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# R E V I E W

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3 Payments System Risk: What Is It  
and What Will Happen If We Try  
To Reduce It?

---

18 Federal Budget Trends and the  
1981 Reagan Economic Plan

---

32 An Introduction to Non-Tariff  
Barriers to Trade

---

47 Can a Central Bank Influence Its  
Currency's Real Value?  
The Swiss Case

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## **In This Issue . . .**

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Both commercial banks and the Federal Reserve assume risk by participating in the payments system. In recent years, the Federal Reserve has taken actions to limit such risk, and further actions are under consideration. In the first article in this *Review*, "Payments System Risk: What Is It and What Will Happen If We Try to Reduce It?" R. Alton Gilbert uses simple balance sheet entries to describe how payments affect risk. He also examines the likely effects of possible actions to reduce payments system risk. Among the actions considered are charging fees on the daylight overdrafts of banks' reserve accounts at Federal Reserve banks and requiring banks that overdraw their reserve accounts to hold additional reserve balances. The illustrations also consider the operation of CHIPS—the private system for electronic payments—under a procedure that ensures the execution of payments messages processed by that system.

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In the second article in this *Review*, "Federal Budget Trends and the 1981 Reagan Economic Plan," Keith M. Carlson assesses the success and failure of federal budget policy during the eight-year Reagan administration. The article compares the 1981 Reagan budget plan, along with its economic assumptions, with the actual performance of these budget figures over the 1981-88 period.

Carlson concludes that the Reagan budget policy was successful in several respects, namely, increasing national defense spending, reducing the growth of the noninterest portion of nondefense spending and reducing the overall tax burden. The major exception to the Reagan budget plan was the rise in net interest produced by a failure to forecast the 1981-82 recession, which, in turn, had a compounding interest effect on outlays.

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Restrictions on international trade, primarily non-tariff barriers, have multiplied rapidly in the 1980s. In the third article in this *Review*, "An Introduction to Non-Tariff Barriers to Trade," Cletus C. Coughlin and Geoffrey E. Wood provide a primer on these barriers. The authors begin by identifying numerous non-tariff barriers and document their proliferation. The general effects of non-tariff barriers, like those of tariff barriers, are to increase the domestic prices of the protected goods and to impede trade to benefit selected producers at the expense of domestic producers. Numerous reasons for the increasing use of non-tariff instead of tariff barriers are provided. Among the reasons are their more certain protective effects, the possibility that some benefits can be captured by foreign producers and domestic politicians and the fact that their adverse effects are generally less obvious to consumers.

To date, attempts through the General Agreement on Tariffs and Trade (GATT) to counteract the expansion of non-tariff barriers have met with little success. A brief history of these attempts completes the paper.

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The large fluctuations in exchange rates observed in the 1980s have prompted many central banks of industrialized nations to discuss exchange market intervention. These discussions have explored whether it is appropriate to use monetary actions to influence exchange rates and, if so, how successful such efforts might be. In the final article in this issue, "Can a Central Bank Influence Its Currency's Real Value? The Swiss Case," Michael T. Belongia and Werner Hermann analyze the distinct experience of one central bank pursuing an exchange-rate objective.

In the first part of their article, Belongia and Hermann review the economic theory that relates monetary actions to movements in the real exchange rate. After concluding that the effects, if any, will be short-lived, they investigate how actions by the Swiss National Bank, relative both to the Federal Reserve and German Bundesbank, have affected the Swiss franc/dollar and Swiss franc/DM real exchange rates. Their results indicate that a central bank can influence real exchange rates only for a period of months; moreover, a *predictable* response will occur only with regard to the one bilateral rate that receives highest priority as a policy objective.

## ***R. Alton Gilbert***

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# Payments System Risk: What Is It and What Will Happen If We Try To Reduce It?

**B**OTH commercial banks and the Federal Reserve assume a certain amount of risk in participating in the payments system. This paper provides an introduction to payments system risk and the public policy issues involved in limiting the risk. Using simple balance sheet entries to illustrate, the paper will examine how policies intended to reduce payments system risk would affect banks and bank customers.

