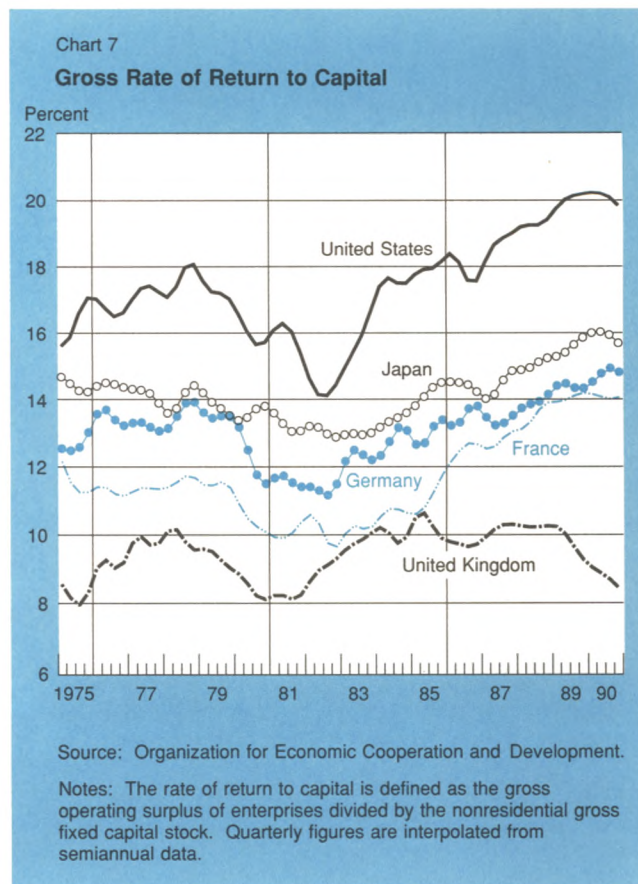
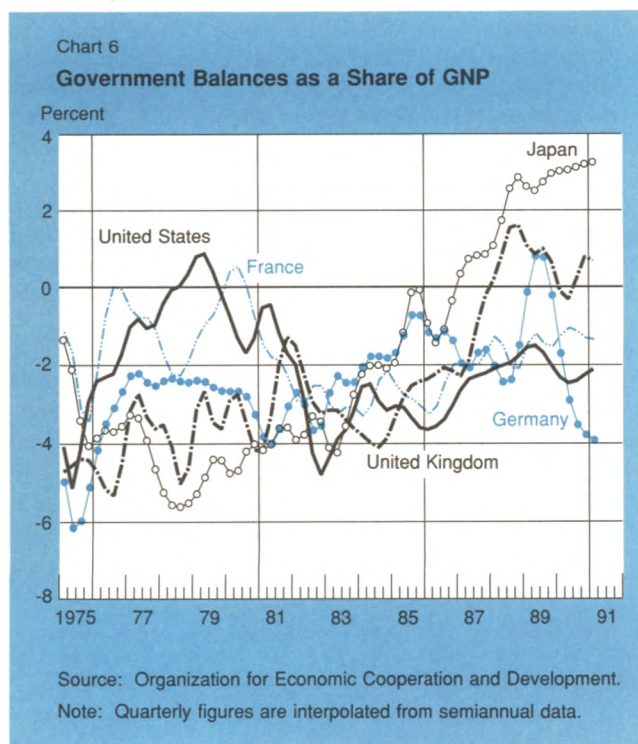
the extent that this increase reflects a fundamental shift in capital productivity or capital's share of output, it may have contributed to the rise in real interest rates on financial assets.<sup>16</sup>

A second factor determining the equilibrium real bond rates is their risk. Conceptually, the interest rate on an asset includes a "risk premium" to compensate for the uncertainty about the future value of wealth entailed in

#### *Footnote 15 continued*

discussion of the issues raised, see James Chen-Lee and Helen Sutch, "Profits and Rates of Return in OECD Countries," OECD Working Paper no. 20, 1985. One alternative measure is the market return to equities, which was also relatively high during the 1980s; the Barro and Sala i Martin study ("World Real Interest Rates") in fact attributes much of the rise in short-term real rates during the 1980s to this factor.

<sup>16</sup>The reasons for the increasing return to capital are unclear, although a general rise in profit shares was apparently one proximate contributor. Note, however, that investment was very robust abroad during the latter half of the 1980s and in the United States in the middle portion of the decade. This pattern at least suggests that returns to capital improved significantly. Blanchard and Summers ("Perspectives") make a similar argument and provide evidence that the shifts may have been manifest by the early 1980s.





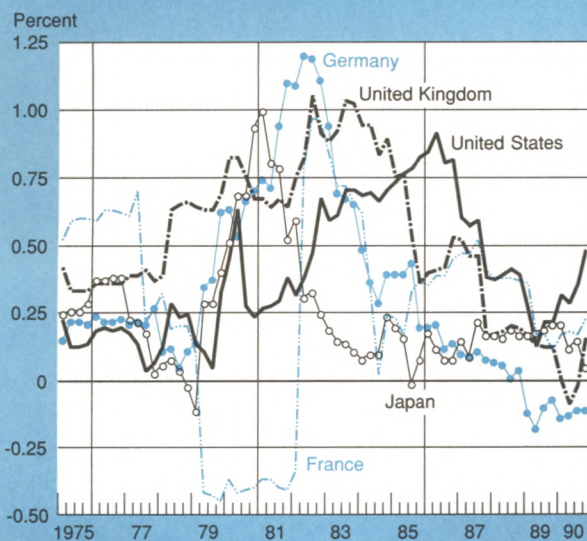
holding that asset. Like the return to capital, risk has a number of possible proxies, all of which are imperfect. Chart 8 shows a common measure based on the historical contribution, "beta," of government bonds to the volatility of the overall market portfolio—a portfolio that consists of domestic bonds plus domestic equities. Generally, these measures reached their peaks in the early to mid-1980s; they have fallen considerably since then. Abroad, the risk proxies appear about equal to or lower than those of the latter 1970s, although in the United States they seem to have remained somewhat higher.

An alternative proxy that may better reflect prospective risks than measures based on past performance is the ratio of government debt to GNP. One rationale is that high and rising government debt burdens could undermine the credibility of the government's commitment to contain inflation or could create other economic problems that depress the future value of government

debt. As the upper panel of Chart 9 indicates, the public debt ratio in the United States rose throughout the last decade; by contrast, the debt ratio has fallen or leveled off since 1985 in Japan, Germany, and France, and declined continuously in the United Kingdom since the mid-1970s.

Chart 8

### Contribution of Bonds to the Volatility of the Domestic Portfolio

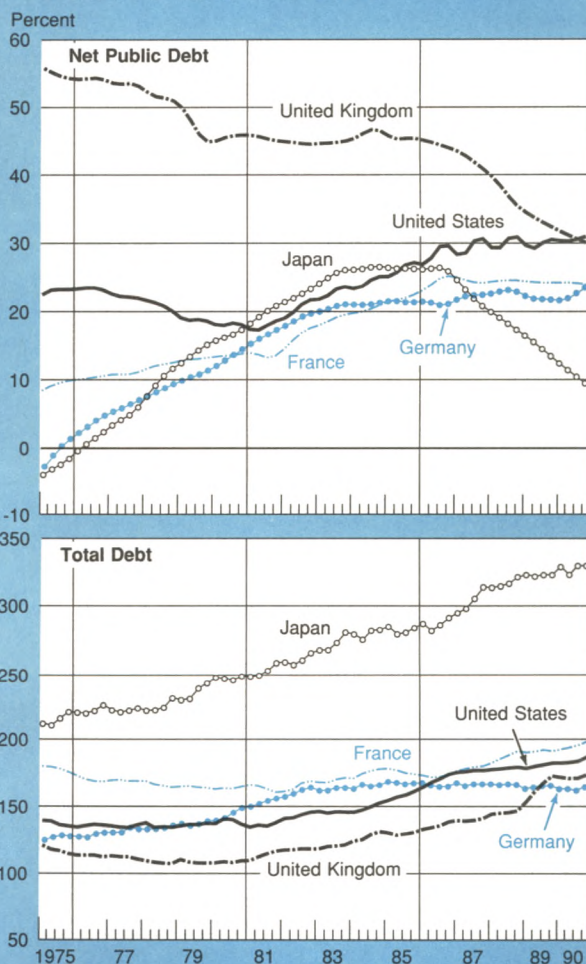


Source: Authors' calculations.

Notes: The risk contribution, or beta ( $\beta$ ), of bonds is defined as the covariance between the ex post real bond yield and the real return on the domestic portfolio (bonds plus equities weighted by their respective shares of the total value of domestic bonds and equities) divided by the variance of the ex post real return on the domestic portfolio. The data plotted here and used in the estimation of the model (equation A.1 of the appendix) are three-year moving averages. Since the average maturity of the bonds is not known, the computation assumes an average effective duration of six years in calculating capital gains.

Chart 9

### Debt as a Share of Nominal GNP



Sources: Organization for Economic Cooperation and Development (OECD), Bank for International Settlements, U.K. Central Statistical Office, and Board of Governors of the Federal Reserve System.

Notes: Net public debt for all countries and gross public debt for all countries except the United States are interpolated from semiannual data of the OECD. Gross public debt and private nonfinancial sector debt for the United States are available quarterly. Private nonfinancial sector debt (private nonbank debt for the United Kingdom) is interpolated from annual data.

Deregulation and other extensive changes in financial structure represent a third factor thought to have permanently affected real interest rates. These changes, which have occurred to varying degrees in all major industrial countries over the last decade, have spurred the exceptionally rapid growth of private sector debt in the 1980s. It is widely believed that this debt growth, along with the great increase in the number and complexity of available financial instruments associated with it, has added to aggregate financial risks by increasing the vulnerability of lenders and borrowers to adverse economic developments.<sup>17</sup> Moreover, the factors leading to increased credit availability may well have affected interest rates in other ways—for example, by substantially curtailing credit rationing and other mechanisms that tended to depress rates below market clearing levels.<sup>18</sup> These considerations suggest that the trend in overall debt, private as well as public, better reflects the impact of changes affecting equilibrium returns on financial assets than do historical risk measures or government debt alone. As shown in the lower panel of Chart 9, the overall debt ratios have grown substantially and continuously over the last decade in all the countries except Germany.

<sup>17</sup>Bank for International Settlements, *Recent Innovations in International Banking*, Chap. 10, April 1986.

<sup>18</sup>For an extensive discussion of these financial changes and their effects, see M. A. Akhtar, "Recent Changes in the Financial System: A Perspective on Benefits versus Costs," in D.F. Fair, ed., *Shifting Frontiers in Financial Markets* (1986).

### *Estimates of the equilibrium rate*

To apply the Wicksellian approach to the analysis of the real rate movements, we have estimated empirical models of interest rate determination for the five countries. Each of the country models consists of two basic relations, estimated on quarterly data beginning in 1975. The first describes the determination of the equilibrium real long-term interest rate in terms of the fundamental factors described below. The second relation depicts the fluctuations in real rates around those equilibria as the rates adjust to changes in the equilibrium determinants and shifts in macroeconomic policies.<sup>19</sup> Details of the models, their estimation, and key properties are given in the appendix. Beginning with the equilibrium relation and then proceeding to the overall "explanation" of the real rate movements provided by the full models, we will focus on the models' main economic implications.

Empirical relations between the equilibrium long-term interest rates and the return, risk, and financial change measures are summarized in Tables 3 and 4. We focus

<sup>19</sup>The dynamic model has a fairly traditional form in that movements in long-term real interest rates are effectively related to movements in real short-rates and, in part through the latter, to changes in macroeconomic policies. However, following the "error correction" methodology (see, for example, Engle and Granger, "Cointegration"), we include the real rate equilibrium in the dynamic relations, so that long-term real interest rates approach their equilibrium in the absence of further disturbances. An equilibrium relation between long and short rates is also included in the model. The dynamic relations should be regarded as partial reduced forms, with variables such as real income and oil price shocks essentially reflected in the estimated coefficients on the policy variables.

Table 3

### **Determinants of the Equilibrium Long-Term Interest Rate**

Dependent variable is the bond yield less average inflation over the past three years as measured by the consumer price index

	Japan		Germany		France		United Kingdom		United States	
Constant	-20.3	(-8.4)	-12.8	(-7.0)	-7.55	(-6.1)	-38.4	(-9.3)	-11.3	(-5.0)
Return to capital	—		0.57	(4.7)	0.47	(4.8)	0.76	(1.9)	0.44	(1.9)
Beta	3.19	(2.3)	—		—		8.53	(6.6)	7.04	(7.1)
Ratio of debt to GNP	0.08	(9.3)	0.06	(8.8)	0.30	(12.5)	0.22	(11.3)	0.026	(1.3)
Adjusted R-squared	.57		.62		.71		.71		.64	
Cointegration test:										
ADF	-3.51**		-3.03		-3.45**		-3.01		-3.75*	

Notes: The bond yield is the yield to maturity on ten-year government bonds, except in the case of Germany, where the term is four years or longer. Return to capital is the ratio of profits (including depreciation) to gross capital stock; The source for these figures is the Organization for Economic Cooperation and Development. Beta is the contribution of the government bond to the risk of the overall (bonds and equities) domestic portfolio. The ratio of debt to GNP is the total nonfinancial debt ratio; it is calculated as the nominal value of gross government debt plus nonfinancial private debt, divided by nominal GNP (except in France). In France, the public debt ratio is used; it is calculated as the nominal value of net government debt divided by nominal GNP. T-statistics are in parentheses. ADF is the augmented Dickey-Fuller test. Critical values for the Dickey-Fuller statistic are obtained from P.C.B. Phillips and S. Ouliaris, "Asymptotic Properties of Residual-Based Tests for Cointegration," *Econometrica*, vol. 58, no. 1 (January 1990), pp. 165-93.

\*Significant at the 12.5 percent level.

\*\*Significant at the 10 percent level.



on the relations using the overall debt measure (except for France) since these appear somewhat superior to those using government debt only.<sup>20</sup> In any case, the empirical relations are intended, first, to provide an estimate of the movements in the equilibrium real rate itself. These movements are important for interpreting the evolution of actual rates and, in particular, for assessing the influence of monetary policy and other primarily cyclical influences. Second, the relations provide some indication of the factors at least associated with, and perhaps even proximately responsible for, changes in the real rate equilibria. We caution, however, that the relations, along with the interpretations given below, cannot be viewed as causal in any meaningful sense. As the discussion above indicates, the return and risk measures may well be related to more fundamental determinants of the real rates, but they probably are in large part proxies for their effects.

As Table 3 shows, the equilibrium long-term real interest rate appears positively and significantly related to

the debt ratio<sup>21</sup> in all cases except Japan.<sup>22</sup> The beta risk measure appears to contribute to the real rates of Japan, the United Kingdom, and the United States, although (at least in this particular relation) not to those of Germany or France. The return to capital exerts the most uniform influence across countries. In particular, a rise of 1 percentage point in the return to capital is associated with an increase in the equilibrium rate of roughly one-half of 1 percentage point for Germany, France, and the United States, and about three-quarters of 1 percentage point for the United Kingdom. These magnitudes are consistent with the view that bonds and real capital assets are close but imperfect substitutes. The effects of a change in the debt ratio vary more considerably among countries. A rise in the debt ratio of 1 percentage point is associated with increases of 20 and 30 basis points in the U.K. and French real rates, respectively, but with much smaller increases for Japan and Germany, and a negligible

<sup>20</sup>In general, the equations using total debt come closest to accepting the hypothesis that the residuals have a constant mean (in other words, that the real rate and other variables are "cointegrated")—a key criterion if the relations are to be used to estimate the real rate equilibrium. The augmented Dickey-Fuller (ADF) tests reported in the table support this hypothesis most strongly for Japan, France, and the United States, and at best marginally for Germany and the United Kingdom. The alternative equations using the government debt ratio give quite similar estimates of the equilibrium real rate, although what they imply about its determinants differs importantly in certain respects. In any case, data limitations and other factors seriously constrain the ability to choose among alternative variables, underscoring the need to interpret our results cautiously.

<sup>21</sup>The equilibrium relation was tested with total debt and with (net) government debt. Arguably, total debt is a preferable measure because it provides a more comprehensive notion of risk and captures more fully the pace of financial innovation and deregulation over time. Total debt as a share of GNP provides better results than does government debt for all countries but France. Financial markets in France remained regulated longer than those of other industrial economies, with reforms coming in much later. So, for France, the total debt ratio is not associated with an increasing real rate through much of the sample.

<sup>22</sup>The presence of private debt causes the return to capital to drop out of the equilibrium relation for Japan. When only public debt is used, the return to capital enters significantly with a positive sign.

Table 4

### Contributions to Change in the Equilibrium Long-Term Interest Rate

In Percentage Points

	Japan	Germany	France	United Kingdom	United States
Return to capital	—	0.46	0.65	0.64	0.87
Beta	-0.73	—	—	-1.11	2.18
Ratio of debt to GNP	5.16	1.60	3.13	6.46	0.79
Total change in equilibrium real long-term interest rate	4.33	2.06	3.78	5.99	3.84
Actual change in real long-term interest rate	4.61	1.86	3.81	6.87	4.47
Unexplained change	0.28	-0.20	0.03	0.88	0.63

Notes: The entries in the first three lines of the table combine the coefficients of Table 3 with the differences in subsample means of the arguments between the first (1975-I to 1982-IV) and second (1983-I to 1990-IV) halves of the sample period. For example, the mean value of the real long-term interest rate in Japan for the second half was 4.61 percentage points higher than it was for the first half. The average "equilibrium" value of the real long rate increased 4.33 percentage points over the two periods; 5.16 percentage points of this change was attributable to the shift in the mean value of the total debt-to-GNP ratio. The relative riskiness of bonds in the Japanese portfolio declined over the two periods, thereby reducing the equilibrium value of the real long rate by 0.73 percentage points.

change for the United States.<sup>23</sup>

Of course, the overall influence of each factor on the evolution of long-term rates over the sample period depends on the amount by which the determinant varies as well as the size of its respective coefficient. Table 4 presents a simple accounting of the sources of shift in the equilibrium interest rate between the first and second halves of the sample period.

The pattern of relative contributions in the United States differs from that of the other countries. Here, the rise in the relative risk of bonds accounts for about half the increase in the real rate; the increase in the rate of return to capital and the rise in the debt ratio account nearly equally for the remainder of the explained shift in the equilibrium real rate. The shift in the debt ratio contributes less to the rise in the equilibrium long-term interest rate in the United States than it does in the other countries. One reason could be that the greatest increase in the debt-to-GNP ratio occurred somewhat later than the steepest rise in the real interest rate. The increase in private and public debt contributes slightly more than three times as much to the rise in the German real long-term rate as does the rise in the return to capital. In France, the rise in the public debt ratio accounts for about three-quarters of the shift in the equilibrium rate over the two halves of the sample.

To sum up, the equilibrium component of a Wickselian model explains between 60 and 70 percent of the variation in real long-term interest rates in the major industrial economies over the period 1975-90. Charts 10 through 14 illustrate how well the equilibrium relation alone explains the major movements of the real long rate in each of the five countries over time. These results are consistent with the case made above for the factors influencing the equilibrium rate. But we caution against too strict a structural interpretation of the equilibrium equations. Debt and the other variables could be picking up the influence of a host of other factors related to real interest rates. All we can claim is that the variables are related in a way that helps to explain the equilibrium shift in the real rate.<sup>24</sup>

<sup>23</sup>The U.S. and U.K. debt data for the private nonfinancial sector are consolidated (U.S. data are from Board of Governors of the Federal Reserve System, *Money, Stock, Liquid Assets, and Debt Measures*; U.K. data are from Central Statistics Office, *Financial Statistics*, various issues, Table 14.1). By contrast, private debt data for Japan, Germany and France are summed from sector balance sheets and could contain double counting of cross-sectoral holdings (source of data is OECD, *Financial Statistics*, Part 2, *Financial Accounts of OECD Countries*, various issues, Table 33 B.) Where identified, liabilities in the form of equity shares are subtracted. Comparisons across countries regarding the influence of private debt would require further data refinement to ensure comparable coverage of the debt aggregate.

<sup>24</sup>Because we cannot measure inflation expectations at all precisely, and because a significant portion of the surge in inflation during

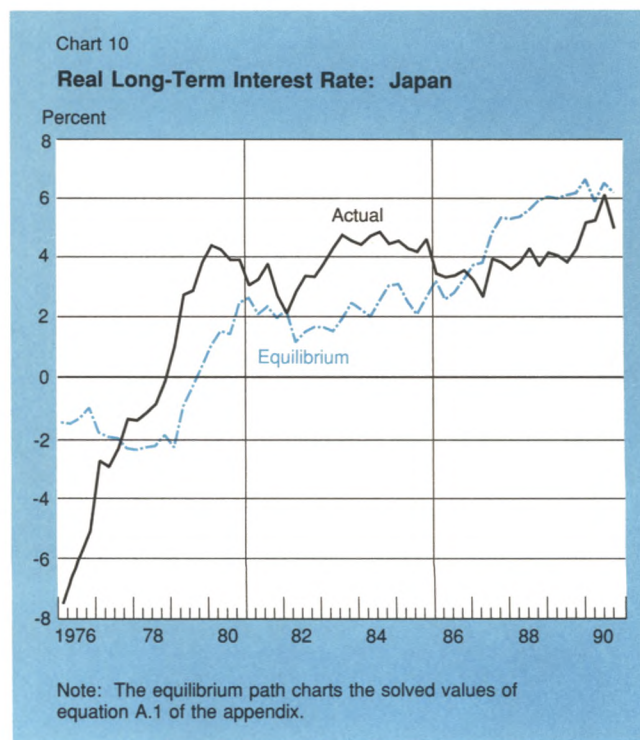
Some 30 to 40 percent of the variation in real long rates remains to be explained by other influences. Fiscal policy, apart from its link to the debt ratio, and monetary policy could drive short-term fluctuations in the real rate. The dynamic equations discussed below will allow monetary and fiscal policy to play a role in the adjustment of the real rate to shifts in the determinants of the equilibrium rate.

#### *Estimates of the short-run fluctuations in real long rates*

The second key relationship in the country model explains the fluctuations of the real long rate around its equilibrium value. The dynamic equation explains the change in the real long rate in terms of the difference between the previous period's actual rate and equilibrium rate, current and past changes in interest rates, and shifts in macroeconomic policy. Fiscal policy changes are introduced in the form of current and past changes in government deficits or surpluses. Current and past changes in the real central bank intervention

#### *Footnote 24 continued*

the mid-1970s was very likely unanticipated, our estimates probably overstate the true increase in equilibrium real rates from the 1970s to the 1980s. This overstatement is probably greatest for Japan and the United Kingdom. These two countries underwent the largest surge in inflation during the 1970s, and their equilibrium long-term real rates appear by our measure to have increased the most.