## **PAYMENTS SYSTEM RISK: WHAT IS IT?**

Many banks overdraw their reserve accounts at the Federal Reserve during part of each business day as they process payments within the payments system. The Federal Reserve is concerned about the extent of this intraday credit for several reasons. First of all, since it does not charge interest on the intraday credit it extends, it is providing this overdraft facility at no cost to banks and, thus, may be overused by banks. Second, and more important, it is possible, though unlikely, that a bank could fail while its reserve account is overdrawn. In this event, the Federal Reserve would become a general creditor of the failed bank. Finally, the Fed is concerned with the risk that banks assume through their participation in private wire transfer systems. Current Federal Reserve policy is de-

signed to limit the risk assumed by Reserve Banks as well as commercial banks who participate in private systems for their electronic payments. (See appendix 1 for a description of that policy.)

## ***Federal Reserve Daylight Overdraft Risk and the Operation of Fedwire***

While various types of transactions affect the reserve balances of banks, daylight overdrafts generally reflect large transactions through Fedwire, the wire transfer system operated by the Federal Reserve System. Institutions with reserve or clearing accounts at a Reserve Bank may transfer their reserve balances to other institutions that have similar accounts. These transfers, which averaged \$605 billion per business day in 1987, are processed electronically through Fedwire.

Federal Reserve Banks transfer reserves to receiving banks even if the reserve balance of the sending bank is insufficient to cover the transfers. Transfers over Fedwire are "final" when the receiving banks are notified of the transfers. Thus, if a sending bank should fail while its reserve account was overdrawn, the Federal Reserve would have no claim on banks that received reserves from the failed bank over Fedwire.

U.S. Treasury and agency securities also are transferred among banks over Fedwire. Ownership

records of these securities are maintained in each Federal Reserve Bank's computer system. Banks can transfer securities held in their names to other institutions through these computers, a system called "book-entry." A transfer of securities in book-entry form can be arranged either in conjunction with a transfer of reserves of equal value or as a separate transaction. Such securities transactions contribute to daylight overdrafts, since typically the reserve accounts of banks are debited when their book-entry securities accounts are credited. Transfers of book-entry securities over Fedwire averaged \$312 billion per day in 1987.

The Federal Reserve measures its exposure to payments system risk by simply summing the maximum daylight overdraft each day across all banks. In 1987, the Fed's exposure to daylight overdrafts averaged \$112 billion, approximately 53 percent of which can be attributed to transactions involving book-entry government securities.<sup>1</sup> Some specific features of this risk measure should be noted. First, unlike conventional risk measures, the Federal Reserve's measure does not incorporate the probability that a bank will fail while in an overdraft position or the probability of Fed losses in such situations.<sup>2</sup> Since the Federal Reserve has never incurred a loss on daylight overdrafts, the probability of losses in the future are quite low.

Second, it exceeds the actual sum of reserve account overdrafts at any point during the day; the maximum overdrafts of individual banks typically occur at different times during the day. Third, it represents the loss that the Federal Reserve would incur on a given day if all banks with overdrawn reserve accounts failed when their overdrafts were at maximum levels and the Federal Reserve recovered nothing.

### **Systemic Risk and the Operation of CHIPS**

The Clearing House Interbank Payments System (CHIPS) is an electronic payment system operated by the New York Clearing House. It currently is the only private electronic payment system in operation in the United States. CHIPS has about 140 members, which include U.S.-chartered banks and

foreign banks. Members of CHIPS send and receive payment messages during the day; no funds are actually transferred to cover these payment messages, however, until the end of the day. Net obligations are settled at day's end through Fedwire transfers in the reserve accounts of CHIPS participants. Banks in net debit positions on CHIPS at the end of the day (value of payment messages sent exceeds the value of payment messages received) transfer funds from their accounts at Reserve Banks to a reserve account maintained by the clearing house at the Federal Reserve Bank of New York, while banks in net credit positions receive reserve transfers from that account. The value of payment messages processed by CHIPS averaged \$555 billion per day in 1987.