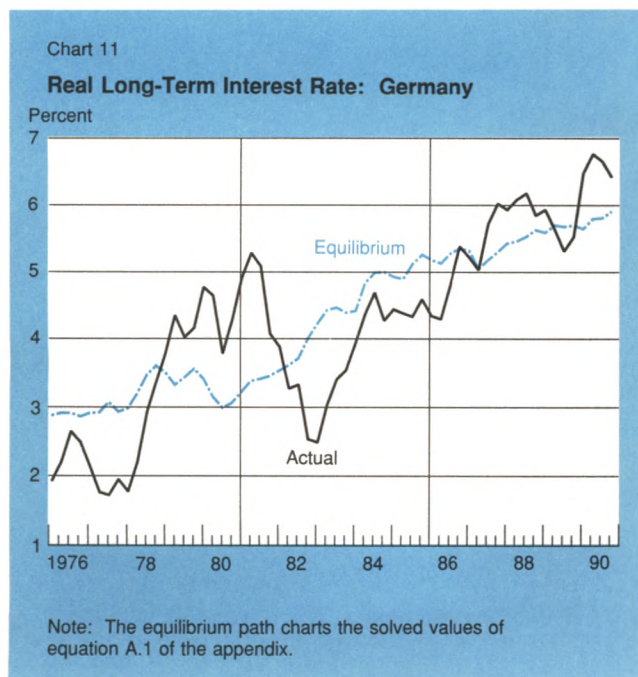
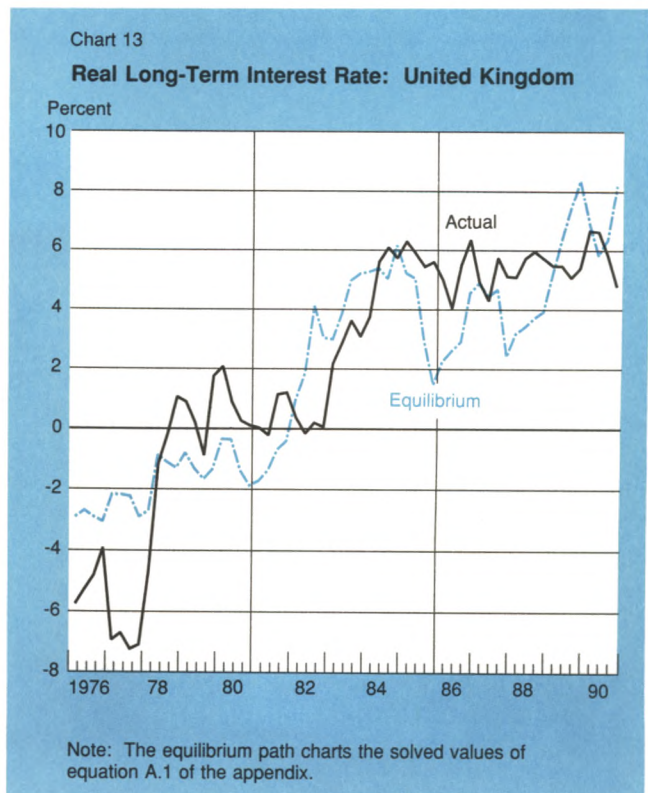
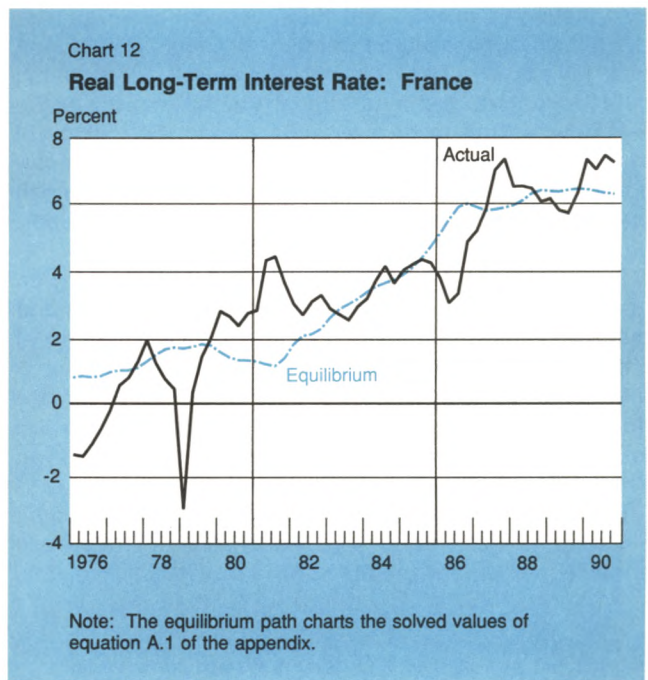
rate represent shifts in monetary policy.<sup>25</sup> The model imposes the condition that the real long rate, if unperturbed by macroeconomic policy changes or random shocks, will converge over time to the equilibrium relation estimated above.

Incorporating the information on monetary and fiscal policies improves the explanation of rate movements over history. Relative to the movements captured by the equilibrium relation, the dynamic model reproduces history with approximately 5 percent (United Kingdom) to 45 percent (France) less error.<sup>26</sup> However, the dynamic model's main application is to assess the relative contributions of the equilibrium long rate and changes in macroeconomic policies to movements in the actual real rate.

We apply this assessment to episodes of unusual movement in the real rate. For example, between 1978 and 1979 the Bank of Japan raised the intervention rate nearly 6 percentage points. The equilibrium real rate

<sup>25</sup>Tests on earlier versions of the dynamic model (using the ratio of government debt to GNP in the equilibrium relation) indicated that changes in the return to capital and changes in beta did not contribute to the explanatory power of the dynamic relations. Although we did not repeat the tests for the models using total debt in the equilibrium equation, the earlier findings led us to exclude changes in these arguments from the dynamic equations.

<sup>26</sup>The appendix table assesses the ability of the equilibrium relation and the dynamic model to track history across countries and measures the degree to which each country's dynamic model improves on the explanatory power of the equilibrium relation alone.





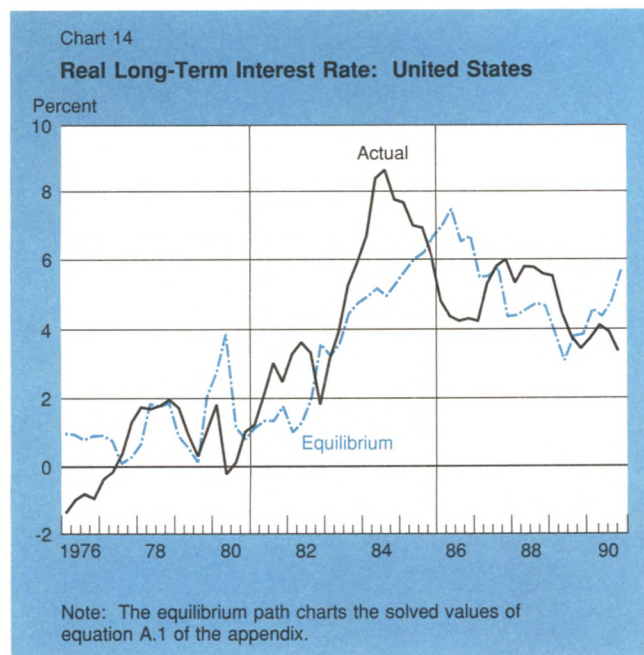
also moved up in 1987 and 1979, but with a two-quarter lag and by 2 percentage points less than the real long rate (Chart 10). The dynamic equation, incorporating policy changes, explains almost the full run-up in the real rate, with at most a one-quarter lag. How much of the difference between the actual rate and the equilibrium rate is attributable to monetary policy, how much to fiscal policy, and how much to the adjustment properties of the model?

Two additional sets of calculations, one assuming an alternative history of unchanged monetary policies and the other an alternative history of unchanged fiscal policies, shed light on such a decomposition.<sup>27</sup> Table 5 attributes the changes in four countries' real long rate during selected intervals to shifts in the equilibrium relation, changes in monetary policy, and changes in fiscal policy.<sup>28</sup>

In Japan during 1978-80, the real long rate rose some 5½ percentage points, and the equilibrium rate rose about 5 percentage points. The decomposition of this

<sup>27</sup>Such alternative histories might not represent realistic policy choices, but they can help us to assess the importance of the changes in policy relative to other changes affecting the economic environment. These model simulations are described further in the appendix.

<sup>28</sup>The intervals are uniform for all countries except Germany, where the real long-term rate reached a trough at the end of 1982. Note that France is omitted from the table.



change suggests that the rise in the central bank rate would have added about 2¾ percentage points to the real long rate, while the increase in the government deficit would have influenced the real rate by much less, an increase of ¼ percentage point. This accounting indicates that with changes in the determinants of the equilibrium, a rise in the real central bank rate, and a

Table 5

### Attribution of Real Long Rate Changes in Selected Episodes

In Percentage Points

Japan	1978-80	1981-84	1985-88	1989-90
Equilibrium	5	½	2¾	0
Monetary policy	2¾	-¾	-2¼	½
Fiscal policy	¼	0	¼	0
Total†	7¾	-¼	¾	¾
Actual change in real long-term rate	5½	1½	-¾	¾
Memo: Initial gap	1	¼	1½	-2
Germany	1978-80	1981-82‡	1983-88	1989-90
Equilibrium	0	¾	1½	¼
Monetary policy	¾	-1¼	1½	-½
Fiscal policy	¼	-¼	0	1
Total†	1	-¾	3	1
Actual change in real long-term rate	2½	-2¼	3¼	½
Memo: Initial gap	-1¼	1¾	-1¾	½
United Kingdom	1978-80	1981-84	1985-88	1989-90
Equilibrium	¾	8	-1¼	3
Monetary policy	1½	1½	-1	-1½
Fiscal policy	¼	¼	-2¼	1¼
Total†	2¾	9½	-4½	2¾
Actual change in real long-term rate	4¾	5¾	-½	-¾
Memo: Initial gap	-2	1¾	1	¼
United States	1978-80	1981-84	1985-88	1989-90
Equilibrium	¼	4¼	-1	1¾
Monetary policy	-1½	1¾	-½	-2
Fiscal policy	1¼	-1	0	¾
Total†	0	5	-1½	½
Actual change in real long-term rate	-¾	6½	-2	-2¼
Memo: Initial gap	1	0	2	1¾

†Columns may not sum to totals because of rounding.

‡Intervals are uniform for all countries except Germany, where the real long-term rate reached a trough at the end of 1982.



widening government deficit in these years, the real long rate in Japan would have risen some 7¼ percentage points. Thus it appears that unexplained factors along with the adjustment process itself held the rise to 5¼ points.

During 1978-80, monetary policies in all five countries tightened (Chart 5) and real long rates rose by 2½ to 5 percentage points in all countries except the United States. In Japan, Germany, and the United Kingdom monetary policy had a positive influence on the real rate, but in the United States it did not. The reason for this anomaly might be that during 1980, the *real* central bank intervention rate (the argument of the dynamic equations) in the United States declined sharply.<sup>29</sup> The attributions suggest that during this episode, fiscal policy generated upward pressure on rates of about ¼ to 1¼ percentage points in all countries.

The 1981-84 period, if judged by movements in the nominal central bank intervention rates, appears to be a period of monetary easing. But on net, the real central bank rates declined between the beginning and end of the period only for Germany and the United States. In Germany (between 1981 and 1982) and Japan, monetary policy negatively influenced the real long rate. But the United Kingdom, perhaps owing to the rise in the real central bank rate, experienced tighter monetary policy than the movement in the nominal central bank rate would suggest. Germany showed a negative contribution from fiscal policy, consistent with a declining deficit ratio over this interval.

In all countries but the United Kingdom, nominal central bank rates continued to decline between 1985 and 1988 (1983 to 1988 for Germany). In Japan, the real central bank rate also tended to decline; here the effect of monetary policy on the real long rate was negative. In Germany, however, the real central bank rate increased despite the decline in the nominal rate; our calculations attribute 1½ percentage points of the rise in the real long rate over the period to monetary policy. The final episode, 1988-90, might also be characterized as a period of tight monetary policies because all four countries experienced increases in their nominal central bank rate (although the rate hikes were comparatively

mild in the United States). In addition, real central bank rates rose and fell, but ended higher in the episode. Nevertheless, only in Japan did monetary policy appear to raise the real long rate.

Of the three forces—equilibrium shifts, monetary policy, and fiscal policy—equilibrium shifts tended to predominate in explaining real long rates over the three- to five-year intervals. In slightly under half the episodes reported in Table 5 (seven of sixteen), the changes in the real long rate attributable to shifts in the equilibrium rate were as large or larger than the changes attributable to either monetary or fiscal policy. Germany poses an interesting exception: here, the equilibrium shifts were no larger than the influences of monetary or fiscal policy in any of the four intervals. Recall that in Germany, the real long rate (and therefore the equilibrium rate) varied over a narrower range than in the other countries. Equilibrium shifts showed a strong upward drift over the four intervals; in twelve of the sixteen episodes, the equilibrium factor influenced real rates positively. By contrast, the influences of monetary and fiscal policy did not show clear upward tendencies. In only six of the sixteen episodes were the contributions of monetary policy to the change in the real long rate positive; in nine episodes, fiscal policy contributions were positive. In all but two cases, the magnitude of fiscal policy influences on the real long rate was smaller than that of monetary policy influences.

## Conclusions

We have attempted to identify the broad macroeconomic forces shaping the evolution of long-term interest rates in several major industrial countries. Our basic contention is that the movements in these rates reflect persistent and sizable changes in what we have called their “equilibria,” as well as fluctuations around those equilibria. More specifically, we argue that the dominant portion of the overall rise in the real long-term rates of the United States and major foreign economies over the last fifteen years is attributable to increases in the rates’ equilibrium levels. This large shift in the equilibrium also accounts for the apparent similarity of the broad movements in the countries’ real rates over the period as a whole. Macroeconomic policy as it normally influences rates over the business cycle cannot fully explain the increases in real long-term rates.

Our analysis yields more tentative evidence that the shifts in long-run equilibrium real rates reflect changes in the returns to capital and perceptions of the risks to these returns. In particular, the general rise in the return to capital during the 1980s seems to have been a significant, although not the principal, contributor to the rise in equilibrium real long-term rates of the countries studied. Most strongly associated with the rise in equi-

<sup>29</sup>The dynamic model seems to work less well for the United States than for the other countries. For some intervals, the results presented in Table 5—suggesting, for example, that fiscal policy had a net negative effect on the real rate over the early 1980s and monetary policy a net negative impact on the rate in the 1985-88 interval—are counterintuitive. There are two possible explanations for these anomalies: 1) as Chart 15 in the appendix demonstrates, the directions of fiscal and monetary policy effects in the United States are initially correct but short-lived and lead to reversals over subsequent quarters, and 2) these intervals might not be the best for analyzing U.S. policy shifts because the real central bank rate and the deficit-to-GNP ratio fluctuate inordinately within the interval.

librium real rates in the four foreign countries are increasing debt ratios, which appear to reflect higher aggregate financial risk. Somewhat surprisingly, the debt ratio seems only weakly associated with the increase in U.S. real long-term rates.

Finally, our evidence suggests that at certain times, macroeconomic policies did significantly influence the movements in long-term real interest. For example, monetary policies and changes in budget deficits were important factors behind the movements in real interest

rates in the early 1980s. Nonetheless, it appears that the broader upward movement in the real rate equilibria over the last fifteen years has dominated the business cycle fluctuations induced by the policies. Overall, our analysis suggests that the high levels of real long-term interest rates experienced during the 1980s cannot be explained adequately without taking into account changes in both macroeconomic policies and other economic fundamentals such as rates of return to capital and financial sector risks.

## Appendix: An Empirical Model of Real Long-Term Interest Rates

This appendix describes the major features of the model used to analyze movements in real long-term interest rates. The model combines the equilibrium long-term rate with two dynamic equations to describe the adjustment paths of the real interest rates toward their equilibria. The model was estimated for each country on quarterly data beginning in 1975.

The equilibrium long-term rate,  $RL$ , is related to the return to capital,  $RK$ ; risk,  $\beta$ ; and the total debt-to-GNP ratio,  $DB$ . In the case of France, however, the ratio of government debt to GNP replaces the total debt-to-GNP ratio.<sup>†</sup>

$$(A.1) \quad RL = a_0 + a_1 RK + a_2 \beta + a_3 DB + e_{RL}$$

The dynamic model is based on the well-accepted proposition that long-term interest rates in part reflect movements in short-term rates. For each country, changes in short- and long-term real interest rates are jointly explained in terms of deviations from the real rate equilibrium, changes in monetary policy and in government budget deficits, and the rates' own past changes. The equations have the following form:<sup>‡</sup>

$$(A.2) \quad \Delta RL(t) = b_1 \hat{e}_{RL}(t-1) + b_2 \hat{e}_{SP}(t-1) + \sum_{i=1,2,4} b_{3i} \Delta RL(t-i) + \sum_{i=0,1,2,4} b_{4i} \Delta RS(t-i) + \sum_{i=0,1,2,4} b_{5i} \Delta DF(t-i) + \sum_{i=0,1,2,4} b_{6i} \Delta CB(t-i) + e_{\Delta RL,t}$$

and

$$(A.3) \quad \Delta RS(t) = c_1 \hat{e}_{RL}(t-1) + c_2 \hat{e}_{SP}(t-1) + \sum_{i=1,2,4} c_{3i} \Delta RL(t-i) + \sum_{i=1,2,4} c_{4i} \Delta RS(t-i) + \sum_{i=0,1,2,4} c_{5i} \Delta DF(t-i) + \sum_{i=0,1,2,4} c_{6i} \Delta CB(t-i) + e_{\Delta RS,t}$$

where  $RL$  and  $RS$  are the long-term and short-term real rates, respectively,  $\hat{e}_{RL}$  is the residual from the long-term equilibrium equation A.1,  $\hat{e}_{SP}$  is the long-short spread less its mean,  $DF$  is the ratio of the government deficit to GNP, and  $CB$  is the real central bank intervention rate (nominal rate less the past three years' inflation).

The model incorporates the equilibrium real rate relation. The equations imply that the actual long (and short) real rates will converge to the equilibrium in the absence of further disturbances; likewise, a constant equilibrium for the spread between long and short rates is imposed.<sup>§</sup> We use the real central bank intervention rate to measure the stance of monetary policy, since movements in the nominal rate relative to underlying inflation are the primary influence on the real economy.<sup>||</sup>

<sup>†</sup>Our estimation procedure initially used the return to capital, beta, and one of two debt-to-GNP ratios as the explanatory variables of the real rate in each country. Those arguments with a positive sign were retained, even if only marginally significant. In general, the equations using total debt fit better and came closer to a cointegrating relationship than did those using the ratio of net government debt to GNP. In the case of Japan, the fit with total debt is poorer than with government debt, but the augmented Dickey-Fuller statistic is larger. The final estimation results are summarized in text Table 3.

<sup>‡</sup>Note that contemporaneous causation is assumed to run from the short-term interest rate and the policy variables to the long rate. (For this reason, current values of these variables are included in equation A.2 but not in equation A.3.) In the case of Germany, however, lagged values of the change in the central bank rate are statistically insignificant and therefore omitted.

<sup>§</sup>Recall that the evidence in text Table 2 generally supports the proposition that the spread is stationary. The United Kingdom is, however, an exception; in the model estimation for this country, we allow the equilibrium spread to follow an estimated time trend.

<sup>||</sup>In effect, the model (that is, its "reduced form") ultimately attributes movements in long-term real rates to a) past



## Appendix: An Empirical Model of Real Long-Term Interest Rates (continued)

### Summary Statistics for Interest Rate Models

	Japan	Germany	France <sup>††</sup>	United Kingdom	United States
Root mean squared error (percentage points)					
Equilibrium relation	2.06	0.87	1.31	2.20	1.55
Dynamic model	0.55	0.52	0.76	1.65	0.97
Goodness of fit of dynamic equations ( $\bar{R}^2$ )					
Real long rate	0.56	0.61	0.32	0.59	0.70
Real short rate	0.88	0.43	0.89	0.57	0.88

<sup>††</sup>The model for France uses net government debt as a share of GNP.

The table above compares the abilities of the equilibrium relationship alone and the dynamic model to explain the actual path of the real long-term rate in the five countries. Statistics on goodness of fit for the dynamic equations are also provided.

We introduce hypothetical changes in macroeconomic policy to illustrate how the initial interest rate responses and the rate changes over time differ for monetary and fiscal policy. The initial responses to a 1 percentage point sustained increase in the central bank rate range from 80 basis points in Japan to 40 to 50 basis points in the other countries (Chart 15, upper panel). Since monetary policy has no permanent effect in the model, the rises in the real long-term rate decay at various rates, although the effects do persist for some time, particularly in Japan and France.

A onetime increase of 1 percentage point in the ratio of the government deficit to GNP generates shorter lived interest rate responses than does a monetary policy shock.<sup>††</sup> The deficit surge in the United States, United

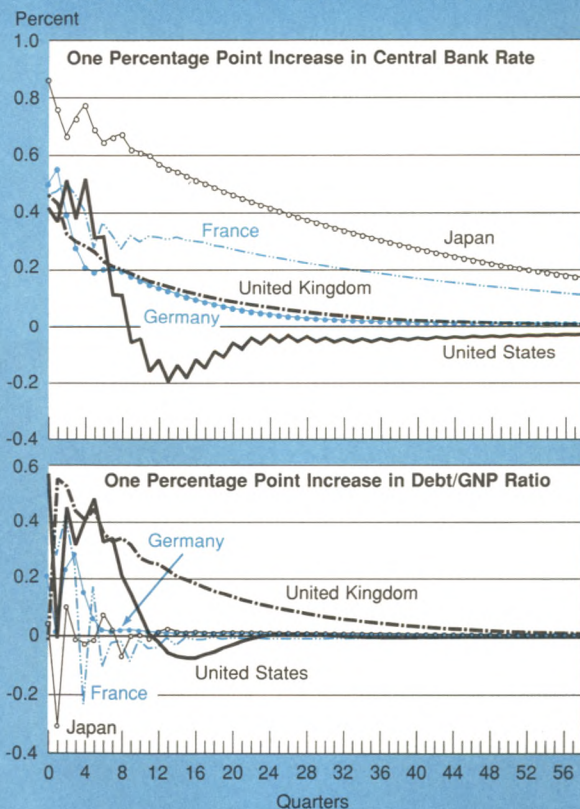
Footnote <sup>††</sup> continued

changes in the equilibrium real rate; b) past changes in the macroeconomic policy variables; and c) "unexplained" disturbances, in particular to short-term rates, as well as factors such as oil shocks. The impact of macroeconomic policies includes not only direct effects, but also indirect effects on interest rates by way of real income and other variables.

<sup>††</sup>This experiment is somewhat artificial in assuming that the equilibrium remains unaffected. Since the debt-to-GNP ratio is a component of the total debt ratio (an argument of the equilibrium real rate), a shock to the change in the deficit would have a permanent effect on the long rate. However, because the purpose of this shock is to illustrate the real income effects over the business cycle, the link to the debt ratio is not completed and consequently the equilibrium does not shift. And since the presence of debt in the equilibrium relation acts as a proxy, the link to debt need not be implemented literally. This shock could also be interpreted as

Chart 15

### Real Long-Term Rate Responses to Shocks



## Appendix: An Empirical Model of Real Long-Term Interest Rates *(continued)*

Kingdom, and France increases the real long rate by some 40 to 60 basis points in the first year (Chart 15, lower panel). The deficit shock causes the real long rate to oscillate,<sup>§§</sup> but the adjustment is heavily damped in most countries, with the possible exception of Japan and France. The most durable effect occurs in the United Kingdom, where a 20 basis point increase in the real long rate persists as long as four years after the shock.

Finally, to identify the contributions of policy changes to movements in the real long rates (text Table 5), the

models are simulated assuming unchanged monetary and fiscal policies. For example, real long-term rates have trended upward over the past fifteen years and real central bank rates are now higher than they were in the high-inflation environment of the mid-1970s. How would real long rates have moved had the real central bank rates not risen? Comparison of these results with the actual paths over history provides a measure of the contribution of tightened monetary policies to changes in real rates. Analogously, the contributions of fiscal policies to the actual movements in real rates are derived from the real rates that would have prevailed had government deficits remained unchanged.<sup>|||</sup>

*Footnote ++ continued*

an assumption that a decrease in private debt offsets the effects of increased public debt on the equilibrium.

<sup>§§</sup>This response stems from sign shifts on the lagged deficit terms in the dynamic equations.

<sup>|||</sup>Again, the effects of alternative fiscal policies on debt are ignored.

# Explaining the Persistence of the U.S. Trade Deficit in the Late 1980s

*by Susan Hickok and Juann Hung*

The United States ran a larger, more persistent trade deficit during the 1980s than many trade analysts had anticipated. To be sure, the dollar's rise in the early 1980s led most observers to predict a sharp increase in the trade deficit in the middle of the decade. However, the return of the dollar to its 1979-80 level (measured in real terms) by 1987, coupled with strong growth in foreign demand, raised expectations that before the decade's end, the U.S. merchandise trade deficit would also return to roughly the level registered at the beginning of the 1980s—about \$25 billion, or 1 percent of U.S. GNP. Instead, the deficit remained above \$100 billion, or more than 2 percent of U.S. GDP, through 1990. Only in 1991 did the deficit slide below the \$100 billion level, reflecting to some extent the effects of the U.S. recession.

Several hypotheses were advanced in the second half of the 1980s to explain the trade gap's persistence, but to date no attempt has been made to assess the relative merits of these theories. This article returns to the puzzle of the enduring deficit and evaluates some efforts by earlier researchers to solve it. As a first step, we investigate whether macroeconomic factors and the debt problems of developing countries played a role in keeping the deficit high. We then turn to a detailed analysis of two prominent interrelated hypotheses put forward to explain the deficit's surprising magnitude in the late 1980s. Our analysis includes a careful review of the statistical evidence bearing on the hypotheses. In addition, it presents an expanded trade model specifically geared to test each theory.

The first hypothesis we investigate argues that the

rise in the dollar in the early 1980s depressed U.S. capital stock investment relative to investment abroad, hurting U.S. supply capability and hence the U.S. trade balance. The dollar's fall in the mid-1980s began reversing this process, but the reversal was not yet complete by the decade's end. With time, further improvement in the trade balance is expected as this reversal plays itself out. The second hypothesis argues that shifts in the structure of U.S. trade flows, affecting both the commodities traded and the participants in trade, significantly weakened the ability of the United States to adjust its trade balance in response to the mid-1980s dollar depreciation. This hypothesis predicts that the U.S. trade balance will not return to its level of the late 1970s or early 1980s over time, despite the return of the dollar to its beginning 1980 level and the ultimate comparability of demand growth in the United States and abroad.

These two hypotheses are not totally independent of each other. Changes in relative capital stock levels could be one determinant of structural shifts in trade. Structural shifts in trade could also be one factor leading to shifts in relative capital stock levels. Although we recognize this interrelationship, we have chosen to focus on narrowly defined versions of each hypothesis. This approach underscores the two theories' very different assessments of the future course of the U.S. trade deficit.