Systemic risk refers to the risk that the failure of one bank will cause one or more other banks to fail. One way that this could happen is through participation in CHIPS. If a bank fails while in a net debit position on CHIPS, other CHIPS participants could suffer losses as well, depending on the procedures in force for dealing with such a default. Payments over Fedwire, in contrast, involve no systemic risk. The Federal Reserve would absorb any losses resulting from failures by banks with overdrawn reserve accounts.

The Federal Reserve measures the payments system risk assumed by CHIPS participants as the sum of their *maximum* net debit positions during the day on CHIPS. This measure averaged \$43.7 billion in 1987.

To relate this measure to systemic risk is difficult, however; under current CHIPS rules, payment messages do not reflect intraday extensions of credit among banks but provisional payments which may be unwound at the end of the day. If a bank could not cover its net debit position on CHIPS at the end of the day, all payment messages to and from that bank would be canceled; new net debit and credit positions would then be calculated for the remaining CHIPS participants, and payments would be made to cover these revised positions. Unwinding CHIPS payments because of a defaulting bank, however, could expose the remaining CHIPS participants to losses if their de-

<sup>1</sup>Daylight overdrafts attributed to transactions in book-entry securities are calculated as follows. A bank is in a net credit position on book-entry securities transfers if the value of securities transferred to the bank's book-entry securities account exceeds the value of securities transferred out of that account to other banks. The book-entry overdraft of a bank for each day equals its largest net credit position on securities transfers that occurs while the reserve account of the bank is overdrawn.

<sup>2</sup>In conventional definitions, risk is specified in terms of the probability distribution of returns on an investment. Under one definition, risk may be measured as the variance of the distribution of returns. See Rothschild and Stiglitz (1970).

positors had withdrawn balances credited to their accounts during the day based on payment messages from the defaulting bank. These banks in turn may be unable to recover the funds withdrawn by their depositors during the day.<sup>3</sup>

### ***Federal Reserve Policy on Payments System Risk***

In recent years, the Federal Reserve Board has taken actions to limit its own risk and the systemic risk involved in CHIPS. The Federal Reserve induced CHIPS to require each bank in its system to establish bilateral net debit limits with each other CHIPS participant, beginning in 1984. Under another program that went into effect in March 1986, the Federal Reserve requires banks to set limits on their daylight overdrafts across Fedwire and CHIPS. (See appendix 1 for details of these policies.) The Fed is currently studying proposals to establish an explicit or implicit price for daylight overdrafts of reserve accounts.

### **HOW PAYMENTS AFFECT RISK**

This section uses simple balance sheets of hypothetical banks to illustrate how transactions through the payments system affect the exposure of the Federal Reserve and commercial banks to potential losses. The illustrations involve federal funds transactions and transactions among CHIPS participants. Appendix 2 illustrates how the payment practices of banks that serve government securities dealers and those that issue and redeem commercial paper affect their reserve overdrafts.

### ***Federal Funds Transactions***

Banks that borrow federal funds overnight are concerned primarily about their reserve balances as of the end of the day, rather than during the day, for two reasons. First, the Federal Reserve is more tolerant of daylight overdrafts of reserve accounts than of negative reserve balances at the close of business. Second, the intraday reserve balances do not count toward meeting reserve requirements; only those balances held at the end of the business day do.

Banks that borrow overnight federal funds typically receive reserves from the lending banks over Fedwire late in the day; they return the requisite reserve balances the following morning. Such

transfers can cause the borrowing banks to overdraw their reserve balances during the day.

The balance sheet entries in table 1 illustrate how federal funds transactions affect the risk borne by the Federal Reserve. Each bank begins the day with deposits of \$100 and reserves of \$10. With a 10 percent reserve ratio, excess reserves are zero. During the previous business day, Bank A borrowed \$25 from Bank B through the federal funds market. Before the end of business on the previous day, Bank B transferred \$25 over Fedwire from its reserve account to the account of Bank A. This transaction created a liability for Bank A (federal funds purchased) and shifted \$25 of the assets of Bank B from reserve balances to federal funds sold.