The recent fall in the U.S. trade deficit highlights the importance of evaluating the different outlooks implied by the two narrowly defined hypotheses. The U.S. recession has clearly played a significant role in reduc-



ing the trade deficit in 1991. However, if this decline in the deficit also partially reflects a readjustment of world capital stocks, a significant part of the recent trade balance improvement may be sustained after the recession ends. But if capital stock developments have not played a prominent role in the deficit's tenacity in the late 1980s or in its more recent decline, the recent trade balance improvement is less likely to be sustained to any substantial degree as the U.S. recovery takes hold.

Our analysis suggests that both the dollar's fall in the mid-1980s and the resurgence of foreign demand in the late 1980s have led to substantial adjustment in the U.S. trade balance. We find, however, that in 1989 the U.S. trade deficit still remained well above the level that exchange rate and demand conditions would have warranted in the past. We further find that the trade deficit's tenacity cannot be simply explained by shifts in world capital stocks in response to exchange rate movements, as the narrowly defined capital stock hypothesis would suggest. Shifts in the relative size of world capital stocks have been dominated by factors other than changes in the value of the dollar. Thus, there is little evidence that relative capital stock developments were moving in step with exchange rate developments in the 1980s or that the U.S. trade balance is currently changing in favor of the United States because of capital stock adjustments to the dollar's depreciation in the second half of the decade.

This article finds that the factor most directly responsible for the relatively weak U.S. trade position in the late 1980s is structural change in world trade. Structural change appears to have substantially hurt both U.S. export and import-competing capabilities in the 1980s. In fact, it is estimated to have worsened the 1989 U.S. trade balance by roughly \$65 billion. As a consequence of structural shifts, the United States may now be expected to be in a significantly weaker trade balance position for any given set of exchange rates and demand conditions than would have been the case in the past.

The next section examines the evolution of the U.S. trade balance deficit in the 1980s, underscoring the limited role played by exchange rate and demand developments in its net deterioration. Following this, we briefly discuss the influence of the developing countries' debt repayment problems on U.S. export sales and the trade deficit. We then analyze the interrelated hypotheses concerning the trade balance impact of shifts in relative capital stocks and structural changes in trade relationships. Our conclusions are compared with those of other recent studies examining the persistence of the U.S. trade deficit—notably the studies of Lawrence and Cline. A final section considers the implications of our findings for future U.S. trade balance adjustment.

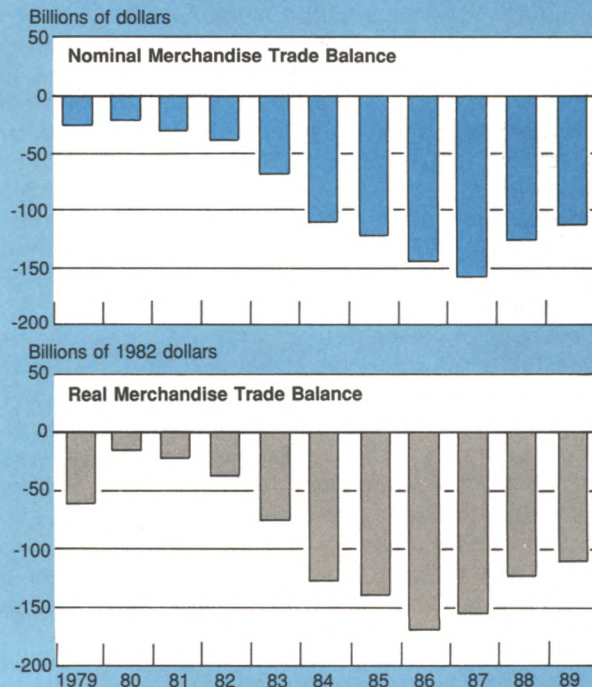
## U.S. trade balance adjustment in the late 1980s

In 1989, the U.S. merchandise trade deficit rose to \$116 billion, four times its level in 1979 (Chart 1). Although the 1989 deficit had come down \$43 billion from a peak level of \$159 billion in 1987, it was still much larger than many analysts had expected. To be sure, the trade deficit has declined substantially further over the last two years, falling to roughly \$75 billion in 1991. However, trade elasticities from a variety of models suggest that this recent improvement has been due to the U.S. recession as well as the net fall in the dollar since 1989.<sup>1</sup> More difficult for economists to explain than the recent fall in the deficit is the failure of the trade deficit in the late 1980s to show significantly more improve-

<sup>1</sup>Calculations based on the income and price elasticities of six macroeconomic models suggest that relative price developments and, more important, relative demand growth developments during 1990 and 1991 basically "explain" all of the improvement in the U.S. non-oil, nonagricultural trade volume balance over these two years. Elasticities are reported in Ralph Bryant, Gerald Holtham, Peter Hooper, eds., *External Deficits and the Dollar* (Washington, D.C.: Brookings Institution, 1988).

Chart 1

### U.S. Trade Balance



Source: National Income and Product Accounts.



ment in response to exchange rate and demand developments. For instance, Hooper and Mann comment that "while the initial widening of the deficit [in the early 1980s] can be adequately explained by macroeconomic factors, the deficit has adjusted substantially more slowly (particularly in real terms) to the fall in the dollar since early 1985 than conventional macro trade equations would predict," while Krugman and Baldwin refer to "the puzzling persistence of the trade deficit."<sup>2</sup>

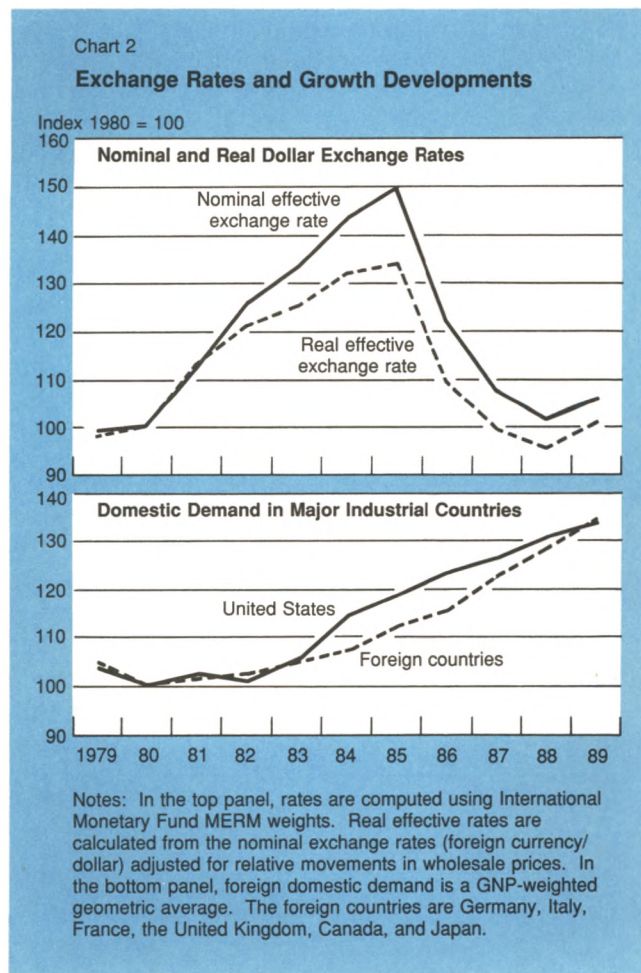
The gap between the deficit's size in 1979 and 1989 is particularly perplexing because the economic fundamentals that typically determine the size of the trade balance—the real effective value of the dollar and the level of U.S. real demand relative to the level of real

<sup>2</sup>Peter Hooper and Catherine Mann, "The U.S. External Deficit: Its Causes and Persistence," Board of Governors of the Federal Reserve System, International Finance Discussion Papers, no. 316, 1987, abstract; Paul R. Krugman and Richard E. Baldwin, "The Persistence of the U.S. Trade Deficit," *Brookings Papers on Economic Activity*, 1:1987, p. 1.

demand in industrial countries abroad—were roughly equivalent in 1979 and 1989 (Chart 2). Of course, exchange rates and relative demand levels had shifted dramatically in the years between 1979 and 1989. The dollar rose 46 percent in the early 1980s before falling back in the mid-1980s. U.S. demand grew much more rapidly than foreign demand in 1983 and 1984, while foreign demand grew more rapidly than U.S. demand in the 1987-89 period. Nevertheless, measured in real terms, the dollar had returned to its 1979 level by 1987 and it remained there for the rest of the decade.<sup>3</sup> Moreover, by 1989 the level of foreign demand had regained its 1979 position relative to the level of U.S. demand.

The similarity in exchange rate and relative demand conditions in 1979 and 1989 suggests that other factors largely explain why the U.S. trade deficit was so high in the late 1980s. To be sure, the change in the dollar in the early 1980s and the rapid U.S. growth rate relative to growth abroad did lead to a much sharper increase in U.S. imports than in U.S. exports in the first half of the decade. It is possible that lingering adjustment to these early 1980s developments, along with differences in U.S. and foreign trade responses to income growth, explains some of the difference between the 1979 and 1989 U.S. trade balance levels. Nevertheless, a variety of estimates of trade volume elasticities indicate that these two macroeconomic factors do not account to any significant extent for the net deterioration in the U.S. trade volume balance between 1979 and 1989.<sup>4</sup> In fact, since exchange rate levels and demand conditions do not appear to be an important factor behind the difference in the trade balance in these two years, 1979 and 1989 are particularly useful reference years in which to examine other hypothesized causes.

Before considering the two most prominent hypotheses, it is important to note that the dramatic divergence between the 1979 and 1989 trade balances consisted primarily of a sharp difference in trade volume balances, measured in constant 1982 prices, for the two years (Chart 1). More particularly, the difference reflected a sharp change in the volume of non-oil imports relative to the volume of nonagricultural exports



<sup>3</sup>The dollar exchange rate index on which this calculation is based includes only the currencies of major industrialized countries. However, a nominal trade-weighted dollar index based on the currencies of eighteen industrialized and newly industrializing economies in Asia also shows that the dollar was back at its 1979 level in 1988 and 1989. See Federal Reserve Bank of Atlanta, *Economic Review*, June-July 1986, Summer 1987, and September-October 1990 issues.

<sup>4</sup>Calculations based on the income and price elasticities of six macroeconomic models suggest that relative price and income movements caused no net deterioration in the U.S. trade volume balance between 1979 and 1989. Of course, these calculations are by nature imprecise. Elasticities are reported in Bryant, Holtham, Hooper, eds., *External Deficits*.



(Chart 3). In 1979 the U.S. non-oil, nonagricultural trade volume balance registered a positive \$9 billion. In 1989 this balance was in deficit by \$54 billion, a swing of \$63 billion from its 1979 position. This difference in the non-oil, nonagricultural trade volume balance will be useful in evaluating the two competing hypotheses: the hypothesis that best explains these trade volume developments is the more plausible. But first we consider another factor often cited in discussions of the tenacity of the trade deficit.

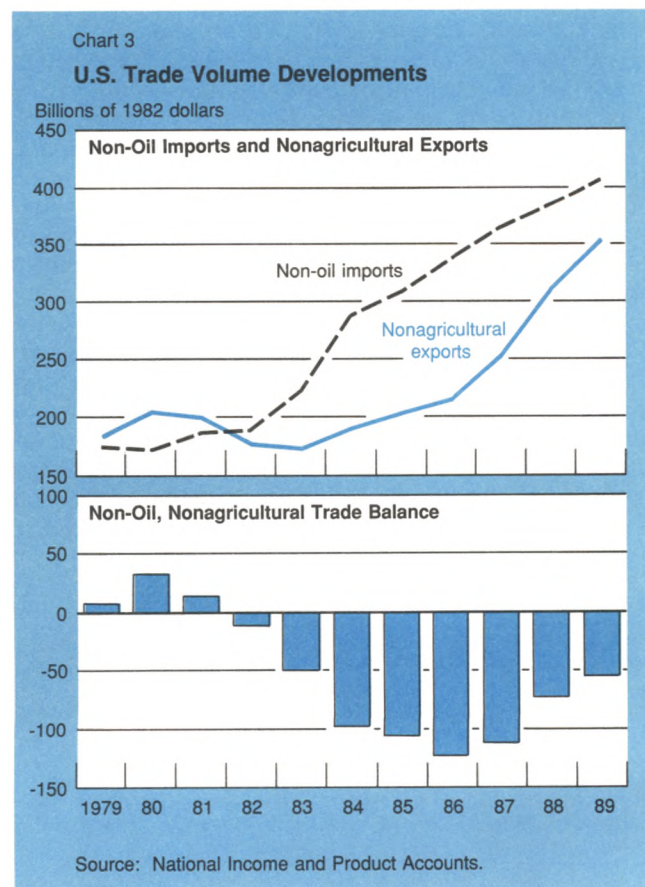
### Developing country problems

In the mid-1980s, the deterioration in the U.S. trade balance position was often linked to the debt crisis in the developing countries. Recognizing the attention this argument received in the past, we briefly reconsider it here. The debt crisis broke out in 1982 when Mexico announced that it was unable to meet its contractual loan obligations. Although many developing countries experienced severe debt repayment problems in the 1980s, the most pronounced regional debt problem was in Latin America. Some analysts felt that this regional

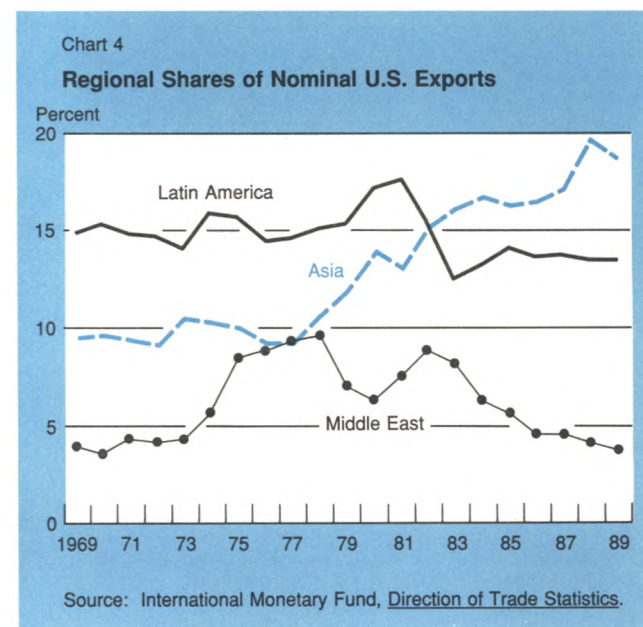
concentration had a particularly sharp impact on U.S. trade because Latin America was a major market for U.S. exports. In this view, a drop in demand in Latin America could have significantly weakened the U.S. trade performance. These analysts further argued that U.S. trade forecasts would not have captured the effect of declining demand in Latin America because the econometric models behind many of the forecasts were driven by perceived growth prospects in industrialized, rather than developing, countries.

In assessing this argument, we note that Latin America's imports did drop sharply in response to financing problems in the 1980s. In 1982 Latin America took 15½ percent of total U.S. exports, already less than the share it had taken at the beginning of the 1980s (Chart 4).<sup>5</sup> In 1983 Latin America's share of U.S. exports fell to 12½ percent and then hovered between 13 and 14 percent for the rest of the decade. This fall in Latin America's share of U.S. exports represented a significant loss of potential U.S. export sales. If U.S. exports to Latin America had grown at the same pace as U.S. exports to the rest of the world during the 1980s (that is, if Latin America had maintained a constant share of U.S. exports), U.S. export volume would have been \$11 billion higher in 1989.

The analysis of the role played by developing countries in shaping U.S. trade performance would not be



<sup>5</sup>The share of U.S. exports going to developing countries was unusually low in 1979 and unusually high in 1980. Consequently, shares given for the beginning of the 1980s refer to the average of 1979 and 1980 shares.





complete, however, without considering other regions. U.S. exports to Asian developing countries soared in the 1980s. Asian countries purchased 13 percent of U.S. exports at the beginning of the 1980s; by the end of the decade, Asia's share had risen to 19 percent. By contrast, the Middle East's share of U.S. exports declined substantially—from 7 percent to 4 percent—during the course of the 1980s as the Middle East adjusted to a sharp decline in the price of petroleum. When these developments are taken into account, the overall share of U.S. exports going to developing countries in 1989 was about the same, roughly 38 percent, as it had been at the beginning of the 1980s. Weakened developing country demand, consequently, does not appear to have been a significant factor explaining the large U.S. trade deficit of the late 1980s.<sup>6</sup>

### **The role of capital stock developments and structural shifts in trade**

The first of the two prominent hypotheses explaining the persistence of the U.S. trade deficit centers on capital stock developments. It argues that the rise in the dollar in the early 1980s discouraged U.S. investment and hence reduced the supply of U.S. goods relative to the demand for U.S. goods, hurting the U.S. trade balance. This capital stock hypothesis, which fits in with the increased attention economic analysis has devoted over the last decade to "supply side" factors, further argues that the fall in the dollar starting in 1985 should now be encouraging U.S. investment and improving the U.S. trade position.<sup>7</sup>

The second hypothesis has several variants, but all contend that changes in the structure of world trade in

the 1980s have affected the U.S. trade response to changes in exchange rates and income levels. Specifically, this structural shift hypothesis argues that at any given exchange rate level and level of U.S. demand relative to foreign demand, the United States will now export less and import more than it did in earlier years because of structural changes in trade relationships.

As noted earlier, the capital stock and structural shift hypotheses are clearly interrelated. According to standard international trade theory, a change in the size of a country's capital stock relative to the size of the capital stock in the rest of the world is likely to affect that country's trade composition. A change in trade composition would be one important example of a structural shift in trade that would affect a country's response to exchange rate changes. Conversely, a structural shift in trade such as a change in purchaser sentiment toward a given country's products could alter investment plans and hence relative capital stock levels.

The cross effects of capital stock changes and structural shifts in trade are very difficult to separate econometrically; therefore, any separate empirical analysis of the two hypotheses must be conducted with care. However, by defining the two hypotheses narrowly and considering only the direct impact of each, we can obtain some interesting findings. Narrowly defined, the capital stock hypothesis would focus on changes in the relative size of capital stocks due solely to exchange rate changes, thereby excluding capital stock developments resulting from structural shifts in trade. The structural shift hypothesis would focus on the impact that structural shifts have had on trade adjustment beyond any direct supply considerations arising from a change in capital stock size. The remainder of this section presents fuller descriptions of these narrowly defined hypotheses and econometric evidence of the validity of each one.

### **Capital stock developments**

The narrowly defined capital stock hypothesis, which we will call the exchange rate/capital stock hypothesis, may be divided into two arguments. The first argument considers relative capital stock levels in the United States and abroad without regard to ownership questions. This argument starts with the premise that a country's export supply and, more generally, its total supply of goods (sold domestically and exported) depend on its production capacity—specifically, the size of its capital stock. The size of a country's capital stock, in turn, depends in part on the level of the country's exchange rate. That is, as a country's currency appreciates, its goods become less competitive, discouraging investment. At the same time, investment is encouraged abroad as foreign goods gain in competi-

<sup>6</sup>Developments in traditional macroeconomic factors—relative price developments and income growth—are consistent with the observation that developing countries did not grow in U.S. export share. Growth in real GNP was only slightly faster in developing countries (registering 3.2 percent per year) than in foreign industrial countries (registering 2.8 percent per year) during the 1979-89 period. The impetus from this small growth differential was likely to have been more than offset by the loss of purchasing power experienced by the developing countries as their terms of trade declined, notably in the oil sector. Moreover, U.S. exports to developing countries generally compete more with exports from other industrialized countries than with goods produced in the developing countries themselves. As noted, there was no net shift in the value of the dollar relative to the currencies of other industrial countries between 1979 and 1989. It might be argued that developing countries should have increased their share of U.S. exports to reflect a growing integration in world trade. It is difficult, however, to choose a benchmark period in the past upon which to base expected share growth. Although developing countries increased the share of U.S. exports they purchased by 6 percentage points between 1969 and 1975, the share they purchased fell by 1 percentage point between 1975 and 1979.

<sup>7</sup>Ramon Moreno describes, but does not specifically endorse, this widely discussed capital stock hypothesis in "The Baffling Dollar," Federal Reserve Bank of San Francisco *Weekly Letter*, December 2, 1988.

tiveness. Domestic production capacity, output, and exports fall relative to foreign production capacity, output, and exports. Consequently, the trade balance of the appreciating country deteriorates.<sup>9</sup>

Applying this argument to U.S. trade, proponents of the exchange rate/capital stock hypothesis contend that the large rise in the dollar in the early 1980s adversely affected U.S. investment and hence depressed U.S. exports relative to U.S. imports. Indeed, in the early to mid-1980s the claim was often made that the strength of the dollar was causing U.S. companies to move production offshore. Moreover, certain U.S. industries, most notably machine tools, sought protection by arguing that U.S. production of their goods was about to cease, making the United States totally dependent on imports to meet its needs. According to the exchange rate/capital stock hypothesis, the fall in the dollar starting in 1985 should have led to a reversal of this U.S. disinvestment process. However, this reversal would not have been completed by 1989 because investors were initially uncertain whether the lower dollar would persist. Even after investors became convinced that the dollar would not rebound, it would take time for investment to be set in place.

The second argument of the exchange rate/capital stock hypothesis focuses on additional trade considerations arising from foreign direct investment. Specifically, foreign direct investment is postulated to have a short-run positive influence on the host country's imports because foreign subsidiaries initially import a disproportionate amount of capital equipment and components from their parent firms. But in the longer run, because the subsidiaries often produce goods identical with those of their parent firms, production in the host country may actually directly displace imports of these goods (as opposed to competing with both imports and other domestically produced goods for domestic sales). Such a development would reduce host country imports even more than would the creation of new domestically owned enterprises. Mindful of these relationships, and assuming that exchange rate developments have significantly influenced foreign direct investment flows, some adherents of the exchange rate/capital stock hypothesis have argued that the rise in the dollar increased U.S. investment abroad in the early 1980s, causing a temporary positive boost to U.S. exports that turned to a depressant on U.S. exports in the late 1980s. Similarly, they have argued that the fall in the dollar starting in

1985 increased foreign investment in the United States, temporarily boosting U.S. imports over the last few years.

#### *Developments in relative capital stocks*

Two observations from the 1980s have focused analysts' attention on the premise that a country's export level is correlated with the size of its capital stock. First, the economies with the strongest capital stock growth, those of the Asian newly industrialized countries (NICs),<sup>9</sup> showed the strongest export growth over the last decade. Second, anecdotal evidence in a few U.S. industries, notably chemicals and paper, suggests that export growth was slowed by capacity constraints in the 1987-88 period.<sup>10</sup>

On a more rigorous econometric level, proponents of the exchange rate/capital stock hypothesis have pointed to work by Helkie and Hooper that estimates a statistically significant relationship between the U.S. trade performance and the size of the U.S. capital stock relative to the size of the aggregate capital stock abroad.<sup>11</sup> (Helkie and Hooper's estimation focused on the direct effects of capital stock changes on trade through changes in supply capabilities; it did not include any indirect effects arising from capital stock developments that cause structural shifts in trade relationships.) These researchers found that U.S. non-agricultural export volume increased roughly 1½ percent for every 1 percent increase in the ratio of the U.S. capital stock to the aggregate capital stock of major foreign industrial countries. Their results also showed that U.S. nonpetroleum import volume fell about four-fifths of 1 percent for every 1 percent increase in the ratio of the U.S. capital stock to the capital stock abroad.

Helkie and Hooper's findings are corroborated by the econometric trade volume model described in the appendix. This model, which specifically incorporates capital stock developments as well as other special trade factors discussed in this article, finds a statistically strong positive relationship between U.S. capital

<sup>9</sup>The group comprises Hong Kong, Singapore, South Korea, and Taiwan.

<sup>10</sup>Whether capacity constraints significantly impeded overall U.S. export growth was frequently discussed during this period. However, only selected industrial supplies industries actually reached their peak capacity levels during 1987-88, and capacity constraints had a minimal impact on overall export growth.

<sup>11</sup>William L. Helkie and Peter Hooper, "The U.S. External Deficit in the 1980s: An Empirical Analysis," Brookings Institution, Brookings Discussion Papers, no. 56, March 1987; Peter Hooper, "Exchange Rates and U.S. External Adjustment in the Short Run and the Long Run," Board of Governors of the Federal Reserve System, International Finance Discussion Papers, no. 346, March 1989.

<sup>9</sup>Investment only responds to what is perceived to be a sustained change in exchange rates; moreover, it takes a fairly long time to be put in place. Consequently, proponents of the exchange rate/capital stock hypothesis argue that these capital stock developments are not captured in normal trade price elasticities, which typically assume that all trade adjustment to exchange rate changes is completed by the end of two years.

stock growth and U.S. export growth. A 1 percent increase in the level of the real gross U.S. nonresidential capital stock is associated with a 3 percent increase in U.S. export volume growth. On the import side, the model finds a weaker but still statistically significant positive relationship between foreign capital stock growth and U.S. import growth. A 1 percent increase in the level of the real gross foreign capital stock<sup>12</sup> is associated with an increase of two-fifths of 1 percent in U.S. import volume. (Our estimated capital stock elasticities are not directly comparable with those of Helkie and Hooper because of differences in capital measurements and model specifications. Nevertheless, both models indicate that capital stock developments in the industrialized countries had a very limited impact on the evolution of the U.S. trade balance in the 1980s.<sup>13</sup>) The weaker import response to foreign capital stock growth may be due to problems in measuring the aggregate foreign capital stock. A second possibility is that foreign producers, viewing the United States as an integral part of their global market, consistently seek to meet demand regardless of the strain it puts on supply, while U.S. producers view foreign countries more as a peripheral market to enter when supply conditions warrant. Differences in the composition of U.S. and foreign exports may also explain the divergence in response to capital stock changes.

These statistically significant relationships between capital stock growth and export and import growth explain one link of the exchange rate/capital stock hypothesis, that between capital stock developments and trade performance. The other link is the relationship between exchange rate movements and capital stock developments. This second link did appear to hold in the late 1960s and 1970s (Chart 5). As the dollar became increasingly overvalued at the end of the 1960s, the real net U.S. manufacturing capital stock fell sharply relative to the real net capital stock in major U.S. trading partners.<sup>14</sup> The relative decline in the U.S.

capital stock subsequently abated in the 1970s after the dollar depreciated following the demise of the Smithsonian Agreement.

A close examination of capital stock developments in both the early and late 1980s suggests that this straightforward mapping between exchange rate movements and relative capital stock developments broke down in the last decade. As the dollar rose in the early 1980s, the U.S. capital stock declined at only a slightly increased pace relative to the capital stock abroad. Relative capital stock changes then leveled off between 1983 and 1985 despite the continued rise in the dollar. Moreover, the U.S. capital stock began declining in relative terms at its early 1980s pace in the second half of the 1980s, well after the dollar had fallen. The U.S. capital stock continued declining relative to the foreign capital stock through 1989, four years after the dollar began its fall and after what most analysts would have considered sufficient time for the dollar's decline to have exerted its effect on capital stock growth. In fact, on an annual average basis the U.S. capital stock fell more relative to the foreign capital stock during the 1986-89 period than it did during the 1980-85 period. Moreover, it fell at an even greater rate in 1989 than it did on average in 1986-88, a pattern strongly contradicting the expected relationship between exchange rate changes and relative capital stock movements.

These relative capital stock developments clearly show that factors other than exchange rate changes dominated U.S. and foreign investment decisions in the 1980s. Of course, income growth has traditionally been found to dominate all other considerations in investment planning. Beyond this, however, a very low U.S. savings rate during the past decade was a prime factor behind weak U.S. investment.<sup>15</sup> Strong European investment in the late 1980s was in part tied to preparation for the Europe 1992 program. Strong Japanese investment was associated with a surge in the Japanese stock market in the mid-1980s, which substantially reduced the cost of capital in Japan.<sup>16</sup> The overriding influence of these factors helps to explain some elementary empirical findings: in a very simple regression equation for the log of the real gross U.S. capital stock, the estimated sum of the coefficients on twelve lags of the nominal exchange

<sup>12</sup>This stock unfortunately includes residential construction because data excluding residential construction were not available for all of the countries covered. See the appendix for a description of this aggregate.

<sup>13</sup>A major difference in model specification is that Helkie and Hooper use the ratio of the U.S. capital stock to the foreign capital stock as a variable in their regressions whereas our model uses the actual levels of the capital stocks. Our model is built from structural supply and demand relationships, in which capital stock levels set the basic amount of available supply.

<sup>14</sup>Our comparisons are based on changes in the ratio of the real net U.S. nonresidential capital stock to the real net aggregate capital stock in ten major foreign industrial countries, although the comparisons also hold true for the ratio of the real net total U.S. capital stock to the real net aggregate capital stock in these countries. Timely, comprehensive data excluding the residential capital stock abroad were not available. However, data on real net

*Footnote 14 continued*

capital stocks in manufacturing for four major foreign countries and the United States through 1987 suggest a movement relatively similar to that of these broader capital stock measures.

<sup>15</sup>Ethan S. Harris and Charles Steindel, "The Decline in U.S. Savings and Its Implications for Economic Growth," this *Quarterly Review*, Winter 1991, pp. 1-19.

<sup>16</sup>Robert N. McCauley and Stephen Zimmer, "Explaining International Differences in the Cost of Capital," this *Quarterly Review*, Summer 1989, pp. 7-28.

rate is statistically insignificant (t-statistic:  $-0.69$ ); in a second regression for the U.S. capital stock, the sum of the coefficients on twelve lags of the real exchange rate is also statistically insignificant (t-statistic:  $0.12$ ) and of the wrong (unexpected) sign. Similarly, in comparable simple regressions for the real gross capital stock abroad, the sums of the coefficients of twelve lags of both the nominal and real exchange rates are also insignificant (t-statistics:  $-0.84$  and  $-0.27$ , respectively) and of the wrong sign.<sup>17</sup>

<sup>17</sup>All regressions reported in this paragraph impose an Almon lag distribution on the impact of the lagged exchange rate terms. The

Of course, these regression specifications are extremely simple, and a more comprehensive regression exercise could give different results. Nevertheless, both the regression results and the observed U.S. and foreign capital stock growth rates in the 1980s do raise serious questions about one of the two key tenets of the exchange rate/capital stock hypothesis—that while the

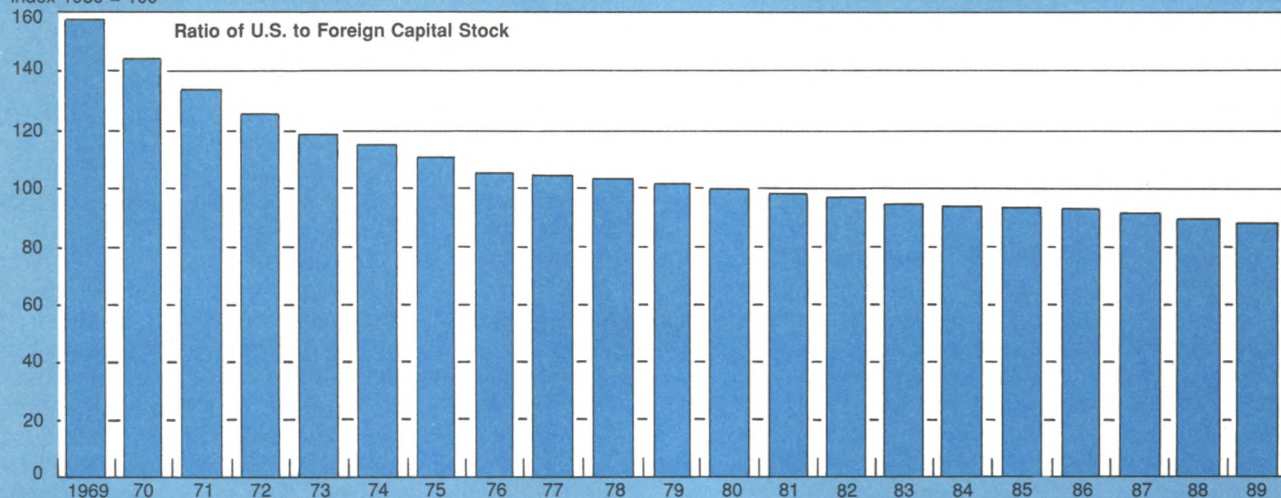
*Footnote 17 continued*

regressions also include a constant term and the contemporaneous level of real U.S. or foreign GNP. All variables are entered in natural log form. The exchange rate terms are computed as explained in the model description in the appendix.

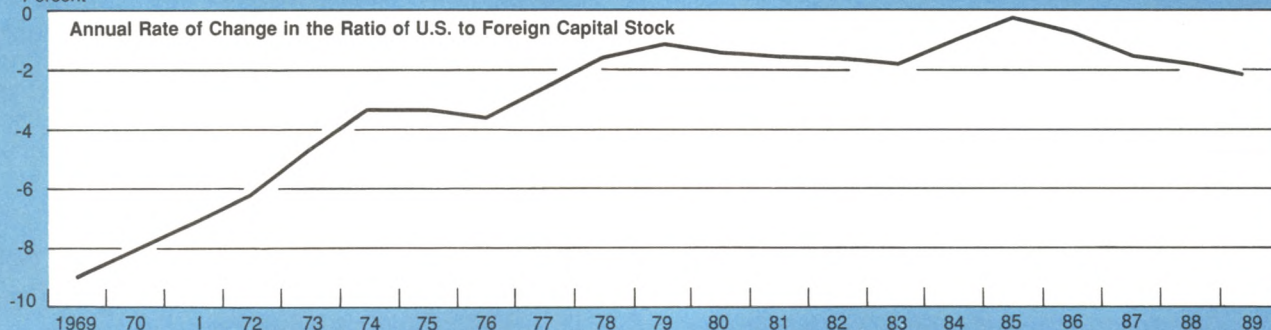
Chart 5

### Capital Stock Developments

Index 1980 = 100



Percent



Sources: National Income and Product Accounts; Organization for Economic Cooperation and Development, *Flows and Stocks of Fixed Capital*.

Notes: U.S. capital stock excludes the residential sector. Foreign capital stock is an import-weighted index of the real net fixed capital stock for the ten major industrial countries.



rise in the dollar in the early 1980s hurt U.S. relative capital stock developments, the fall in the dollar since 1985 is reversing the U.S. relative capital stock deterioration and will eventually lead to a substantial U.S. trade balance improvement in the beginning of the 1990s. Although the dollar's fall in the second half of the 1980s may have prevented even less favorable U.S. capital stock developments, one cannot easily point to any evidence of a significant exchange-rate-induced improvement in the U.S. capital stock in recent years that would signal a sustained improvement in the U.S. trade balance in the medium term. Other factors appear to have simply overwhelmed any exchange rate effects.

The second major tenet of the exchange rate/capital stock hypothesis—that a fall in the U.S. capital stock relative to the foreign capital stock will necessarily worsen the U.S. trade balance—is also called into question by the results of the model discussed in the appendix. The model's elasticities indicate that, in general, capital stock growth in the United States has had an impact on U.S. exports substantially exceeding that of capital stock growth abroad on U.S. imports. For the 1980s in particular, the model suggests that moderate U.S. capital stock growth raised U.S. exports much more than considerably stronger foreign capital stock growth raised U.S. imports, a finding that sharply rebuts the capital stock hypothesis. A more realistic appraisal of the role of capital stock developments in the 1980s would scale capital stock growth in each area by GNP growth because most investment typically goes to satisfy domestic rather than foreign demand. During the 1980s, the U.S. capital stock grew 2 percent faster than U.S. GNP. The foreign capital stock grew 15 percent faster than foreign GNP. The model's elasticities suggest that a growth rate for U.S. capital stock 2 percent beyond that necessary to maintain a constant U.S. capital/output ratio increased U.S. exports by about \$23 billion, while a growth rate for foreign capital stock 15 percent beyond that necessary to maintain a constant foreign capital/output ratio increased U.S. imports by about \$25 billion. In other words, the model suggests that even conservatively scaled by GNP growth, capital stock developments in the 1980s did not significantly contribute to the net increase in the U.S. trade balance deficit between 1979 and 1989.

Note that Helkie and Hooper's capital stock data and model generate essentially the same conclusion—that capital stock developments explain little of the difference between the 1979 and 1989 U.S. trade volume balances—despite the very different capital stock specifications employed by these authors. Helkie and Hooper's model specification based on the ratio of the U.S. manufacturing sector capital stock to the manufacturing sector capital stock of five major foreign industrial

countries does show that capital stock developments can significantly affect U.S. trade. According to Helkie and Hooper's data, however, this capital stock ratio remained virtually constant during the 1979-89 period after having fallen substantially in earlier years. Consequently, capital stock developments as measured by this ratio would not explain any of the changes in the net U.S. trade balance over the 1980s. In fact, Hooper notes that relative capital stock developments in the United States and in major industrialized countries have been dominated by factors other than exchange rate changes in the 1980s.<sup>18</sup>

In another model specification, Helkie and Hooper add the capital stock of ten developing countries to their foreign capital stock aggregate. The U.S. capital stock did fall about 10 percent relative to the more comprehensive measure of foreign capital stock between 1979 and 1989. Hooper feels that this fall was a major factor behind the persistence of the U.S. trade deficit in the late 1980s. Most of the fall, however, is attributable to trend growth in the developing countries' production capacity rather than to an investment reaction to exchange rate changes, as the exchange rate/capital stock hypothesis would require. Trend growth in developing countries' production capacity, in fact, could be considered as one element in the structural shifts hypothesis.

Overall, it is difficult to conclude that relative capital stock movements driven by exchange rate changes directly explain much of the difference in the U.S. trade volume deficit between 1979 and 1989. It appears unlikely that the U.S. capital stock will soon rebound relative to the foreign capital stock in direct response to the mid-1980s dollar depreciation and thus lead to a substantial, sustained reduction in the U.S. trade deficit. In sum, the narrowly defined capital stock hypothesis finds little empirical support.

#### *Developments in foreign direct investment*

The second argument of the exchange rate/capital stock hypothesis concerns the additional effect capital stock increases financed by foreign direct investment are expected to have on a country's trade. As noted earlier, some economists have suggested that factories established through foreign direct investment are likely to increase a country's import level initially because these factories tend to purchase a disproportionate share of their capital equipment and components from their parent firms. In the longer run, these factories are expected to reduce imports as their production disproportionately displaces parent firm final sales. Studies of

<sup>18</sup>Peter Hooper, "Comment," in C. Fred Bergsten, *International Adjustment and Financing: the Lessons of 1985-91* (Washington, D.C.: Institute for International Economics, 1991), pp. 103-12.

recent Japanese direct investment in the United States by Orr and Suzuki show that for some industries these additional foreign direct investment effects can be significant in size.<sup>19</sup> However, an examination of total direct investment flows and their impact on U.S. trade in the 1980s suggests that the distinctive effects of foreign direct investment, beyond those implicit in overall capital stock developments, account for little of the U.S. trade balance deterioration during the 1980s.

The model described in the appendix estimates that U.S. direct investment abroad does have a statistically significant long-run impact lowering U.S. export growth, as this hypothesis would predict. But the contention that foreign direct investment, spurred by changes in the dollar in the 1980s, partly explains the large U.S. trade deficit in the late 1980s requires a positive correlation between the level of the real stock of U.S. investment abroad and the exchange rate value of the dollar. During the last decade, such a correlation did not exist. The real stock of U.S. direct investment abroad grew on average 2 percent a year in the early 1980s when the dollar was rising. However, the stock of U.S. investment abroad grew at an average annual rate of 7½ percent during the 1970s and 3½ percent during the late 1980s, periods when the dollar on net fell. In fact, simple regressions of the real stock of U.S. investment abroad against twelve lags of the nominal and real exchange rates of the dollar show no statistically significant correlations.<sup>20</sup>

An examination of direct investment flows into the United States and their impact on U.S. imports also raises questions about the foreign direct investment argument. Consistent with this argument, the real stock of foreign investment in the United States did grow at a dramatically rapid pace in the late 1980s, when the dollar was falling, relative to the early 1980s, when the dollar was rising (average annual growth rates of 144 percent and 16 percent, respectively). But our regressions and those reported by Orr show no statistically significant relationship during the last two decades between growth in the stock of foreign direct investment in the United States and U.S. import growth. Given the varying ages of foreign subsidiary operations in the United States, this lack of relationship may reflect a mixing of the positive initial import effects and the negative long-run import effects of foreign direct investment. According to Orr, it may also reflect the fact that

foreign investment in the United States during much of the 1970s and 1980s was in industries subject to U.S. import restrictions, limiting any long-run trade displacement impact such as that found in our model for the export side. Orr does estimate, through a detailed analysis of industry data rather than regression techniques, that the surge in foreign direct investment (primarily the establishment of Japanese automobile subsidiaries) in the United States in the second half of the 1980s may have increased U.S. imports by about \$5 billion in recent years because of capital equipment and components shipments.<sup>21</sup> This relatively small increase suggests that foreign direct investment in the United States did not make a substantial contribution to the net deterioration in the U.S. trade balance over the 1979-89 period.

Overall, the capital stock hypothesis, viewed narrowly as asserting that changes in the dollar's value determine relative capital stock levels, foreign direct investment flows, and ultimately trade balance levels, does not hold up very well as an explanation of the large and persistent U.S. trade deficit in the late 1980s or as a reason to expect a sustained improvement in the U.S. trade balance in the near future. Of course, capital stock developments have a number of indirect effects on trade dynamics. For instance, relative capital stock changes can affect the composition of trade and, consequently, trade elasticities. Moreover, capital stock changes may reflect or elicit changes in a producer's commitment to exporting or importing from a given country, an effect much discussed under the term "trade hysteresis." The impact of these and other structural shifts in trade is discussed below.

### **Structural changes in trade**

The structural shift hypothesis focuses on all trade shifts affecting the level of U.S. exports or imports at any given exchange rate and relative demand level. These shifts include changes in trade composition across industry categories or across products within a given industry. Also included is a change in the perceived desirability of purchasing products from different regions (owing, perhaps, to the purchasers' increased familiarity with new products) or of supplying products for sale to different regions (a response to changes in producers' fixed cost considerations). The hypothesized result of all of these changes is that at any given exchange rate level and level of U.S. demand relative to foreign demand, the United States will now export less and import more than it did in earlier years.

Perhaps the best known variant of the structural shift hypothesis is the "beachhead" hysteresis model pro-

<sup>19</sup>James Orr, "The Trade Balance Effects of Foreign Direct Investment in U.S. Manufacturing," this *Quarterly Review*, Summer 1991, pp. 63-76; Tsuyoshi Suzuki, "External Balance of Japan," Nomura Research Institute *Quarterly Economic Review*, May 1990, pp. 26-28.

<sup>20</sup>The regressions reported here follow the same format as the exchange rate/capital stock regressions described in the previous subsection.

<sup>21</sup>Orr, "Trade Balance Effects."

posed by Baldwin.<sup>22</sup> This model deals with the last of the changes just mentioned, that of new fixed cost considerations. Baldwin proposes that when the dollar rose in the early 1980s, a group of new foreign producers started to sell goods in the U.S. market. Once some of these producers had met the fixed costs of setting up distribution networks (a development related to the previous capital stock hypothesis), gaining brand name recognition, and so forth, they were unwilling to stop exporting to the U.S. market when exchange rates returned to their initial levels.

A permanent change in the composition of market participants could have had several effects on the relationship between U.S. import level and relative prices. First, import supply would probably have been greater at any given exchange rate level than in the past. The sensitivity of both import supply and import demand to changes in exchange rates would also have been likely to change, because the new foreign producers probably sold a different type of product than did the traditional suppliers of U.S. imports. The increase in imports at any given exchange rate level would have helped to sustain the U.S. trade deficit in the late 1980s. Depending on how they shifted, changes in the sensitivity of import supply and demand to exchange rate shifts could also have contributed to the deficit by limiting the import reaction to the dollar's fall in the second half of the decade.

Counterpart hysteresis effects may have occurred on the U.S. export side. The sharp rise in the dollar in the early 1980s may have driven some U.S. exporters out of foreign markets while inducing foreign firms, perhaps from other exporting countries, to enter those same markets. As the dollar fell, the change in market participants abroad as well as the fixed cost considerations of, say, reestablishing distribution networks may have kept some U.S. firms from reentering foreign markets. U.S. export supply and demand relationships may have been altered by this change in U.S. export market participants, particularly if the change entailed a significant shift in U.S. export composition.

More generally, any substantial change in U.S. import and export composition during the 1980s, whether or not induced by changes in the value of the dollar, could have affected the level of U.S. imports and U.S. exports. Since the sensitivity of demand and supply to price changes differs significantly across products, a change in product composition may explain why U.S. imports and exports did not return to their previous levels (relative to each other) when the dollar moved back to its 1980 level. Moreover, if either U.S. or foreign

trade compositions changed, the level of competition facing any product may have also changed, affecting the demand or supply of exports or imports at any given price. Consequently, substantial composition change could have been an important determinant of the difference in the 1979 and 1989 U.S. trade balances despite the similarity of exchange rate and relative aggregate demand levels in those two years.

The composition of U.S. trade did, in fact, change substantially between 1979 and 1989. Perhaps the most notable changes were an 8 percentage point rise in capital goods as a share of U.S. nonagricultural export volume and a much sharper 19 percentage point rise in capital goods as a share of U.S. nonpetroleum import volume (Chart 6). That capital goods rose more as a share of U.S. imports than as a share of U.S. exports was symptomatic of the growing convergence between the composition of U.S. exports, traditionally more oriented towards capital goods, and the composition of other countries' exports, traditionally less oriented toward capital goods. This convergence was in part the result of the capital stock developments highlighted in the previous section.<sup>23</sup> It may also reflect the inroads foreign capital goods producers made in the 1983-84 period when the dollar was high and U.S. demand buoyant, inroads that these producers retained in the late 1980s for the hysteresis reasons just discussed.

Products across the spectrum of capital goods showed a greater rise in import share than export share. Disaggregated by product type, data at the three-digit Standard Industrial Classification (SIC) level indicate that for thirteen out of sixteen industries, import share gain exceeded export share gain.<sup>24</sup> That this pattern held for such diverse capital goods categories as farm machinery and communications equipment suggests a fundamental shift in U.S. trade structure in the capital goods sector: the United States appears to have suffered a decline in competitiveness in many capital goods products.

Note that some of the rise in capital goods as a share of both U.S. exports and U.S. imports resulted from tremendous growth in the volume of world computer trade. Much of this recorded growth reflects technological progress; computer volume is measured in units of

<sup>23</sup>Hickok argues that changes in the relative size of capital-to-labor ratios in the 1970s and 1980s were a major factor behind shifts in the composition of U.S. manufactured goods exports and imports over the course of the 1980s ("The Shifting Composition of U.S. Manufactured Goods Trade," this *Quarterly Review*, Spring 1991, pp. 27-37).

<sup>24</sup>Radio and television receivers, electronic components, and miscellaneous electric machinery are the exceptions. Computed share gains are based on nominal data adjusted for a revision to the SIC classifications starting with the 1983 data and the impact of the 1989 Boeing strike.

<sup>22</sup>Richard Baldwin, "Hysteresis in Import Prices: The Beachhead Effect," *American Economic Review*, vol. 78, no. 4 (September 1988), pp. 773-85.

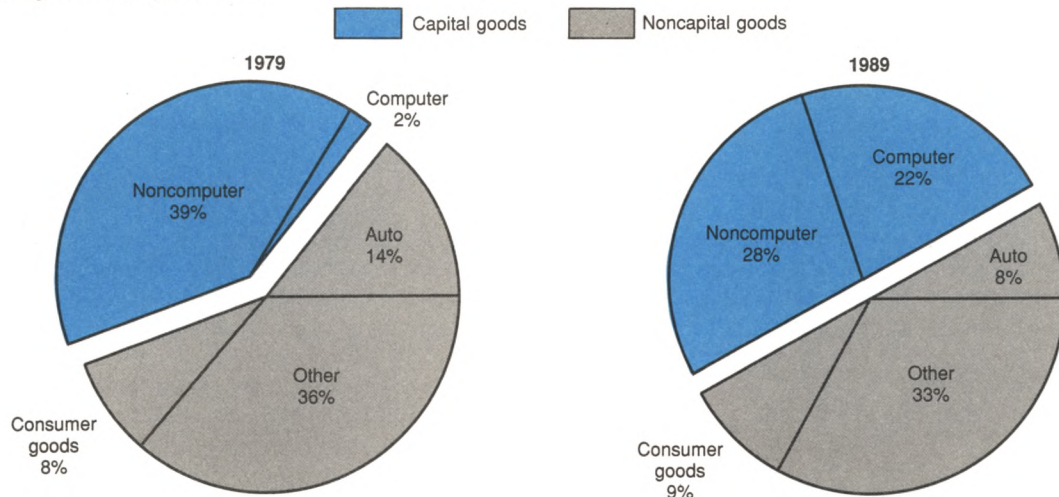
computing power, and computers in 1989 were much more powerful than computers in 1979. Because the United States has been relatively competitive in the field of computers, rapid recorded growth in computer trade actually helped the U.S. trade volume balance in 1989.

If in the 1979-89 period the recorded volume of computer exports and imports had grown at the same rate as the volume of other U.S. manufactured goods exports and imports rather than growing many times as fast, the U.S. trade volume deficit would have been

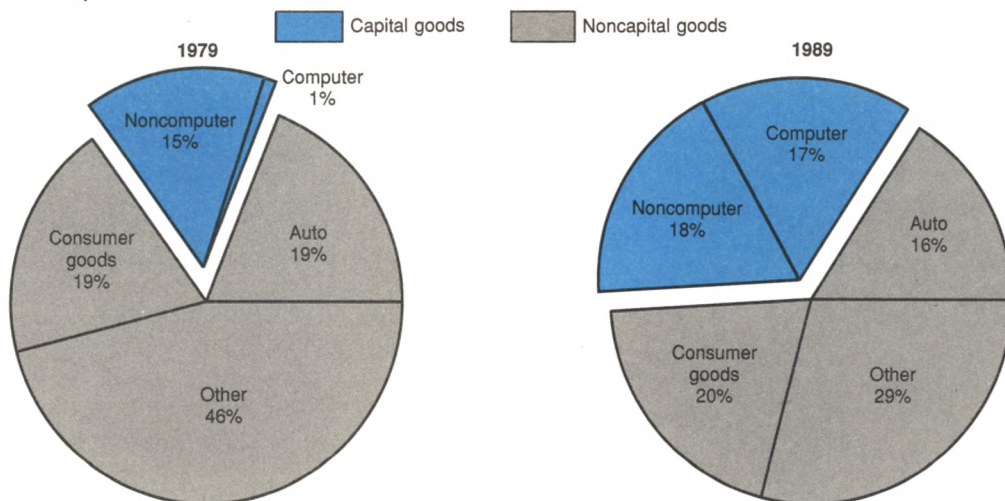
Chart 6

# U.S. Trade Composition Developments

## Nonagricultural Export Volume



## Nonpetroleum Import Volume



Source: National Income and Product Accounts.