The first transaction by Bank A in the current day is a transfer of \$25 from its reserve account to the reserve account of Bank B, returning the funds it had borrowed overnight; this eliminates the liability of federal funds purchased by Bank A. Since the balance in the reserve account of Bank A was only \$10 at the start of the day, the transfer of \$25 makes its reserve account overdrawn by \$15. This presents no problem for Bank A, however, since it plans to borrow \$25 through the federal funds market later in the day to eliminate its reserve overdraft and meet its reserve requirement of \$10.

If Bank A borrows the \$25 in the federal funds market, the lending bank(s) will transfer the reserves to the account of Bank A in the afternoon. Given the time gap between the transfer of funds to lending banks in the morning and the transfer of reserves to Bank A in the afternoon, the Federal Reserve effectively lends \$15 to Bank A during part of the business day by permitting the reserve overdraft.

The Fed is a general creditor of Bank A while its reserve account is overdrawn. To illustrate the risk it assumes in permitting daylight overdrafts, suppose that participants in the federal funds market find out that the value of Bank A's assets have declined by \$15 just after Bank A transfers \$25 to Bank B. After this information becomes known, Bank A will be unable to borrow reserves in the federal funds market at prevailing market rates. The agency that chartered Bank A must decide whether it is solvent. If Bank A is declared solvent and has assets to pledge as collateral, it could

<sup>3</sup>The legal status of claims by the banks against their depositors in such situations is currently unclear. See Mengle (1989).

Table 1

## Risk Created by the Transfer of Reserve Balances in Overnight Federal Funds Transactions

Balance sheets at start of day:

Bank A				Bank B			
Reserves	\$ 10	Deposits	\$100	Reserves	\$ 10	Deposits	\$100
Other assets	125	Federal funds purchased	25	Federal funds sold	25	Net worth	10
		Net worth	10	Other assets	75		

Bank A sends \$25 of its reserve balances to Bank B over Fedwire:

Bank A				Bank B			
Reserves	-\$ 15	Deposits	\$100	Reserves	\$ 35	Deposits	\$100
Other assets	125	Federal funds purchased	0	Federal funds sold	0	Net worth	10
		Net worth	10	Other assets	75		

Value of other assets at Bank A reduced by \$15:

Bank A				Bank B			
Reserves	-\$ 15	Deposits	\$100	Reserves	\$ 35	Deposits	\$100
Other assets	110	Federal funds purchased	0	Federal funds sold	0	Net worth	10
		Net worth	-5	Other assets	75		

receive a loan from the Federal Reserve to cover its reserve overdraft. If the supervisory agency declares Bank A insolvent, it will be closed. If Bank A is closed and liquidated, the depositors get first claim on the \$110 of "other assets." In this case, the Federal Reserve will receive \$10 against the \$15 overdraft of the reserve account and, thus, will lose \$5.

If the Federal Reserve had known that Bank A was in poor financial condition, it would have required the bank to pledge collateral against its overdrafts.<sup>4</sup> By requiring collateral, the Fed shifts the risk to other parties. Suppose, in this case, that Bank A had pledged \$15 of its riskless assets to the Federal Reserve to cover its overdrafts. When the bank fails, the Fed would hold the \$15 in collateral

to cover any losses. The loss of \$5 would be borne by uninsured depositors or the Federal Deposit Insurance Corporation (FDIC). Thus, requiring collateral against reserve overdrafts does not necessarily protect the public sector; it may simply shift the loss from the Federal Reserve to the FDIC.

### Transactions Among CHIPS Participants

In the case illustrated in table 1, the Federal Reserve assumes the risk. Banks also assume risk by participating in CHIPS. The interbank risk exposures created through the processing of payment messages through CHIPS are illustrated in table 2.

In the first transaction of the day, a depositor of Bank A sends \$25 to a depositor of Bank B in the

<sup>4</sup>Task Force (1988), pp. 65-69.