Note: Import and export volumes are measured in constant 1982 dollars.



\$5 billion higher in 1989.

That capital goods grew much faster as a share of U.S. imports than as a share of U.S. exports may be expected to have had an adverse effect on the U.S. trade balance, abstracting from computer trade. On the U.S. import side, the increased share of capital goods probably lowered the responsiveness of U.S. import demand to the fall in the dollar in the second half of the 1980s because capital goods purchases are generally less responsive to changes in relative price than are purchases of other products. On the U.S. export side, increased foreign competition in the typically oligopolistic capital goods area probably reduced the extent of foreign demand for U.S. capital goods exports, the United States' strongest export category, at any given exchange rate level. As a secondary effect, increased foreign competition also likely increased the foreign price sensitivity of demand for U.S. products.<sup>25</sup>

Results from the model in the appendix suggest that there have indeed been structural changes in U.S. trade conditions adversely affecting the U.S. trade balance during the 1980s. Specifically, the constant and price elasticity terms in the model show statistically significant shifts in the mid 1980s, shifts that taken together result in a substantial deterioration in the predicted U.S. trade balance. Quantitatively, the shifts (excluding the effect of increased computer trade) translate into a \$67 billion deterioration in the net U.S. trade volume balance relative to what it would have been had these shifts not occurred. The model estimates that export volume has declined \$22 billion and import volume has increased \$45 billion as a result of these shifts.

Our estimate of \$67 billion for the trade deterioration due to structural shifts should be viewed as suggestive rather than precise, given the econometric difficulties involved. Although the figure is based on a hypothesized long-run change in structural trade relationships, this shift has only been estimated over a short period of four and a half years. Nevertheless, the large size of the estimated impact, coupled with t-statistics indicating that statistically significant shifts did occur, does imply that these shifts probably had a very great impact on the U.S. trade balance. In fact, the magnitude of the estimated \$67 billion deterioration due to structural shifts strongly suggests that the shifts were the primary factor behind the difference in the 1979 and 1989 U.S. trade balance levels. Importantly, the impact of these

shifts is estimated to be long lasting; that is, it will not be reversed in the near to medium term without some specific change in U.S. trade conditions.

Given the large, albeit imprecise, magnitude of this estimated effect, it would be reassuring to have further evidence supporting the model's results. One observation substantiating the model's conclusions is that the noncomputer capital goods sector—the sector most clearly identified as showing a structural shift—does appear to account for the bulk of the deterioration in the U.S. trade volume balance between 1979 and 1989. If noncomputer capital goods imports and exports had grown at the same rate as other imports and exports, respectively, during those ten years, the U.S. trade volume deficit would have been \$46 billion less in 1989. In other words, the poor trade performance of the non-computer capital goods sector relative to that of other sectors accounts for about three-quarters of the net deterioration in the U.S. trade balance over the last decade.

Two other observations help to corroborate the model's results. First, the model estimates a rise in the foreign price sensitivity of demand for U.S. exports and a decline in the U.S. price sensitivity of demand for U.S. imports, developments that the observed change in U.S. export and import composition would lead one to expect. Second, other analysts have also found significant signs of structural shifts in trade: Baldwin presents a model showing indications of hysteresis,<sup>26</sup> and some recent studies provide implicit evidence of structural shifts. These studies will be discussed in the next section.

Overall, it appears that the hypothesis concerning structural shifts in U.S. trade best explains why the U.S. trade deficit remained so high in the late 1980s. This hypothesis is strongly supported by the observed shift in the composition of U.S. trade, which would seem to mandate a change in estimated trade relationships. Moreover, that capital goods increased much more sharply as a share of U.S. imports than of U.S. exports strongly suggests a secular decline in U.S. competitiveness. Consequently, it is not surprising to find that structural shifts seem to account for much of the tenacity of the U.S. trade deficit.

These structural shifts have several implications for future trade adjustment. First, U.S. exports now appear to face a much more competitive, price-sensitive foreign market, while U.S. imports are better able to maintain their competitive position in the face of a change in the value of the dollar. Structural shifts, therefore, imply that the United States trade balance is not likely to regain its

<sup>25</sup>This export price elasticity argument differs from the argument on the import side, which posits a decrease in the price sensitivity of demand due to an increased share of capital goods imports. Two factors account for the difference. First, capital goods increased significantly less in share on the export side than on the import side. Second, a rise in price sensitivity due to increased competition was less relevant on the U.S. import side because the U.S. market for capital goods was already very competitive.

<sup>26</sup>Baldwin, "Hysteresis."

position of the late 1970s or early 1980s unless the dollar moves substantially below its value at the start of the past decade or the ratio of U.S. demand to foreign demand falls permanently below its 1980 level. Second, the shifts suggest that further changes in the U.S. trade balance are likely to arise more from export developments and less from import developments than has been the case in the past. In other words, if the United States wants further trade balance adjustment, it must compete more vigorously in world trade rather than expect foreign producers to shoulder their traditionally higher share of trade realignment.

### Comparison with other adjustment analyses

Several recent studies have examined the U.S. trade imbalance in the late 1980s. These studies have reached differing conclusions, most notably regarding the role they assign to exchange rate changes in the U.S. trade balance evolution. The studies, however, all implicitly support the conclusion that structural shifts in U.S. trade relations in the 1980s have led to a deterioration in the U.S. trade balance position.

A small group of economists have contended that the U.S. trade deficit remained large even after the dollar fell in the mid-1980s because exchange rate changes no longer had any significant impact on trade flows. This group has offered little empirical evidence to support its contention. Rather, the group has advanced several arguments to explain why exchange rate movements are no longer important: 1) foreign producers have cut prices to offset the fall in the dollar, 2) an increasing share of U.S. trade has been with developing countries whose currencies have not appreciated against the dollar, and 3) an increased number of imported products, such as VCRs, are not produced in the United States.<sup>27</sup> Most economists, while conceding that these arguments may have some validity, firmly reject the group's assertion that exchange rate changes no longer have a significant impact on trade flows. Note, however, that these arguments, even if only partially true, do suggest that a structural shift has occurred in U.S. trade relationships.

Recent studies by Cline and Lawrence represent more mainstream analyses of factors behind the tenacity of the U.S. trade deficit in the late 1980s.<sup>28</sup> Both studies argue that traditional trade models, which incorporate a substantial trade response to exchange rate

developments, work reasonably well once data peculiarities are resolved. Lawrence, whose study has been endorsed by Krugman,<sup>29</sup> emphasizes that U.S. trade volume equations estimated for the period from 1976 through the first half of 1984 forecast U.S. trade volumes in 1989 fairly well after adjustment for computer trade: the sharp deterioration in the U.S. trade balance between 1979 and 1989, according to Lawrence, is attributable to a much higher U.S. income elasticity of demand for imports relative to the foreign income elasticity of demand for U.S. exports. Cline also finds that a conventional set of equations accounts quite well for the U.S. trade deficit in the late 1980s. In contrast to Lawrence, however, Cline estimates roughly similar U.S. and foreign income elasticities. Cline attributes the large U.S. trade deficit in the late 1980s to the fact that the real level of the dollar, deflated by U.S. and foreign export unit values, was 15 percent higher in 1989 than it had been, on average, during 1978-80. He argues that if the real dollar had fully returned to its 1978-80 level based on the export unit value criterion, the U.S. trade deficit would have been largely eliminated in 1989.

This article shares the view of both Lawrence and Cline that exchange rate changes continue to have a significant impact on U.S. trade flows. It argues, however, that structural shifts in U.S. trade relations have weakened the U.S. trade response to the dollar's decline in the second half of the 1980s. Closer examination of the Lawrence and Cline studies suggests that they, too, imply significant structural shifts in U.S. trade relationships in the 1980s.

Two elements of Lawrence's results indicate that structural shifts have occurred in U.S. trade. Lawrence estimates a much higher income elasticity of demand for U.S. imports than for U.S. exports compared with the elasticities in models estimated over earlier periods. In addition, when data are added to the Lawrence equations for the 1985-89 period, certain coefficient shifts imply structural breaks.<sup>30</sup> Cline's finding that the real

<sup>27</sup>Robert Kuttner, *The End of Laissez-Faire* (New York: Knopf, 1991), pp. 82-112.

<sup>28</sup>William Cline, "United States External Adjustment: Progress, Prognosis, and Interpretation," Institute for International Economics, 1990, mimeo; Robert Z. Lawrence, "U.S. Current Account Adjustment: An Appraisal," *Brookings Papers on Economic Activity*, 2:1990, pp. 343-92.

<sup>29</sup>Paul Krugman, "Has the Adjustment Process Worked?" Institute for International Economics, Policy Analysis in International Economics no. 34, 1991.

<sup>30</sup>The Lawrence equations are difficult to compare with other trade models because Lawrence excludes computers but includes services trade. The gap between import and export income elasticities in the Lawrence equations is 1.0, about twice the size of the income elasticities found in regressions estimated in earlier periods. See Morris Goldstein and Mohsin S. Khan, "Income and Price Effects in Foreign Trade," in R.W. Jones and P.B. Kenen, eds., *Handbook of International Economics*, vol. 2 (Elsevier Science Publishers, 1985); and Bryant, ed., *External Deficits*.

These earlier regressions do have different specifications and activity variables. Consequently, a comparison of their elasticities with those estimated by Lawrence offers suggestive rather than definitive evidence of structural changes. As to coefficient shifts in Lawrence's regressions, when data are added for 1985-89, the Durbin-Watson statistic in the import equation drops from 2.2 to

value of the dollar, deflated by U.S. and foreign export unit values, was still 15 percent higher in 1989 than in 1978-80 also indicates a structural shift. By most other price measures, including unit labor costs in manufacturing or producer price indexes, the real dollar had returned to its 1978-80 level by 1989. This difference in behavior between the real dollar based on export unit values and the real dollar based on other price indexes was not present in the 1970s. The emergence of a substantial difference between these real dollar series in the 1980s suggests pronounced structural shift in export composition or pricing behavior on the part of U.S. or foreign producers over the past decade. This shift in turn indicates a pronounced change in trade relationships during these years.

Although a finding of structural shifts in trade relationships is implicit in all the recent studies, the studies disagree significantly on the outlook for the U.S. trade balance. The asymmetry of U.S. and foreign income elasticities leads Lawrence to a very pessimistic conclusion: "Rates of growth in the United States that are about 60 percent of those abroad [in countries belonging to the Organization for Economic Cooperation and Development] are required to keep exports and imports growing at similar rates."<sup>31</sup> For different reasons, the small group of analysts who contend that exchange rate changes no longer affect the U.S. trade balance have a similarly pessimistic view of the relative income changes necessary to achieve a sustained improvement in the U.S. trade balance. Cline is much more optimistic. He argues that only a 15 percent further depreciation of the dollar would have balanced U.S. trade in 1989 and that because of roughly similar U.S. and foreign income elasticities, the balance would have

been relatively easy to maintain. This article agrees with Cline that U.S. and foreign income elasticities are roughly equal, but our model indicates that the dollar would have had to fall about double the amount suggested by Cline to have balanced trade in 1989. In other words, we find that the effort required to achieve a sustained U.S. trade balance improvement is considerably greater than Cline's analysis would indicate, but considerably less than Lawrence's analysis would suggest.

## Conclusion

This article investigates the persistence of the U.S. trade deficit in the late 1980s. It finds that changes in the composition of U.S. trade, affecting both commodity categories and foreign producers participating in trade, are primarily responsible for impeding U.S. trade balance adjustment in the late 1980s. These changes have made U.S. imports less responsive to the fall in the dollar since the beginning of 1985 while increasing the foreign competition facing U.S. exports. Exchange rate effects on the size of U.S. capital stock relative to the capital stock abroad do not appear to play a significant direct role in explaining the tenacity of the U.S. trade deficit, although they have undoubtedly contributed to the structural changes behind the deficit's endurance.

Several important implications may be drawn from these findings. First, the U.S. trade balance is not likely to regain its late 1970s position on a sustained basis without substantial further exchange rate movements or significantly slower U.S. growth relative to growth abroad. Second, with the growing similarity between U.S. import and U.S. export composition (a key element of the structural shifts), U.S. products are likely to face greater competition at any given exchange rate level. Finally, given the estimated rise in the foreign price sensitivity of demand for U.S. exports and the decrease in the U.S. price sensitivity of demand for imports, U.S. exports are likely to be more responsive, and imports less responsive, to exchange rate changes than they have been in the past.

### *Footnote 30 continued*

1.4. Lagged import price terms also become much more significant. Moreover, when domestic demand is used as the activity variable, the long-run price elasticity shifts significantly in the 1985-89 period. The constant term shifts in both the import and the export equations when the more recent data are included.

<sup>31</sup>Lawrence, "U.S. Current Account Adjustment," p. 366.



## Appendix: An Expanded, Cointegrated Model of U.S. Trade

Standard trade models do not capture any direct impact of capital stock or foreign direct investment developments on trade flows.<sup>†</sup> Nor do they allow structural shifts in trade relationships to have any effect on trade flows. To test the significance of these factors, we estimate an expanded trade volume model. This expanded trade model includes the U.S. capital stock and the stock of U.S. direct investment abroad as explanatory variables in the export volume equation. To assess the impact of structural changes that may have occurred around 1984, the model also allows the price elasticities of supply and demand for U.S. exports and the export constant term to shift. Comparable adjustments are made to the import volume equation.

Using ordinary least squares, we estimate the expanded export and import volume equations without any lagged terms. The residuals of the regressions are tested to ensure that both equations are cointegrated. Since the equations pass the cointegration test, their estimated coefficients may be viewed as expressing long-run "elasticities" linking changes in export and import volume with changes in the explanatory variables.

The long-run regressions, estimated over the period from the first quarter of 1967 to the fourth quarter of 1988, are:

$$(1) \\ X_t = -15.19 + 0.26 DC - 0.022 \text{Trend} + 1.90 Y_t^* + 3.34 K_t - 1.19 FDI_t - 0.45 P_t^{XD} - 0.38 DP_t^{XD} + 0.65 P_t^{XS} + 2.57 DP_t^{XS} + \epsilon_t^X \\ \begin{matrix} (-2.80) & (0.82) & (-3.95) & (4.20) & (3.26) & (-3.44) & (-2.94) & (-2.20) & (4.97) & (4.07) \end{matrix} \\ \text{adj. } R^2 = 0.98 \quad \text{A.D.F.} = -5.15$$

$$(2) \\ M_t = -10.77 + 0.05 DC + 0.01 \text{Trend} + 2.15 Y_t + 0.41 K_t^* - 0.32 FDI_t^* - 1.28 P_t^{MD} + 1.17 DP_t^{MD} - 0.17 P_t^{MS} + 0.03 DP_t^{MS} + \epsilon_t^M \\ \begin{matrix} (-3.19) & (1.84) & (1.02) & (7.46) & (2.98) & (-1.95) & (-6.43) & (2.89) & (-0.74) & (0.10) \end{matrix} \\ \text{adj. } R^2 = 0.99 \quad \text{A.D.F.} = -5.56$$

<sup>†</sup>Standard trade models are typically of the form:

$$X^d = X^d(C, \text{Trend}, Y^*, P^x - eP^*) \\ M^d = M^d(C, \text{Trend}, Y, P^m - P),$$

where the variables are in natural log terms and  $X^d$  is demand for U.S. export volume,  $C$  is a constant,  $\text{Trend}$  is a time trend,  $Y^*$  is real foreign income,  $P^x$  is the price level for U.S. exports,  $e$  is the nominal exchange rate (dollar/foreign

where all variables are in natural log form,  $t$ -statistics are in parentheses, and

- $X$  = the U.S. nonagricultural export volume
- $M$  = the U.S. non-oil import volume
- $C$  = a constant term
- $DC$  = a dummy constant
- $\text{Trend}$  = a time trend
- $Y$  = real U.S. income
- $Y^*$  = real foreign income (an aggregate income index of twenty-five major U.S. trading partners)
- $P$  = the U.S. producer price index excluding capital goods
- $P^*$  = the foreign price level (trade-weighted wholesale price index for the countries included in the International Monetary Fund's multilateral exchange rate model [MERM])
- $e$  = the effective nominal exchange rate (dollar/foreign currency) between the U.S. dollar and MERM countries' currencies
- $FDI$  = the real stock of U.S. direct investment abroad
- $FDI^*$  = the real stock of foreign direct investment in the United States
- $K$  = the real U.S. net nonresidential capital stock
- $K^*$  = the real aggregate net capital stock of the major OECD countries
- $P^{XD}$  =  $(P^x - eP^*)$ , the relative export price affecting demand, where  $P^x$  is the U.S. nonagricultural export price
- $DP^{XD}$  = a slope dummy for  $P^{XD}$
- $P^{XS}$  =  $(P^x - P)$ , the relative export price affecting supply, where  $P^x$  is the U.S. nonagricultural export price excluding capital goods
- $DP^{XS}$  = a slope dummy for  $P^{XS}$
- $P^{MD}$  =  $(P^m - P)$ , the relative import price affecting demand, where  $P^m$  is the U.S. non-oil import price excluding capital goods
- $DP^{MD}$  = a slope dummy for  $P^{MD}$
- $P^{MS}$  =  $(P^m - eP^*)$ , the relative import price affecting supply, where  $P^m$  is the U.S. non-oil import price
- $DP^{MS}$  = a slope dummy for  $P^{MS}$ .

The export and import specifications in this two-equation model are basically symmetrical. Each includes a constant, a time trend, and the relevant trade partner's level of GNP. Unlike standard models, this model bases  $Y^*$  on an expanded list of twenty-five countries, including

Footnote <sup>†</sup> continued

currency),  $P^*$  is the foreign price level,  $M^d$  is demand for U.S. import volume,  $Y$  is real U.S. income,  $P^m$  is the price level for U.S. imports, and  $P$  is the domestic price level in the United States.

## Appendix: An Expanded, Cointegrated Model of U.S. Trade (continued)

developing countries.<sup>4</sup> The export and import equations also include separate relative price terms to reflect both demand and supply considerations.<sup>5</sup> The relative price ratios affecting export demand ( $P^{XD}$ ) and import demand ( $P^{MD}$ ) capture the traded goods' price relative to the competing goods' price.<sup>6</sup> The relative price ratios affecting export supply ( $P^{XS}$ ) and import supply ( $P^{MS}$ ) measure the traded goods' price relative to the price those goods command in their home market. Relative price slope dummies ( $DP^{XD}$ ,  $DP^{XS}$ ,  $DP^{MD}$ ,  $DP^{MS}$ ) and constant dummies (DC) are allowed to be operational in the third quarter of 1984 to capture any structural shifts. (Krugman and Baldwin suggest that this quarter is likely to be the earliest period in which measured hysteresis effects in response to the dollar's rise might have occurred.<sup>7</sup>) A final set of factors included in the export and import equations deals with investment. The export equation has variables measuring the U.S.-owned capital stock located at home and abroad. The import equation has analogous measures for capital owned by foreigners.

Short-run error-correction models (ECM), or dynamic adjustment regressions, of export and import volume are also estimated. For exports,  $\Delta X_t$  (the first difference in exports) is regressed against lagged residuals from the long-run equilibrium export regression, along with lagged changes in the dependent and independent variables in the long-run regression. A comparable regression is estimated on the import side. After eliminating insignificant lag terms, we obtain a parsimonious ECM representation

for  $\Delta X_t$  and  $\Delta M_t$  as follows:

$$(3) \quad \Delta X_t = -0.37 RX_{t-1} + 1.66 \Delta K_{t-1} - 0.36 \Delta P^{XD}_{t-3} + \mu_t^X \\ (-3.36) \quad (3.32) \quad (-2.40)$$

adj.  $R^2 = 0.22$

$$(4) \quad \Delta M_t = -0.61 \Delta RM_{t-1} + 1.37 \Delta Y_{t-1} + \mu_t^M \\ (-5.55) \quad (3.91)$$

adj.  $R^2 = 0.34$

Overall, the above four-equation model "fits" the trade data very well. In the long-run regressions, the adjusted  $R^2$ 's are high and the coefficients on all variables are of the expected sign and are almost all statistically significant. In the short-run dynamic regressions, the adjusted  $R^2$ 's are at acceptable levels and the coefficient estimates appear plausible.

Reestimation of the model under five variations also suggests that the expanded model is reasonably robust. That is, these five variations in explanatory variables or estimation period do not result in large changes in the estimated coefficients (see table below). Significantly, the major findings of the benchmark model hold true for all five variations: (1) there are large changes in the import and export price elasticities, strongly indicating a significant structural shift in trade; (2) capital stock developments have a much stronger impact on exports than on imports; and (3) the U.S. and foreign income elasticities of demand estimated for each variation are generally fairly close to each other.

In the text, we use the coefficients on the benchmark model's dummy variables to estimate the effect of changes in structural trade relationships. The impact of these dummy variables is to raise predicted U.S. export sales \$24 billion, and predicted U.S. import purchases \$84 billion, over what the model would have predicted in 1989 if the dummy terms had been suppressed. In other words, the statistically significant dummies suggest that structural shifts in world trade resulted in a substantial (\$24 billion) rise in U.S. exports and a huge (\$84 billion) rise in U.S. imports. On net, the dummies suggest that structural shifts led to a \$63 billion deterioration in the U.S. trade balance.

The dummy variables result in a large rise in both export and import volume because they coincide with, and thus partly reflect, the sharp increase in the volume of world computer trade during the 1980s. The impact of the surging computer trade volume on the dummies may be estimated by calculating what the average annual

<sup>4</sup>The countries are Australia, Belgium, Brazil, Canada, People's Republic of China, Denmark, France, Germany, Hong Kong, Israel, Italy, Japan, Korea, Luxembourg, Mexico, Netherlands, Norway, Saudi Arabia, Singapore, Spain, Sweden, Switzerland, Taiwan, the United Kingdom, and Venezuela.

<sup>5</sup>The simultaneous bias problem that would normally occur when traded goods' prices are included as independent variables in trade volume equations disappears in a cointegrated model when the sample size is sufficiently large.

<sup>6</sup>Computer prices have moved very differently from other prices in recent years. Unfortunately, computer prices have a much higher weight in  $P^X$  and  $P^M$  than in  $P$  and  $eP$ , distorting relative price comparisons. For this reason, capital goods prices are removed from the indexes used to construct  $P^X - P$  and  $P^M - P$  for the actual model estimation. (It is impossible to remove only computer prices from these indexes.) Since capital goods prices cannot be removed from  $eP$ , they are not removed from any of the indexes used to construct  $P^X - eP$  or  $P^M - eP$ .

<sup>7</sup>Krugman and Baldwin, "The Persistence."

## Appendix: An Expanded, Cointegrated Model of U.S. Trade (continued)

levels for computer export and import volumes would have been in the period from the third quarter of 1984 to the fourth quarter of 1989 if these volumes had grown at the same rate as the volumes of other nonagricultural U.S. exports and nonpetroleum U.S. imports. These calculated computer volumes would be \$46 billion less than the actual average annual computer export volume and \$39 billion less than the actual average annual computer import volume during the period. The differences, \$46 billion on the export side and \$39 billion on the import side, may be assumed to be the increase in the dummies attributable to the effect of rapidly rising world computer trade on U.S. export and import flows.

According to these calculations, the dummy variables suggest that structural shifts in world trade, excluding the rapid growth in computer trade volume, have led to a

\$22 billion fall in U.S. export volume (the difference between the \$24 billion estimated overall dummy variable rise and the \$46 billion rise attributed to computers) from what it would have been had these structural shifts not occurred. On the import side, the dummy variables suggest that structural shifts in world trade, again excluding the rapid growth in computer trade volume, have caused U.S. import volume to increase \$45 billion (the difference between the \$84 billion estimated overall dummy variable rise and the \$39 billion rise attributed to computers) over what it would have been had these shifts not occurred. On net, structural shifts, excluding the rise in computer trade, are estimated to have caused a \$67 billion deterioration in the U.S. trade volume balance.

### Coefficient Estimates of the Expanded Trade Model under Five Variations

	Benchmark Model	Export Equation				
		No. 1	No. 2	No. 3	No. 4	No. 5
Constant	-15.19	-36.5	-11.0 <sup>†</sup>	-15.02 <sup>†</sup>	-27.3	-7.29 <sup>†</sup>
DC	0.26 <sup>†</sup>	0.014 <sup>†</sup>	0.007 <sup>†</sup>	0.26 <sup>†</sup>	0.007 <sup>†</sup>	-0.02 <sup>†</sup>
Trend	-0.022	-0.03	-0.02	-0.023	-0.03	-0.02
Y*	1.9	1.60	2.2	2.12	3.03	2.76
K	3.34	5.87	2.38	3.09	4.35	2.37 <sup>†</sup>
FDI	-1.19	-1.26	-1.0	-1.09	-1.19	-1.56
P <sub>XD</sub>	-0.45	-0.20 <sup>†</sup>	-0.16 <sup>†</sup>	-0.37 <sup>†</sup>	-0.04 <sup>†</sup>	-0.37 <sup>†</sup>
DP <sub>XD</sub>	-0.38	-0.48	-0.94	-0.45	-0.40	-0.44
P <sub>XS</sub>	0.65	0.47	0.84	0.66	0.44	0.75
DP <sub>XS</sub>	2.57	2.54	2.54	2.47	2.12	1.82
		Import Equation				
		No. 1	No. 2	No. 3	No. 4	No. 5
Constant	-10.77	-10.8	-12.3	-6.44 <sup>†</sup>	-12.0	-11.2
DC	0.05 <sup>†</sup>	0.05 <sup>†</sup>	0.04 <sup>†</sup>	0.03 <sup>†</sup>	0.01 <sup>†</sup>	0.05 <sup>†</sup>
Trend	0.01 <sup>†</sup>	0.01 <sup>†</sup>	0.00 <sup>†</sup>	0.21 <sup>†</sup>	0.00 <sup>†</sup>	0.00 <sup>†</sup>
Y	2.15	2.15	2.24	2.00	2.16	2.17
K*	0.41	0.41	0.44	-0.26 <sup>†</sup>	-0.01 <sup>†</sup>	0.42
FDI*	-0.32 <sup>†</sup>	-0.32 <sup>†</sup>	-0.24 <sup>†</sup>	-0.43	-0.03 <sup>†</sup>	-0.30
P <sub>MD</sub>	-1.28	-1.28	-1.28	-1.09	-1.07	-1.29
DP <sub>MD</sub>	1.17	1.17	1.12	1.02	0.91	1.16
P <sub>MS</sub>	-0.17 <sup>†</sup>	-0.17 <sup>†</sup>	-0.25 <sup>†</sup>	-0.31 <sup>†</sup>	-0.37 <sup>†</sup>	-0.18 <sup>†</sup>
DP <sub>MS</sub>	0.03 <sup>†</sup>	0.03 <sup>†</sup>	0.011 <sup>†</sup>	0.29 <sup>†</sup>	0.41 <sup>†</sup>	0.03 <sup>†</sup>

#### Notes:

Variation no. 1: the model is estimated using total U.S. capital stock.

Variation no. 2: the model is estimated using the real value of the dollar measured against the currencies of six major foreign countries.

Variation no. 3: the model is estimated using data from 1970-I to 1988-IV.

Variation no. 4: the model is estimated from 1970-I to 1988-IV using the trade-weighted domestic demand levels of the United States and six major foreign countries.

Variation no. 5: the model is estimated using data from 1967-I to 1989-III. Data of 1989-IV are excluded because the Boeing strike tainted fourth-quarter export numbers.

<sup>†</sup>Indicates insignificant estimates.



# Evolution of U.S. Trade with China

*by James Orr*

Over the course of the past decade U.S. trade flows with China have contrasted sharply with overall U.S. trade patterns. While the U.S. trade balance as a whole deteriorated during the first half of the 1980s, our trade with China remained roughly in balance. After 1987, when the overall U.S. trade balance began to improve, a surge in imports from China led to a substantial worsening in the U.S. bilateral balance with China. At present, our trade deficit with China has risen to roughly \$12 billion, a sum exceeded only by our deficit with Japan.

This article analyzes developments in U.S. trade with China since 1980. It attributes the surge in U.S. manufactured goods imports from China in the second half of the decade to significant changes in China's foreign economic policies. The country has sought both to improve price competitiveness by devaluing its currency and to acquire capital and technology by encouraging foreign investment. These policy changes have enabled China to take advantage of its vast supply of inexpensive labor and to develop an internationally competitive export sector. Between 1985 and 1990, China raised its share of U.S. imports of manufactured goods and became a significant source of relatively low-cost consumer goods.

One corollary of the growth in U.S. imports from China has been the shift in the pattern of U.S. imports from Asia. In particular, Hong Kong's share of U.S. manufactured imports has declined as Hong Kong producers have increasingly moved processing and assembly operations to China.

## **Trends in U.S.-China trade**

The pattern of U.S.-China trade during the past decade differs remarkably from that of U.S. trade with the rest of the world. The overall U.S. merchandise trade balance steadily worsened during the first half of the 1980s, but U.S. bilateral trade with China remained roughly in balance (Chart 1). Since 1985, however, our bilateral trade balance with China has steadily deteriorated at the same time that the U.S. trade balance with nearly all other major trading partners has substantially improved.

The deterioration in our trade position with China is largely explained by the rapid growth in U.S. imports. After having grown by only \$3.5 billion between 1978 and 1985, U.S. imports from China increased by nearly \$15 billion from 1985 to 1991 (Chart 2). Since 1987, U.S. imports from China have grown at an annual rate of 35 percent, about five times as fast as overall U.S. import growth. In contrast, U.S. exports to China have expanded by about 11 percent annually since 1987, a rate roughly in line with the growth of overall U.S. exports over the same period.<sup>1</sup>

Accompanying the rapid growth in U.S. imports from China has been a significant shift in the composition of these imports. During the first half of the 1980s, food and industrial supplies made up about one-half of U.S.

<sup>1</sup>Overall U.S. exports grew at an annual rate of 16 percent since 1987. The 11 percent annual growth in U.S. exports to China since 1987, however, is low compared with the 21 percent annual growth in U.S. exports to the Asian newly industrialized countries (NICs).

imports from China (Table 1). By contrast, consumer goods imports have dominated the recent growth in trade, expanding to more than three-fourths of U.S. imports from China by 1990. The share of food and industrial supplies by 1990 had fallen to around 15 percent. Consumer goods imports have generally been in relatively unsophisticated product categories, particularly toys, textiles and apparel, and telephones and radios.

Our growing trade imbalance with China not only contrasts with overall trade patterns but also runs counter to the substantial progress the United States has made in reducing its trade deficit with other Asian economies.<sup>2</sup> Between 1980 and 1987, the U.S. trade deficit with all Asian economies rose from \$15 billion to \$98 billion (Table 2). Japan and the Asian newly indus-

<sup>2</sup>Japan, China, the four Asian NICs (Hong Kong, South Korea, Singapore, and Taiwan), Indonesia, Malaysia, the Philippines, and Thailand.

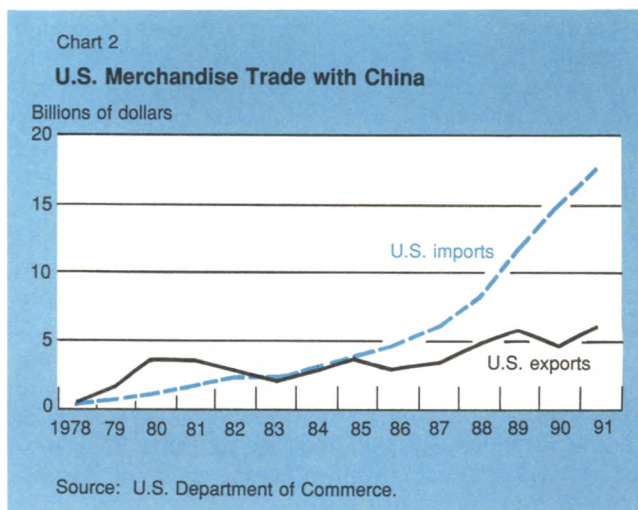
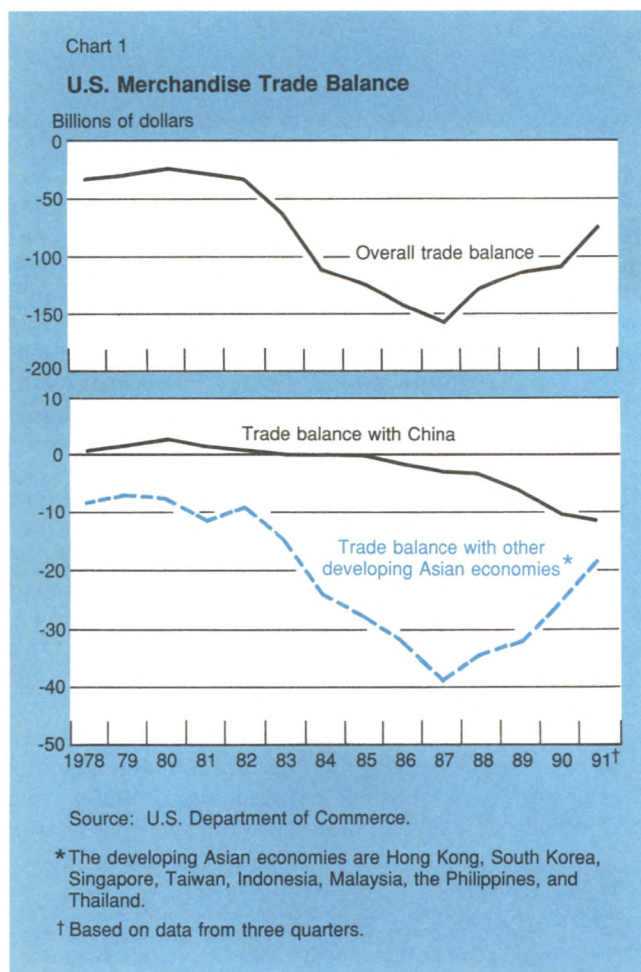
trialized countries (NICs) were the major sources of that deficit. Since 1987 the overall deficit with the Asian economies excluding China decreased by about \$33 billion, an improvement led by the declining deficits with Japan and the Asian NICs. The \$10 billion increase in the deficit with China, however, offset almost one-third of this improvement, and in 1991, the U.S. deficit with China accounted for one-sixth of the U.S. trade deficit with Asia.

### Sources of China's improved international competitiveness

In analyzing the growth of U.S. trade with China, one must recognize that until the late 1970s China was effectively a closed economy. Annual levels of exports and imports were predetermined in five-year economic plans, and trade patterns did not reflect China's relative competitiveness in different products. Moreover, the exchange rate was fixed and Chinese firms were insulated from world price movements. China's adoption of an "open door" policy in 1978 signaled the beginning of an overhaul of its foreign trade system. The country sought to expand the role of market forces in trade and investment decisions and, in particular, to promote manufactured exports.

One major change in China's foreign trade system has involved the exchange rate of its currency, the yuan.<sup>3</sup> Since the early 1980s China has actively pursued a policy of improving the price competitiveness of Chinese goods by devaluing the yuan. The effects of this policy on China's price competitiveness are seen in Chart 3, which plots the real value of the yuan against the dollar. Between 1980 and 1985, the real value of the

<sup>3</sup>The Chinese currency is called the renminbi (RMB). It is denominated in yuan.



yuan depreciated by roughly 50 percent against the dollar. Industrial countries and developing Asian economies other than China also recorded large real depreciations against the dollar during this period. Nevertheless, the dollar's sharp fall over 1985-88 reversed earlier trends with most countries, so that at present the real value of both industrial world and other Asian currencies exceeds their 1980 values against the dollar. In contrast, Chinese authorities have acted to maintain the competitive gains made in the first half of the decade. In particular, they undertook large devaluations in 1990 and 1991 that have kept the yuan still roughly 50 percent below its 1980 level relative to the dollar.<sup>4</sup>

This large currency devaluation against the dollar during the 1980s has significantly enhanced the cost advantage enjoyed by Chinese producers. In particular, the devaluation of the yuan has enabled Chinese suppliers to avail themselves of the vast supply of inexpensive (when measured in dollars) labor and to expand the production and export of goods requiring large amounts

of low-skilled labor. Comparing China's labor costs with those of other countries underscores the Chinese advantage (Table 3). Earnings of workers in the manufacturing sector averaged a mere \$.20 per hour in 1989. Earnings of workers in firms primarily producing manufactured goods for export are estimated to be about twice that level. Even at this higher level, however, Chinese earnings are only about one-fifth as much as the earnings of workers in the manufacturing sectors of the Asian newly industrialized economies and one-twentieth of the wage of comparable U.S. workers.

However dramatic the differences in labor costs, the devaluation of the yuan cannot alone explain the sharp expansion of U.S. imports from China over the past six years. Indeed, as Table 3 suggests, production costs in China were quite low throughout the 1980s, although the gap widened over time. More likely, China's strong export performance in the second half of the 1980s resulted from the combined effects of improved price competitiveness and a series of policy changes in the foreign trade sector designed to expand exports. These changes gave individual firms greater freedom to engage in trade, improved the allocation of foreign exchange by allowing firms to retain and ultimately to trade their foreign exchange earnings, and liberalized

<sup>4</sup>The nominal value of the yuan was set at roughly 1.5 per U.S. dollar in the early 1980s. By mid-1991, the yuan was fixed at roughly 5.2 per U.S. dollar, about 10 percent above the rate at which the yuan was trading in the rather limited foreign exchange market in China.

Table 1

### Commodity Composition of Trade between the United States and China

	U.S. Imports from China (Share of Total)			U.S. Exports to China (Share of Total)		
	1980	1985	1990	1980	1985	1990
Food and industrial supplies	47.8	42.7	15.6	87.8	39.2	39.9
Capital goods	1.0	1.7	7.1	11.4	52.6	43.1
Consumer goods	51.0	54.1	75.9	0.0	0.1	1.5
Other	0.2	1.5	1.4	0.8	2.3	15.5

Table 2

### U.S. Trade with Asia

Billions of Dollars

	1980	1985	1987	1990	1991 <sup>†</sup>
U.S. trade balance with Asia					
Total	-15.0	-74.5	-98.4	-77.9	-74.2
China	2.7	0.0	-2.8	-10.4	-12.4
Asian economies excluding China	-17.7	-74.5	-95.5	-67.5	-61.8
Japan	-10.1	-46.2	-56.3	-41.1	-42.7
Asian newly industrialized countries	-3.0	-22.2	-34.1	-19.9	-13.5
Other Asian economies	-4.6	-6.1	-5.1	-6.5	-5.6

<sup>†</sup>Estimates are based on data through October.



the rules governing foreign direct investment (see box). Improved price competitiveness, therefore, did not by itself boost trade; rather, it reinforced the effects on trade of the overall reform of the foreign trade system.

China's relaxation of restrictions on foreign direct investment was one of the most important reforms that spurred the development of a thriving export sector. The infusion of foreign capital and technology has enabled China's manufacturing sector to expand current export production and to develop production expertise. Liberalizing foreign direct investment promoted this export expansion in two ways. First, Chinese firms were allowed to assemble and export goods made from imported parts and components. These same firms were freed from many of the trade restrictions imposed on other domestic Chinese firms. Second, "special economic zones," created in 1979, offered foreign multinationals specific incentives to establish plants in China for the manufacture and production of goods for export. China initially set aside four geographical areas as special economic zones—three in Guangdong province adjacent to Hong Kong and one in Fujian province directly across the Formosa Strait from Taiwan—and added a fifth, Hainan Island off the coast of southern China, in 1984. Foreign investment was further pro-

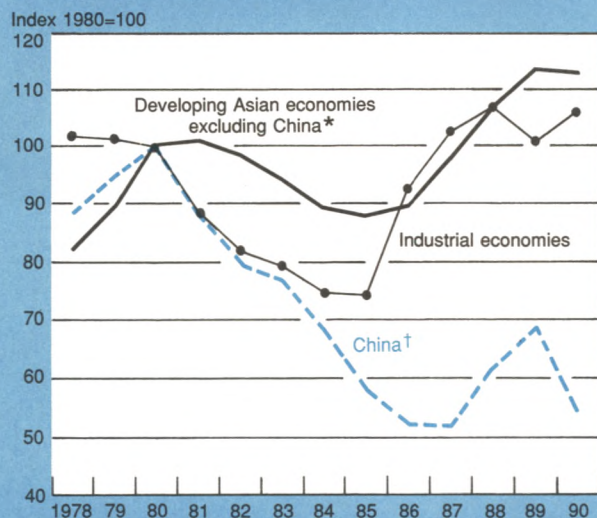
moted in 1984 with the designation of fourteen coastal cities as "open areas" offering foreign firms advantages similar to those in the special economic zones.

Although information on individual sources of investment in the zones and open coastal areas is not available, data on overall trends show a rapid increase in foreign direct investment since the mid-1980s. Between 1979 and 1990 China attracted over \$20 billion of foreign direct investment. The majority of that investment followed the significant liberalization of rules governing foreign investment in 1984 (Chart 4). Foreign investment has accounted for more than 2 percent of total plant and equipment spending in China since 1984, and its importance in domestic capital formation has risen steadily since the early 1980s. In addition, foreign investment has also increased as a share of exports since 1984, exceeding 6 percent of exports in 1990.

The Asian economies accounted for three-quarters of foreign direct investment in China between 1985 and 1990. Of these economies, Hong Kong has been by far the single most important source of foreign investment in China. The flow of investment from Hong Kong into China reflects the large-scale restructuring of Hong Kong's manufacturing sector in the face of rising labor costs. Although Hong Kong firms have invested in factories throughout Asia, China has been the most favored location. Industrial countries have also invested in China, though to a lesser extent. Between 1985 and 1990, investment by the United States, Japan, and the European Community accounted for about one-third of total direct investment in China.

Chart 3

### Real Exchange Rates versus the U.S. Dollar



Note: A rise signifies dollar depreciation.

\* Weighted average using 1985 shares of U.S. imports.

† Computed using China's retail price index and the U.S. wholesale price index.

Table 3

### Labor Cost Comparisons: China and Selected Asian Economies

	Hourly Wage in Manufacturing (U.S. Dollars)		
	1980	1985	1989
China <sup>†</sup>	.26	.20	.22 (0.40 <sup>†</sup> )
Hong Kong <sup>§</sup>	1.53	1.77	2.69
South Korea <sup>§</sup>	.65	.88	2.19
Taiwan <sup>§</sup>	.70	1.17	2.68
Thailand <sup>  </sup>	n.a.	n.a.	0.47
Malaysia <sup>  </sup>	n.a.	n.a.	0.58
United States <sup>§</sup>	5.61	7.27	8.05

Sources: *Statistical Yearbook of China*; U.S. Department of Labor; Hang Seng Bank, *Economic Monthly*, March 1990.

<sup>†</sup> Average industry wages, excluding compensation, converted to U.S. dollars at the official exchange rate.

<sup>§</sup> Hourly wage in firms producing primarily for export.

<sup>§</sup> Hourly wage of production workers in the apparel sector.

<sup>||</sup> Average wage of unskilled workers in manufacturing.

Foreign-owned firms in the special economic zones and the other designated areas are either joint ventures or wholly owned companies. The firms typically engage in manufacturing or assembly operations, which often utilize imported parts and components. Foreign investors are attracted to these areas by the relatively low cost of labor and by the preferential treatment accorded them in the areas of import controls, taxes, foreign

exchange dealings, and profit repatriation.<sup>5</sup>

Data on foreign-owned firms show the importance of foreign investment in the overall expansion of Chinese

<sup>5</sup>At the end of 1990, over 25,000 foreign-owned firms had contracted to invest in operations in China and roughly 12,000 were in operation. These included foreign-owned firms and Chinese firms engaged in the assembly of imported parts and components for export.

### **Box: China's Changing Foreign Trade System**

In 1978 China adopted an "open door" policy toward foreign trade and investment as the first step in an ambitious program of trade reform. Before 1978, Chinese firms were effectively insulated from the world economy. The Chinese government had set required levels of exports and imports in its five-year economic plans. Foreign direct investment was restricted, and only twelve national foreign trade corporations were permitted to have contact with foreign businesses and to carry out the purchase and sale of goods.

Since 1978, these policies have been gradually transformed. The government has been working to expand the role of market forces in trade and investment decisions and, in particular, to expand and improve the efficiency of China's manufactured exports. Although China's foreign trade system is significantly more market-oriented today than in the late 1970s, the transition is by no means complete.

A chronology of the principal reforms since 1978 follows.

#### **1979/1980**

The government enacts the "Law of the People's Republic of China on Joint Ventures Using Chinese and Foreign Investment," which encourages the growth of joint ventures between Chinese firms and foreign partners and establishes four special economic zones offering incentives for firms to locate there and produce goods for export. Over time, the law is interpreted as allowing the establishment of wholly foreign-owned firms.

The government decentralizes the control over exports and imports; the twelve national trade corporations share this authority with provincial and other local-level governmental authorities.

The government introduces a system of import licensing; licenses and tariffs become means of controlling imports. The ease of obtaining a license and the number of goods requiring a license have varied with economic circumstances over time.

#### **1984**

Local area authorities are given expanded power to

export and import, and large private firms are allowed to engage in trade directly. Over 4000 such entities now engage in trade.

Local foreign trade corporations and private firms engaging in exporting are allowed to retain the rights to 25 percent of their foreign exchange earnings. Retention rights are increased beyond the 25 percent level for "key" export industries, exports in excess of planned targets, and provinces in which the special economic zones are located.

Foreign-owned firms are allowed to trade foreign exchange in a newly established foreign currency market.

The Chinese currency is devalued by 40 percent.

Hainan Island is designated as the fifth special economic zone, and similar foreign investment incentives are extended to fourteen coastal cities.

#### **1985/1986**

The authority to export and import extended to various local authorities and enterprises in 1984 is curtailed in the face of balance of payments problems; some central government control over trading is reimposed.

The Chinese currency is devalued by 14 percent.

#### **1988**

The government establishes local foreign exchange swap centers where firms can trade foreign exchange at market prices.

The Chinese currency is devalued by 40 percent, a measure that mitigates the adverse effects of high domestic inflation on competitiveness.

#### **1990**

Incentives for foreign investment in relatively high-tech industries, similar to the incentives in special economic zones, are extended to a municipality of Shanghai.

#### **1991**

The Chinese currency is devalued by 10 percent. All residents of China are permitted to trade in the foreign exchange swap centers.



exports. The firms' first exports, reported in 1985, accounted for only about 1 percent of total Chinese exports in that year (Table 4). By 1990, exports of foreign-owned firms accounted for almost 17 percent of total Chinese exports. Moreover, in 1990 alone, these exports accounted for nearly three-quarters of the growth in China's exports.

The available data on the performance of foreign-owned firms in China cannot track the firms' exports to specific final destinations. But two observations, taken together, suggest that foreign-owned firms have contrib-

uted significantly to the growth of China's exports to the United States. First, foreign investment has been largely concentrated in the manufactured goods sector. Second, virtually all of the growth in China's exports to the United States since 1984 has consisted of manufactured goods. Foreign-owned firms are thus likely to have accounted for a substantial share of the growth of these manufactured exports to the United States.

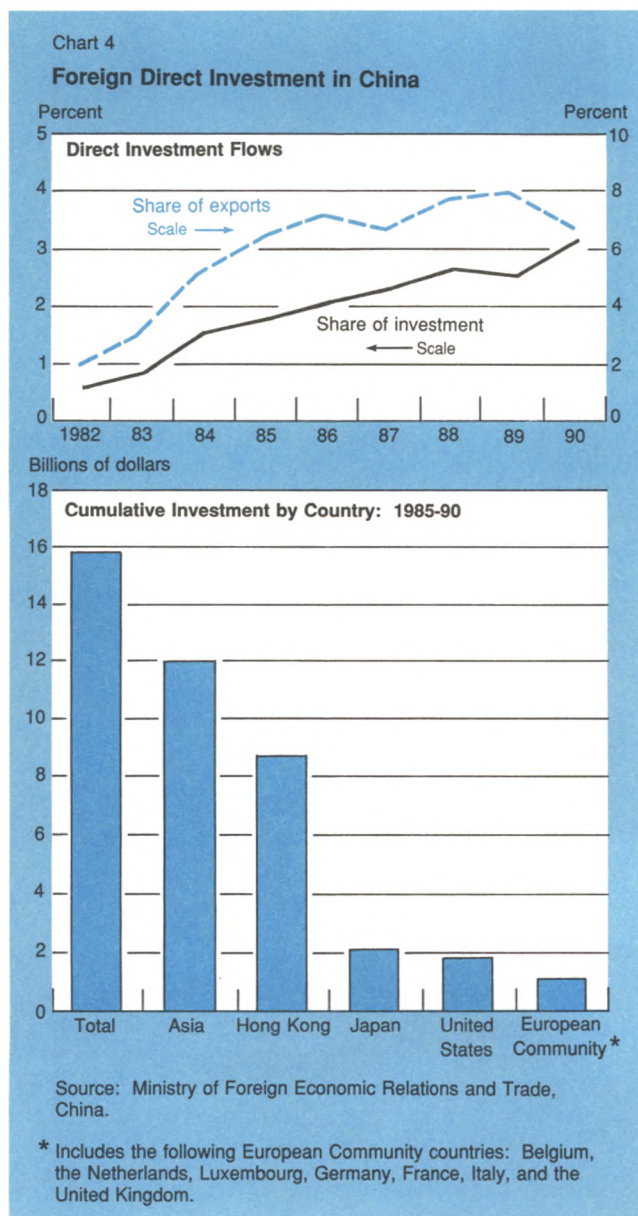
Note, however, that the United States has not been the only destination for China's manufactured exports: in 1990, 30 percent of China's manufactured exports were to the United States, while about 25 percent were to Japan and the European Community. Nevertheless, since 1984, China's manufactured exports to the United States have grown faster than exports to these other industrial countries.<sup>6</sup> The increasing importance of the United States as a destination for China's manufactured exports between 1984 and 1990 further suggests that a significant part of China's export growth to the United States since the mid-1980s has been due to the growth in exports of foreign-owned firms.

### The changing pattern of U.S. trade with Asia

The growth of foreign investment in China and, in particular, the importance of Asian countries as a source of that investment have significantly altered the trade links between the United States and the region. An examination of Asian market shares in U.S. manufactured goods imports indicates that Chinese inroads in U.S. markets for several categories of low-tech consumer goods have often been made at the expense of other countries in Asia.

China's share of U.S. manufactured goods imports has grown substantially over the past decade, reaching 3.8 percent in 1990 (Table 5). Dramatic market share gains have been made in three categories: telecommunications equipment; textiles and apparel; and toys, games, and sporting goods. In each of these areas China's market shares rose by more than 5 percentage points during the 1980s, with the most rapid gains recorded between 1985 and 1990.

The market share of other Asian economies (excluding Japan) in these categories declined over the course of the 1980s. In particular, the large increase in China's market share in textiles and apparel contrasts sharply with the declines recorded by other Asian countries. Note, however, that the overall market share of U.S. manufactured goods imports from other Asian countries increased over the course of the 1980s. This evidence suggests that losses in market share incurred by these



<sup>6</sup>The U.S. share of China's manufactured exports rose from 20 to 30 percent between 1984 and 1990, while the combined shares of Japan and the European Community rose from 20 to about 23 percent.



countries in low-tech goods were offset by gains in other areas.<sup>7</sup>

One country whose U.S. market share in manufactured goods has declined is Hong Kong. Hong Kong's share of U.S. manufactured goods imports fell by a percentage point during the 1980s. Considerably larger declines were observed in each of the categories in which Chinese imports expanded rapidly. Given the importance of Hong Kong as an investor in China, these shifts in market shares are not surprising. As noted earlier, more than one-half of all foreign investment in China since 1985 has been from Hong Kong. Furthermore, roughly 75 percent of that investment has been in the manufacturing sector, primarily in relatively low-wage industries.<sup>8</sup> Within China, Hong Kong investors have tended to establish manufacturing plants in Guangdong province, a location that is linked to Hong

Kong by efficient transportation and communications networks and that contains three of the five special economic zones.<sup>9</sup>

Data on trade links between China, Hong Kong, and the United States suggest how the growth of foreign-owned firms in China has altered trade patterns. Although Hong Kong's share of total imports has fallen, total shipments from Hong Kong to the United States have increased substantially over the course of the 1980s (Table 6). Underlying this increase, however, is the expansion of Hong Kong's re-exports from China.<sup>10</sup> These re-exports, which are measured as Chinese

<sup>7</sup>The gains were recorded mainly in capital goods, especially electronic components and equipment.

<sup>8</sup>Data are not available to determine how much of the investment recorded as coming from Hong Kong is actually from other Asian countries that for a variety of reasons list their Hong Kong subsidiaries as the source of their investment.

<sup>9</sup>Recent trends suggest that Taiwan, and to a lesser extent, South Korea, are rapidly becoming important sources of foreign investment in China as their manufacturing sectors face growing competitive pressure. Reports indicate that Taiwan's investments have been concentrated in Fujian province; over 90 percent of this investment has been in manufacturing industries. The investment includes relocating the production facilities for Taiwan's shoe, umbrella, textiles, and toy industries to China.

<sup>10</sup>Hong Kong's re-exports consist of goods produced in China and shipped through Hong Kong to other destinations. They can include goods produced in both foreign-owned firms in China and Chinese-owned firms.

Table 4

### The Role of Foreign-Owned Enterprises in China's Exports: 1984-90

	Total Merchandise Exports (Billions of Dollars)						
	1984	1985	1986	1987	1988	1989	1990
Total exports	26.1	27.4	30.9	39.4	47.5	52.5	62.1
Exports of foreign-owned enterprises	0	.3	.9	1.3	2.3	3.9	10.5
Foreign-owned enterprises' share of total (in percent)	0	1.1	2.9	3.3	4.8	7.4	16.9

Sources: *China's Customs Statistics*; Hong Kong Bank, *China Briefing*, March 1991.

Table 5

### Shares of U.S. Imports: China and Selected Asian Economies

Product	Share of U.S. Imports (Percent)								
	China			Developing Asian Economies Excluding China			Hong Kong		
	1980	1985	1990	1980	1985	1990	1980	1985	1990
All Manufactures	0.6	1.0	3.8	16.5	18.1	19.2	3.5	3.3	2.5
Telecommunications†	0.0	0.1	5.3	32.8	31.2	31.2	3.9	3.1	2.2
Textiles and apparel	4.5	6.9	13.0	54.7	47.8	41.8	19.9	17.7	13.1
Toys, games, and sporting goods	1.2	3.2	10.6	46.5	45.7	44.5	11.5	9.3	6.1

† Primarily radios, televisions, and telephones.

Table 6

**Trade between China, Hong Kong, and the United States: 1984-90**

Billions of U.S. Dollars

	1984	1988	1990
Hong Kong's shipments to the United States			
Total <sup>†</sup>	9.4	15.6	19.8
Exports	7.8	9.3	8.5
Re-exports from China	1.1	5.5	10.5
Trade of China's licensed processing and assembly firms with Hong Kong			
Imports of parts/components from Hong Kong	n.r.	6.0	7.5
Share of total imports from Hong Kong (percent)	n.r.	50.0	53.2
Exports of assembled goods to Hong Kong <sup>‡</sup>	n.r.	5.9	9.1
Share of total manufactured exports to Hong Kong (percent)	n.r.	32.4	34.2

Sources: *China's Customs Statistics* and *Hong Kong Review of Overseas Trade*.<sup>†</sup> These data are not comparable to U.S. trade data because they treat re-exports differently. Total shipments includes a small amount of re-exports from other countries.<sup>‡</sup> Finished products assembled in licensed processing firms in China using imported parts, components, and materials.

n.r. = not reported.

exports in U.S. trade data, rose from \$1.1 billion in 1984 to \$10.5 billion in 1990. In contrast, direct exports from Hong Kong to the United States have actually declined over the past three years. Shipments of Chinese exports through Hong Kong to the United States now make up almost one-half of the combined exports of Hong Kong and China to the United States.

As investment from Hong Kong spurs China's export trade and encourages the growth in shipments of Chinese goods through Hong Kong, a new pattern of trade is evolving between China, Hong Kong, and the United States. Although precise data on the operations of Hong Kong firms in China are not available, evidence suggests that a sizable number of these firms are engaged in the processing and assembly of goods from parts and components imported from Hong Kong. In fact, the economic reforms that encouraged foreign investment also encouraged firms, both foreign-owned and wholly Chinese firms, to engage in these operations. The one advantage to firms performing these operations in China is the low cost of labor; the actual value added to the good in China may be relatively small.

Data on the activities of these licensed processing firms in China show that the firms play an important role in trade between Hong Kong and China. In 1990, the firms imported parts and components from Hong Kong totaling \$7.5 billion, or more than 50 percent of all of China's imports from Hong Kong. At the same time, China exported over \$9 billion of assembled goods to Hong Kong, a quantity that represents almost 35 percent of its total exports to Hong Kong. Although these

data neither fully describe the activities of Hong Kong firms in China nor indicate the final destination of the goods, they suggest that these firms are increasingly using China as a base for the final processing and assembly of exports.

### Conclusion

The growth of manufactured exports from China to the United States since the mid-1980s reflects both China's effort to improve price competitiveness through exchange rate devaluation and the acquisition of capital and technology through foreign investment. These developments have enabled China to take advantage of its vast supply of inexpensive labor and to increase significantly the ability of its manufacturing sector to compete in world markets. In the latter half of the 1980s, China raised its share of U.S. imports of manufactured goods and became a significant supplier of several categories of relatively low-cost manufactured goods.

The growth of foreign investment in China has shifted the pattern of U.S. imports from the region. In the categories where China has significantly increased its share of U.S. imports—telecommunications; textiles and apparel; and toys, games, and sporting goods—the shares of other Asian economies have declined. Hong Kong, in particular, has seen substantial declines in its shares of U.S. manufactured imports. Shipments of goods from Hong Kong to the United States are increasingly goods produced in China. Nevertheless, the amount of actual value added to the product by firms in China may be relatively limited.

# Treasury and Federal Reserve Foreign Exchange Operations

November 1991-January 1992

The dollar declined through the end of the calendar year, approaching historical lows against both the German mark and the Japanese yen as sentiment toward the prospects for U.S. economic recovery turned increasingly negative and large short-dollar positions were built up. Early in the new year, however, the dollar recovered somewhat as expectations about the economy tended to stabilize and short positions were significantly reduced. The dollar's decline was consequently pared back at the end of the period to a net  $3\frac{1}{2}$  percent against the mark and 4 percent against the yen. On a trade-weighted basis, the dollar declined  $2\frac{3}{4}$  percent, on balance, over the period.<sup>1</sup> On January 17, the U.S. authorities sold \$50 million against yen in their only intervention operation of the period.

## November and December

As the period opened, skepticism was deepening about the prospects for a U.S. economic recovery. During the fall, it had become increasingly apparent that the tentative pickup in consumer spending following the Persian Gulf War had served merely to work off inventories and would not lead to a sustained pattern of growth. Then, just prior to the period, any remaining hopes of recovery suffered a severe blow when the Conference Board's

index of consumer confidence took an unexpected plunge. Thus, by early November, market participants were beginning to question what mechanism might still be able to spark recovery, noting that up to that point monetary policy had been about the only instrument available to support the economy.

Under these circumstances, the November 6 announcement that the Federal Reserve had cut its discount rate  $\frac{1}{2}$  percentage point to  $4\frac{1}{2}$  percent was widely anticipated. But market observers noted that the Federal Reserve had now cut the discount rate five times in eleven months, producing a cumulative drop of  $2\frac{1}{2}$  percentage points, and they were beginning to doubt whether monetary policy could do much more to facilitate recovery. At the same time, they were sensitive to the political pressures generated by disappointment about the economy and concerned about what alternative measures might be proposed. Operators in the exchange markets, who were mindful that interest rate differentials were already widely unfavorable to the dollar, especially in relation to the German mark, felt a strong incentive to sell the dollar short.

The dollar declined as events in November and early December tended to confirm pessimism about U.S. economic prospects. In mid-November, when financial markets grew nervous about a congressional proposal to spur consumer spending by capping credit card interest rates, a sharp drop in U.S. equity prices dragged the dollar down for a few days. In late November and early December, release of data showing a further drop in consumer confidence and a much sharper than expected drop in payroll employment prompted another sell-off. Meanwhile, statistics for consumer price infla-

A report presented by William J. McDonough, 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. Robert Ennis was primarily responsible for preparation of the report.

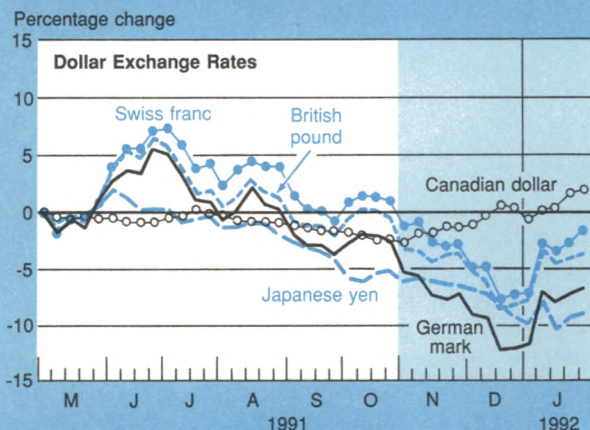
<sup>1</sup>The trade-weighted value of the dollar is measured by the Federal Reserve Board staff's index.



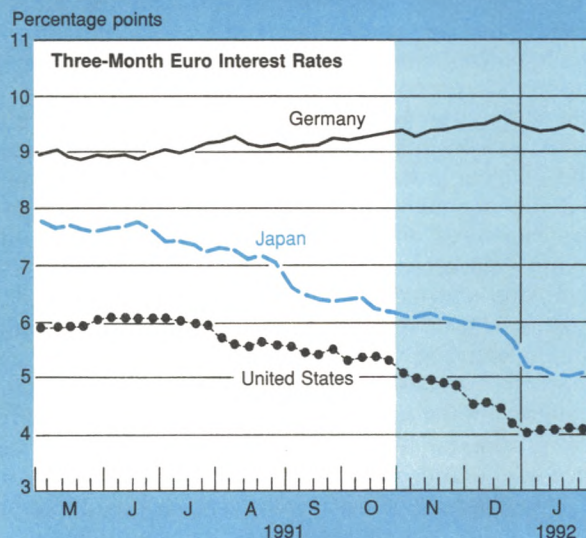
tion suggested to financial markets that the Federal Reserve had further leeway to ease monetary policy. In addition, speculation mounted that an excessively expansionist fiscal package might be forthcoming.

Chart 1

**During the first two months of the period, the dollar declined steadily amid evidence of weakness in the U.S. economy. After the new year, the dollar reversed course as market participants bought dollars to cover short positions.**



**During November and December, German interest rates firmed while U.S. and Japanese interest rates declined.**



Notes: The top panel shows the percentage change of weekly average rates for the dollar against designated currencies from May 3, 1991. The bottom panel shows weekly average U.S., German, and Japanese three-month Euromarket interest rates from May 3, 1991.

The dollar declined more against the German mark during this period than against other currencies. This was in part because interest rates in Germany were at, and were expected to stay near, historically high levels. The German economy was still going through the transition associated with unification. Although the full force of the unity-related boom had dissipated earlier in the year, credit demands were still significant enough to keep monetary aggregate growth stronger than desired, and inflationary pressures were being kept alive by high wage demands. Accordingly, market participants believed that the German Bundesbank would seek to maintain a tight monetary policy stance. They interpreted the Bundesbank's money market operations as clear evidence of its intention to resist domestic and international pressures to ease. They saw this policy stance as implying that the large interest rate differentials against the dollar would be maintained for the foreseeable future. Market participants also suspected that there might be tension between the monetary policy objectives of Germany and those of other European countries where economic activity was generally decelerating more rapidly. And they were wary of the possibility that these tensions might be reflected sooner or later in pressures within the exchange rate relationships of the European Monetary System (EMS), pressures that might spill over into the exchange markets more broadly—especially because final negotiations over eventual monetary union in Europe were scheduled for early December in Maastricht, the Netherlands.

In this environment, two announcements by the Finnish authorities in mid-November, first, that the Finnish markka would float and, later, that it would be effectively devalued by about 12 percent, heightened the sense of exchange rate risk and boosted the German mark. This episode served as a reminder that market pressures could at times force unwanted changes in exchange rate policy. In response, market participants rushed to reduce their holdings of assets denominated in those European currencies that had previously appeared attractive because of their high yields but that no longer carried a yield sufficient to compensate for their perceived exchange risk. The Swedish krona, for example, came under significant pressure, forcing the Swedish Riksbank to raise its marginal lending rate by a total of 7 percentage points by early December.

As market participants sought to shift funds from higher yielding currencies into the mark, the Exchange Rate Mechanism (ERM) of the EMS became strained. Market participants questioned whether an ERM realignment at the upcoming Maastricht summit could be avoided, raising further uncertainty about the effects such developments might have on the dollar. Support

for the mark was partly offset, from time to time, by concerns about the rapidly moving political situation in the Soviet Union and its possible negative effects on European countries, including Germany.

In the event, the Maastricht summit proceeded without incident and tensions among European currencies abated somewhat by mid-December. But the growing disparity in economic conditions between the United States and Germany persisted. As wage negotiations in Germany became more tense, the Bundesbank moved to increase interest rates both sooner and by a larger amount than the market had expected, announcing  $\frac{1}{2}$  percentage point rises for both its discount and Lombard rates on December 19. To avoid renewed exchange rate pressures, all other EMS central banks except the Bank of England followed this interest rate move, at least in part, over the next several days. By contrast, on December 20, the Federal Reserve reduced its discount rate by more than had been expected. The 1 percentage point cut brought the discount rate to  $3\frac{1}{2}$  percent, its lowest level since 1964. The Federal Reserve also appeared to signal that it had relaxed reserve pressures to an extent consistent with about a  $\frac{1}{2}$  percentage point decline in the federal funds rate.

As the foreign exchange market responded to these divergent moves in interest rates, the dollar continued its decline against the German mark. After moving irregularly lower in November and early December, the dollar moved down a further  $3\frac{1}{2}$  percent after December 19, hitting its low of the period of DM 1.5025 on December 27. At this level, the dollar had depreciated 10 percent from DM 1.6713 at the period's start and  $18\frac{1}{2}$  percent from its 1991 high.

The dollar's decline against the yen during November and December was more tempered than its decline against the mark. Evidence was accumulating that the pace of expansion in Japan was clearly decelerating. Japan's monetary growth was slowing, business confidence and investment intentions were weakening, and flagging domestic demand was being reflected in a widening of Japan's trade surplus. Market participants had therefore come to expect that the Japanese monetary authorities, who had eased official interest rates the previous July, would continue moving to a somewhat more accommodative monetary policy stance, so that U.S.-Japanese interest differentials would remain relatively stable. Indeed, official Japanese interest rates declined during these two months. The Bank of Japan trimmed its official discount rate once in mid-November and again at the end of December. At the same time, persistent weakness in Japan's equity market and political uncertainty caused by recent scandals also weighed on the yen at a time when the dollar was declining generally.

As a result, the dollar eased only moderately against the yen during November. Although the pace of decline quickened during December, the dollar rebounded at the end of the year to close December at ¥124.80, down on balance  $4\frac{3}{4}$  percent from ¥130.75 at the beginning of the period.

### January

By early January, the dissolution of the Soviet Union was introducing a new level of uncertainty, especially regarding the outlook for Europe. Although recurring rumors about the Soviet Union's financial condition had been a concern during the earlier months, market participants were now faced with the prospects of greater disarray stemming from changing political structures and moves to liberalize prices in January. Accordingly, the German mark was increasingly susceptible to selling pressures whenever new financial or political difficulties in the former Soviet Union became evident.

Meanwhile, market participants' assessment of the German mark and the German economy weakened considerably after the new year. Press commentary at that time increasingly focused on the sustained slowdown in Germany's expansion. Not only was the pace of domestic demand moderating, but export orders were also sagging under the weight of slowing economies in other industrialized countries. Market participants did not believe that this evidence would lead to any near-term moderation of the Bundesbank's tight monetary policies; indeed, the Bundesbank appeared still to be concerned about wage inflation and credit demands. But the evidence did suggest that the scope for further policy tightening was more limited and the prospects for growth in the coming year more clouded than previously perceived. Under these circumstances, market participants began to question whether interest differentials so unfavorable to the dollar would continue to widen.

Moreover, the financial markets appeared to react positively to the Federal Reserve's policy move of mid-December. The capital markets in the United States had responded favorably, with long-term interest rates easing and the stock market showing sustained strength. Also, the move appeared to have broken the pattern of market expectations concerning U.S. interest rates. Market participants were less certain that a weaker than expected U.S. economic statistic would immediately trigger another monetary policy action, and they were more likely than before to attribute weakness in the data to temporary factors. Moreover, they became mindful once again of the possibility that some statistics might show greater than expected strength.

The dollar's decline against the European currencies therefore lost momentum early in January. Market participants were aware that the dollar had been under



virtually continuous selling pressure for almost six months. Many investors as well as foreign exchange market operators had portfolios that were heavily weighted in assets denominated in European currencies. The developments of November and December had led to an even greater concentration in these portfolios of assets denominated in German marks. Under the circumstances, there was a perception of a large risk of loss if market sentiment should switch in favor of

the dollar and a perception of diminishing chance of gain if sentiment should remain negative to the dollar.

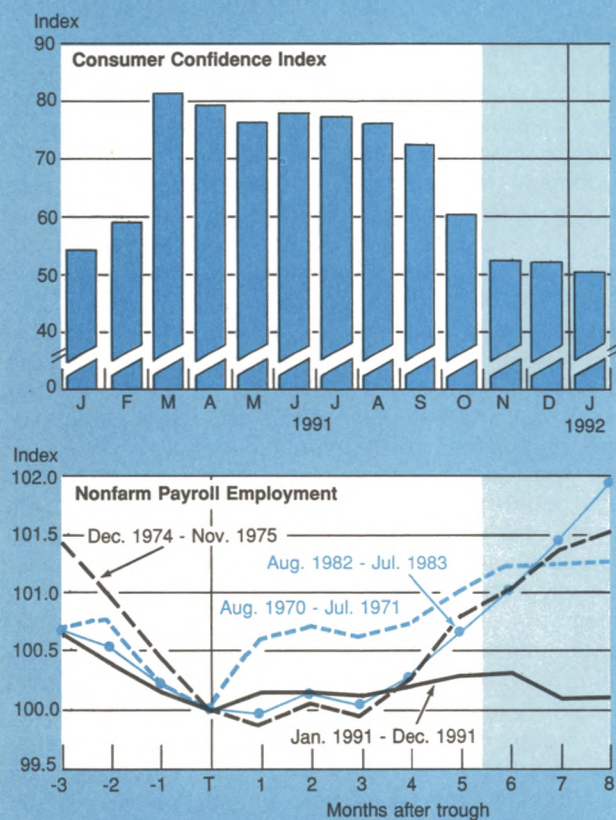
For a short while, however, the focus of market attention was the Japanese yen, a currency against which the dollar continued to decline in early January. Talk had already begun to circulate before the turn of the year that the United States and Japan would agree on some official action to support yen appreciation. Commentary about President Bush's trip to Japan to meet with Prime Minister Miyazawa suggested that the deteriorating condition of the U.S. economy would prompt the President to seek ways to reduce the U.S. trade deficit. There was also speculation that the Japanese government was looking for ways to counter weakness in Japan's stock market. In this context, an upward move in the yen's exchange rate was thought to be acceptable to both governments.

In response to these expectations, the dollar received only a temporary boost from the year-end cut in the Bank of Japan's discount rate. During the first five business days of January, the dollar resumed its downward trend against the yen, declining 1½ percent to a low of ¥122.80 on January 7, the day President Bush arrived in Tokyo. At this level, the dollar was down 6 percent from the start of the period and 13½ percent from its 1991 high.

Thereafter, expectations of official action to support the Japanese yen gradually faded. Market participants became less convinced during President Bush's stay in

Chart 2

**Data released early in the period reinforced the negative outlook for U.S. economic recovery. Consumer confidence fell for a second consecutive month in November. Employment remained depressed, failing to show the rebound typical of previous recoveries.**



Notes: The top panel shows the Conference Board's consumer confidence index; the shaded portion highlights data released during the period. The bottom panel shows nonfarm payroll employment data during each of the past four recessionary periods. The data are indexed with the trough month set at 100. Data for months six, seven, and eight of the current period were released on November 1 and December 6, 1991, and January 10, 1992, respectively.

Table 1

### Federal Reserve Reciprocal Currency Agreements

In Millions of Dollars

Institution	Amount of Facility January 31, 1992
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
<b>Total</b>	<b>30,100</b>



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, 1991	November	December	January	Outstanding as of January 31, 1992
National Bank of Panama	143.0 <sup>†</sup>	—	—	—	+ 143.0	143.0

Note: Data are on a value-date basis. Components may not add to totals because of rounding.

<sup>†</sup>Represents a bilateral credit facility with the National Bank of Panama that was established on January 28.

Japan that the two countries would take immediate steps to strengthen the yen against the dollar. In keeping with these diminished expectations, the President and the Prime Minister agreed “that recent exchange rate movements were consistent with current economic developments.” Nonetheless, market participants continued to focus on the possibility that a more generalized Group of Seven (G-7) policy towards the yen might be considered at an upcoming G-7 meeting on January 25. This possibility seemed credible to market participants because the yen had lagged behind rising European currencies during previous months and because this gap appeared to be generating economic and political concerns in a number of countries other than the United States. But in time, even this proposition lost standing in the marketplace.

When the G-7 meeting occurred in New York, the finance ministers and central bank governors issued a communiqué in which they agreed to intensify their cooperative efforts to strengthen world economic growth. With reference to exchange markets, the G-7 “agreed to continue to monitor market developments and reaffirmed their commitment to cooperate closely in exchange markets, thus contributing to favorable conditions for stable exchange markets and economic recovery.” Market participants, however, were somewhat disappointed by the absence of any specific mention of the yen exchange rate.

As expectations of a yen appreciation subsided, market participants began to worry that there was an overhang of short-dollar positions against the yen as well as against the European currencies. Concerns about the technical position of the market came to the surface when the dollar did not fall off sharply on news that President Bush had become ill and had had to leave a state dinner during his Tokyo trip. The dollar's unusual lack of sensitivity to potentially disturbing news about

Table 3

### Net Profits (+) or Losses (–) on United States Treasury and Federal Reserve Foreign Exchange Operations

In Millions of Dollars

	Federal Reserve	U.S. Treasury Exchange Stabilization Fund
Valuation profits and losses on outstanding assets and liabilities as of October 31, 1991	+ 2,764.8	+ 1,132.6
Realized November 1, 1991-January 31, 1992	+ 75.0	+ 3.9
Valuation profits and losses on outstanding assets and liabilities as of January 31, 1992	+ 3,615.2	+ 1,941.6

Note: Data are on a value-date basis.

an American president's health was interpreted as indicating how unwilling market professionals were to extend their short-dollar positions further and how great the risks were that the dollar might rise abruptly if a general effort to cover some of these short-dollar positions were to develop.

Under these circumstances, the dollar drifted higher and staged an uneven recovery during most of January. In some instances, particular events triggered dollar buying: the announcement in January of a stronger than expected report for U.S. employment, testimony by Chairman Greenspan that further dampened expectations of an early easing of Federal Reserve monetary policy, and rumors out of the former Soviet Union of violence and political upheaval. In other instances, however, the dollar's rise was precipitated by the bidding of market professionals and their customers that reflected pent-up demand from previous months.

These pressures were particularly intense around mid-month. The dollar rose sharply to trade at levels that had not been expected just weeks before and that therefore threatened to unleash yet further rounds of bidding as market participants continued to cover their short positions. Under these circumstances, the U.S. monetary authorities entered the market on January 17, in an operation coordinated with the Japanese monetary authorities, selling \$50 million against yen. The intervention sale was shared equally by the Federal Reserve and the Treasury's Exchange Stabilization Fund (ESF). After this operation, the dollar declined sharply. While subsequently finding support, it remained below the highs of DM 1.6355 and ¥129.37 reached on January 15. The dollar closed the period at DM 1.6125 and ¥125.75, down on balance over the three months by nearly 4 percent against the two currencies. At these levels, the dollar was about 12 percent below its 1991 highs against both the mark and the yen.

\* \* \* \*

In other operations, a total of \$1,301 million in off-market spot and forward foreign currency sales, executed by the U.S. monetary authorities with foreign monetary authorities, settled during the period.

- The two remaining forward purchases of \$551.1 million and \$549.9 million against marks settled on November 27 and December 27, respectively, completing the \$5,548.5 million of spot and forward dollar purchases from the Bundesbank. As previously reported, the operation was initiated in June 1991 to adjust the foreign currency reserves of the Federal Reserve and the ESF. For each transaction, 60 percent was executed for the account of the Federal Reserve and 40 percent for the ESF account.

- On November 22, the Federal Reserve agreed to purchase \$200 million against German marks from a foreign monetary authority.

The ESF continued to purchase SDRs against marks in transactions by agreement with the International Monetary Fund (IMF). During the period, a total of \$341.7 million equivalent of such SDR purchases settled, of which \$41 million equivalent was transacted in the previous report period. The ESF also purchased a total of \$443.4 million against sales of SDRs in transactions by agreement with foreign monetary authorities needing SDRs to pay IMF charges or for repurchases. An additional \$50.6 million, which was transacted in October, settled in the period.

The Treasury agreed to participate in a special financing facility for the first time since March 1991. On January 28, the Treasury, through the ESF, established a \$143 million bilateral credit facility to assist Panama in repaying its arrears to international creditors. Panama drew the full amount on January 31. The facility is scheduled to expire on March 20, 1992.

During the November–January period, the Federal Reserve and the ESF realized profits of \$75 million and \$3.9 million, respectively, from the sales of foreign currencies. As of the end of January, cumulative bookkeeping or valuation gains on outstanding foreign currency balances were \$3,615.2 million for the Federal Reserve and \$1,941.6 million for the ESF. 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, the Federal Reserve holdings in these securities amounted to \$8,938.8 million equivalent and the Treasury holdings amounted to \$9,203.5 million equivalent, valued at end-of-period exchange rates.

# Treasury and Federal Reserve Foreign Exchange Operations

August-October 1991

The dollar, having already come down from its post-Gulf war highs before the beginning of August, moved irregularly and moderately lower during the August-October period under review. This development occurred as the recovery of the U.S. economy appeared both slower to emerge and less vigorous than had been anticipated in earlier months. The dollar eased during the three-month period by over 4 percent against the mark, close to 5 percent against the yen, and about 3¾ percent on a trade-weighted basis.<sup>1</sup> The U.S. monetary authorities did not intervene in the foreign exchange markets during the period.

## August

As the period opened, the dollar was generally trading with a negative bias, weighed down by widening interest rate differentials adverse to the dollar. Previously, market participants had expected that the United States would emerge quickly out of recession at a time when some other economies might be slowing, and that the large interest rate differentials providing a disincentive to investment in dollar-denominated assets would thereby be eliminated. But U.S. data released around the beginning of August caused a reappraisal of this view, raising questions about the vigor of the U.S. economy and renewing talk of further declines in U.S. interest rates. At the same time, the Japanese authori-

ties were trying to dampen expectations that a reduction of the Bank of Japan's official discount rate in early July would quickly be followed by another such move. In Germany, new data revealing rising inflation encouraged expectations that the Bundesbank would raise official interest rates to contain inflationary pressures before the start of important labor negotiations for the coming year.

Against this background, the dollar showed some vulnerability to selling pressure in early August, particularly against the mark. Publication of a weak July non-farm payroll employment report, following a succession of other worse than expected U.S. statistics, prompted a 2 percent drop in the dollar from its high of DM 1.7675 on August 2. Evidence that the Federal Reserve had eased the federal funds rate 25 basis points on August 6 triggered a new round of selling of the dollar against the mark that took the exchange rate briefly below DM 1.70 on August 8. But around mid-August when the Bundesbank announced that it was raising its official Lombard rate by less than the market had expected, the dollar almost completely reversed its decline of the previous weeks. Against the yen, the dollar followed a similar pattern, easing from a high of ¥138 on August 2 to almost ¥135 about a week later before retracing some of this decline. But these movements were somewhat more subdued since revelations surrounding scandals in Japan's financial markets were weighing on the Japanese currency.

News early Monday, August 19, that Soviet President Gorbachev had been removed from office sparked a sudden scramble for dollars. The prospect that the Soviet leader would be replaced by a reactionary gov-

A report presented by Margaret L. Greene, Senior Vice President of Foreign Exchange at the Federal Reserve Bank of New York. Roger M. Scher was primarily responsible for preparation of the report.

<sup>1</sup>The trade-weighted value of the dollar is measured by the Federal Reserve Board staff's index.



ernment seeking to roll back the reforms that permitted liberalization in eastern Europe and the unification of Germany inflamed the markets' deepest anxieties about the outlook for Europe in general, and Germany in particular. Market participants, seeking currency safe havens, moved funds out of marks and into other currencies, including the U.S. and Canadian dollars and the Swiss franc—currencies thought to be geographically insulated from whatever potential political disruption and social unrest might ensue. In a matter of hours, the dollar rose 7 pfennigs, or about 4 percent, to touch DM 1.8350 amid fears that the coup attempt would lead immediately to widespread violence. By the time New York trading began that day, the dollar had come well off its highs after reports circulated that a number of central banks had been intervening and as the likelihood of violence in the Soviet Union appeared to diminish. In these circumstances, no intervention was undertaken by the U.S. authorities. By Wednesday, August 21, reports circulated that the putsch had failed and that Gorbachev would return to office. Market participants were impressed by the strength of public support for a more democratic government in the Soviet Union and at the same time surmised that the threat to continued liberalization might induce western nations to offer substantial assistance to eastern Europe. Thus, the outlook for Germany and the mark appeared somewhat improved on balance. In response, the dollar quickly fell back below its pre-coup levels. By the end of August, the dollar was trading near levels that prevailed at the beginning of the month, closing at DM 1.7465 and ¥136.80.

The very sharp swings in exchange rates that occurred around the time of the events in the Soviet Union, following the volatility that had been evident beforehand, had an unnerving effect on many market participants. There were numerous reports that substantial losses arising from the Soviet episode had induced many market participants subsequently to reduce their position-taking activities. The dollar's sharp rise also served as a reminder of the risk of holding short-dollar positions.

The movement of the dollar against the yen, though broadly in the same direction, had been less sharp because the developments in the Soviet Union were perceived to have a less immediate impact on Japan than on Germany. As a result, market participants became persuaded of the merits of using the Japanese yen as a vehicle for taking positions either in favor of or against the German mark since the yen might not entail as much price risk as the dollar.

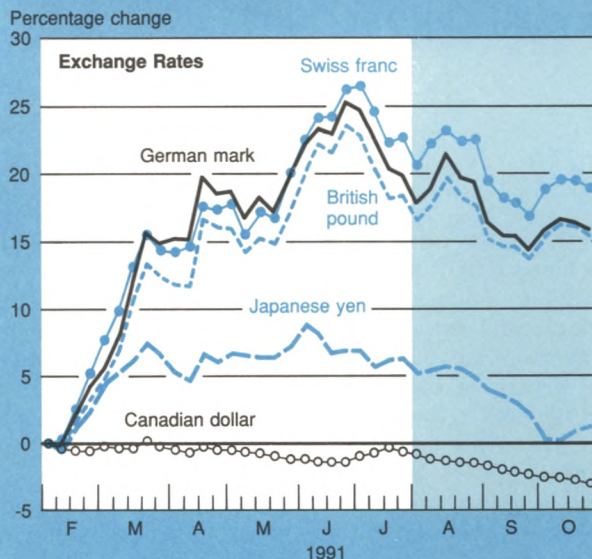
### Early September

In early September, the release of a new round of

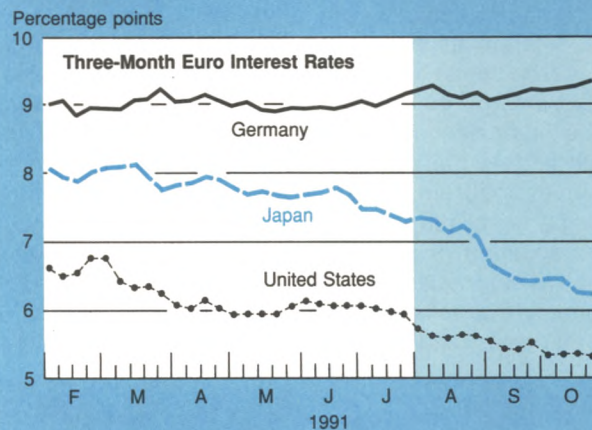
monthly U.S. data reinforced doubts about the strength of the U.S. recovery and, in a context of renewed calls by U.S. officials for lower U.S. interest rates, revived the negative market sentiment toward the dollar. A steep downward revision in U.S. nonfarm payroll data was reported on September 6, following a downward revi-

Chart 1

**The dollar declined moderately and irregularly during the period as doubts arose over the vigor of the U.S. economic recovery.**



**During the August-October period German interest rates firmed while U.S. and Japanese interest rates declined.**



Notes: The top panel shows the percentage change of weekly average rates for the dollar from February 6, 1991. The bottom panel shows weekly average U.S., German, and Japanese three-month Euromarket interest rates from February 6, 1991.



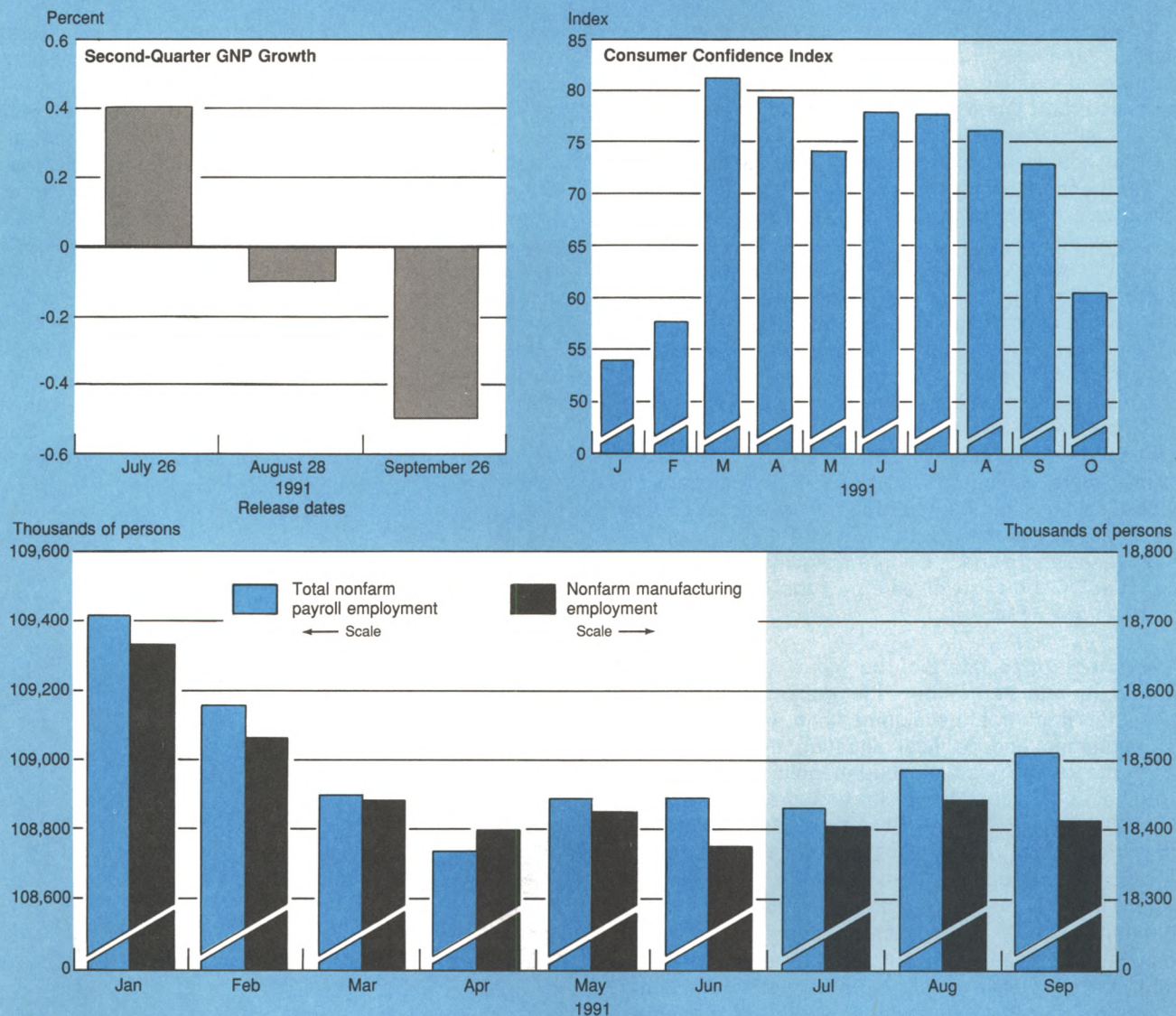
sion in late August of U.S. second-quarter GNP growth. The following week, the Bureau of Labor Statistics released price data that appeared to suggest that the risks of reigniting inflation were low. These data, along with reports of anemic growth in monetary aggregates,

further intensified expectations that more aggressive easing by the Federal Reserve lay ahead. On September 13, the Federal Reserve announced a 50 basis point cut in the discount rate to 5 percent.

At the same time, developments in Germany and

Chart 2

**Data released during the period reinforced perceptions that the U.S. economic recovery was failing to live up to expectations.**



Notes: The top left panel shows the seasonally adjusted annual rate of growth in U.S. second-quarter real GNP. The advance, preliminary, and final releases of the GNP data occurred on July 26, August 28, and September 26, respectively. The top right panel shows the Conference Board's consumer confidence index. The shaded portion in the bottom panel represents payroll reports released during the August-October period and revised on November 1, 1991.

Japan served to improve sentiment for the currencies of those countries. Market participants felt that because the Bundesbank's official interest rate hike in August was at the lower end of the range of expectations, another tightening of German monetary policy could not be ruled out. The contrast in monetary policy orientation in the United States and Germany weighed on the dollar relative to the mark. With respect to the yen, the prospects for interest rates were not so divergent from those in the United States. Indeed, the Japanese authorities were seen as exerting downward pressure on Japanese short-term interest rates to shore up confidence in Japanese financial markets and to respond to evidence suggesting that the Japanese economy was losing steam. At times there was even talk in the market that the authorities in Japan and the United States might act jointly to lower interest rates. Nevertheless, the yen tended to firm relative to the dollar as the outflow of portfolio capital from Japan appeared to be slowing. Many market participants believed that Japanese firms were anxious to improve the yen liquidity of their balance sheets, particularly ahead of the fiscal half-year reporting date at the end of September. It appeared as well that domestic and foreign investors were becoming more confident that the time had come to take advantage of attractive buying opportunities in the Japanese stock market.

Under these circumstances, market participants became more willing to sell dollars, and those who needed to buy felt content to postpone their dollar purchases. During the first two weeks of September, the dollar eased more than 3 percent against the mark to just under DM 1.69 as well as 2 percent against the yen to just under ¥134.

### Mid-September to late October

Starting in mid-September, the dollar drew support against the mark from developments in eastern Europe. The economic and political situation there appeared vulnerable to the kind of sudden political or military crisis that could cause the dollar to appreciate substantially, as it had during the Soviet putsch. The military and social disintegration taking place in Yugoslavia was both a disturbing development in itself and an example of the risks facing countries trying to make the adjustment to democratic governance and market economies. Moreover, talk began to circulate that the Soviet Union might not be able to remain current in its international obligations, and these financial pressures were seen as posing severe strains on the Soviet economy ahead of the difficult winter season.

In early October, economic factors also came to lend more support to the dollar. Unexpectedly positive data on U.S. employment and new home sales led market

participants temporarily to question their negative view of U.S. economic prospects. Furthermore, proposals then circulating in the U.S. administration and Congress to encourage bank lending and to cut taxes led market participants to consider that instruments other than monetary policy might be employed in efforts to spur the economy. As a result, earlier expectations that U.S. interest rates would continue to decline until economic activity picked up more decisively in the United States diminished.

This change in expectations roughly coincided with a revision of expectations concerning German interest rates. Market participants were becoming increasingly impressed with evidence of decelerating economic activity in many of Germany's neighbors. They were also aware of the intensifying pace of negotiations within the European Community over European monetary union. As time passed and the Bundesbank did not move to raise interest rates again in September, many market participants began to consider the possibility that a combination of domestic and international considerations might make another increase in official German rates unlikely.

Under these circumstances, the pace of the dollar's decline against the mark slowed during the second half of September, even as the exchange rate eased to its low for the period under review of DM 1.6577 on September 30. Then in October, the dollar actually firmed a

Table 1

### Federal Reserve Reciprocal Currency Arrangements

In Millions of Dollars

Institution	Amount of Facility October 31, 1991
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
<b>Total</b>	<b>30,100</b>



little against the mark and subsequently fluctuated without clear direction, trading as high as DM 1.7218 on October 28.

Against the yen, by contrast, the dollar showed a more pronounced tendency to weaken, especially in early October. As market participants considered the implications of a deflation of Japan's asset-price bubble and consumer boom, the prospect loomed that Japan might once again develop a troublesome current account surplus. In fact, Japan's surplus with Europe had grown, attracting political attention in at least some European countries. With the approach of the G-7 meetings in mid-October, talk developed that the major industrialized nations would agree to seek an appreciation of the yen as a means of containing Japan's growing surpluses with Europe and the United States. Statements by Japanese government officials suggesting that the yen might appreciate, in addition to a meeting between U.S. Treasury Secretary Brady and Japanese Finance Minister Hashimoto before the G-7 talks, encouraged these expectations. When the G-7 communiqué of October 12 was interpreted as suggesting that the yen's recent appreciation had been appropriate, the yen advanced further against the dollar, reaching an eight-month high close to ¥128.50. But thereafter market participants focused anew on the prospects for a cut in Japan's official discount rate. Expectations of continued easing of Japanese monetary policy were reinforced in late October by several factors, including data releases showing both a further slowing of growth in Japan's money supply and a moderation of inflation, official comments promoting lower interest rates, and the accession to the prime minister's office of former Finance Minister Miyazawa—who was viewed as supporting an easier monetary policy. As a

result, outflows of portfolio capital resumed, the yen gave up some of its gains, and the dollar was again trading as high as ¥132.50 on October 28.

### Last days of October

During the last days of October, sentiment toward the dollar turned decidedly negative, and the dollar eased across the board. Market participants began to forecast an even feebler U.S. recovery than had been anticipated and to expect further easing of U.S. interest rates. A much worse than expected U.S. consumer confidence report, coupled with what were viewed as pessimistic comments about the economy by Federal Reserve Chairman Greenspan, revived expectations that the Federal Reserve would move soon to ease monetary policy. Meanwhile, in Germany, a combination of rising money supply growth, double-digit wage demands, and reports from the Bundesbank and German economic institutes warning of inflationary pressures appeared to market participants to give the Bundesbank reason to tighten monetary policy if it so desired.

Therefore, at the close of the period, market attention was again focused on the contrasting demands on monetary policy in the major countries. With the existing interest rate differentials also remaining adverse to the dollar, the U.S. currency moved lower. The dollar's decline against the yen was somewhat constrained in light of clear evidence that Japanese monetary policy was also on an easing trend. Yet, the dollar closed the August-October period at DM 1.6713 and ¥130.75, so that the decline that had started in midsummer continued well into fall. At these closing levels, the dollar was 9 percent below its high against the mark reached in July but still 16 percent above the all-time low reached in mid-February during the Gulf war. Against the yen, the dollar had come down more than 8 percent from its high in June to trade only 3 percent above its mid-February lows.

The U.S. monetary authorities did not intervene during the period. However, the settlement of a large portion of the U.S. monetary authorities' forward dollar purchases against foreign currencies—which, as previously reported, were initiated in June and July to adjust the foreign currency reserves of the Federal Reserve and Exchange Stabilization Fund (ESF)—took place during the period.

- Three of the forward transactions, entered into with the Bundesbank on June 25, settled during the period: \$554.9 million on August 27, \$553.6 million on September 27, and \$552.3 million on October 28. For each transaction, 60 percent was executed for the account of the Federal Reserve and 40 percent for the account of the ESF. Of the original \$5,548.5

Table 2  
**Net Profits (+) or Losses (–) on  
United States Treasury and Federal Reserve  
Foreign Exchange Operations**  
In Millions of Dollars

	Federal Reserve	U.S. Exchange Treasury Stabilization Fund
Valuation profits and losses on outstanding assets and liabilities as of July 31, 1991	+ 1,919.9	+ 321.4
Realized August 1, 1991-October 31, 1991	+ 105.1	+ 9.4
Valuation profits and losses on outstanding assets and liabilities as of October 31, 1991	+ 2,764.8	+ 1,132.6

Note: Data are on a value-date basis.

million of forward dollars purchased at that time, a remaining \$1,101 million will be settled by the end of the calendar year.

- The two remaining forward transactions of \$1,000 million each against another foreign currency settled, one on August 19 and the other on September 18. The dollars purchased were split evenly between the Federal Reserve and the ESF.

In other operations, the ESF continued to execute transactions as agreed with the International Monetary Fund (IMF) to facilitate transactions in Special Drawing Rights (SDRs). During the period, it sold German marks against SDRs equivalent to \$227.4 million, of which \$186.4 million was settled during the period. The ESF also purchased a total of \$324.1 million against sales of SDRs with foreign monetary authorities in need of SDRs for payment of IMF charges or for repurchases, of which \$273.6 million was settled during the period.

As previously reported, the ESF repurchased a total of \$2,500 million of foreign currency warehoused by the Federal Reserve in August. These repurchases reduced the amount of ESF foreign currency balances warehoused with the Federal Reserve from \$4,500 million equivalent to \$2,000 million equivalent.

During the August-October period, the Federal Reserve realized profits of \$105.1 million and the Treasury realized profits of \$9.4 million from the currency exchanges described above conducted directly with foreign monetary authorities. Cumulative bookkeeping or valuation gains on outstanding foreign currency balances at the end of October were \$2,764.8 million for the Federal Reserve and \$1,132.6 million for the ESF (the latter figure includes valuation gains on warehoused funds). These valuation gains represent the increase in the dollar value of outstanding currency assets valued at end-of-period exchange rates, compared with 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 October, holdings of such securities by the Federal Reserve amounted to \$7,583.4 million equivalent, and holdings by the Treasury amounted to \$8,684.9 million equivalent, both valued at the end-of-period exchange rates.

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