**Table 2**  
**Risk Created by the Transfer of Funds over CHIPS**

**Balance sheets at start of day:**

Bank A				Bank B			
Reserves	\$ 10	Deposits	\$100	Reserves	\$ 10	Deposits	\$100
Other assets	100	Net worth	10	Other assets	100	Net worth	10

**Depositor at Bank A transfers \$25 to depositor of Bank B, transaction over CHIPS:**

Bank A				Bank B			
Reserves	\$ 10	Deposits	\$ 75	Reserves	\$ 10	Deposits	\$125
Other assets	100	Reserves payable	25	Reserves receivable	25	Net worth	10
		Net worth	10	Other assets	100		

**Depositor at Bank B transfers \$25 to depositor of Bank C, over CHIPS:**

Bank B				Bank C			
Reserves	\$ 10	Deposits	\$100	Reserves	\$ 10	Deposits	\$125
Reserves receivable	25	Reserves payable	25	Reserves receivable	25	Net worth	10
Other assets	100	Net worth	10	Other assets	100		

form of a wire transfer over CHIPS. Bank A debits the deposit account of that customer for \$25. Because banks do not report their balance sheets on an intraday basis, there is no official term for the offsetting liability entry in this transaction. In this case, we will call it "reserves payable." For Bank B, deposit liabilities and an asset item called "reserves receivable" each increase by \$25.

In the next transaction, a depositor of Bank B directs it to send \$25 to a customer of Bank C. After the second transaction, Bank B is even with CHIPS. If there were no more transactions over CHIPS that day involving Bank B, the settlement for CHIPS transactions would have a zero impact on the reserve account of Bank B. Bank A, in contrast, would have its reserve account debited for \$25, while Bank C would have its account credited by \$25. Bank A would have to increase its reserve balance before the time for settlement of CHIPS payments to facilitate settlement.

Suppose that, before the end of the day, adverse publicity prevents Bank A from borrowing \$25 in the federal funds market. This situation could create a liquidity problem for Bank B. If Bank A cannot obtain sufficient reserves to cover its net debit position on CHIPS, current rules call for unwinding all transactions involving Bank A and settling the transactions among the remaining CHIPS participants. This settlement would involve a transfer of \$25 in reserves from Bank B to Bank C. Such a net settlement cannot take place, however, because Bank B has only \$10 in its reserve account. Thus, unless the Federal Reserve lends \$25 to Bank A or Bank B, all CHIPS transactions for the day would be canceled.

Simulation exercises indicate that the unwinding of transactions with one large CHIPS participant that cannot meet its payment obligations would make a high percentage of other participants unable to meet their commitments on



CHIPS without additional reserves.<sup>5</sup> In these exercises, some banks that become illiquid have no direct transactions with the defaulting bank. Thus, as illustrated in table 2, a default by Bank A keeps Bank C from receiving its payments over CHIPS, because the default by Bank A makes Bank B illiquid.

As the central bank, the Federal Reserve is responsible for preventing such a liquidity crisis. In our example, the Fed could lend reserves either to Bank A or Bank B. If it considers Bank A to be solvent, it could lend the \$25 and take collateral. The \$25 added to the reserve account of Bank A facilitates the net settlement on CHIPS. If Bank A turns out to be insolvent, the collateral protects the Federal Reserve from loss, transferring it instead to the general creditors and the FDIC.

Alternatively, the Federal Reserve could prevent a liquidity crisis by lending \$25 to Bank B, allowing Bank B to meet its required reserves and CHIPS obligation to Bank C. Even if the Fed prevents a liquidity crisis by lending \$25 to Bank B, the default of Bank A could make Bank B insolvent. This is an example of systemic risk involved in the operation of the payments system. Suppose that the transfer of \$25 from Bank B to Bank C is initiated by the depositor of Bank B who received \$25 from Bank A. Bank B makes this transfer before discovering the default by Bank A. At this time, it is not clear whether the courts would permit Bank B to regain these funds from its depositor.<sup>6</sup> If Bank B's loss exceeds \$10, it is bankrupt.

Suppose, instead, that this depositor of Bank B holds the extra \$25 in its demand deposit account at Bank B until the end of the day. The transfer of reserves from Bank B to Bank C was initiated by a different depositor of Bank B. When Bank A's default is discovered, Bank B could cancel the \$25 in reserves receivable and reverse the \$25 credit to its demand deposit liabilities. In this case, the unwinding of the CHIPS transaction has no adverse effect on the net worth of Bank B.

## THE EFFECTS OF POSSIBLE CHANGES IN POLICY

Changes in policy on payments system risk are being discussed within the Federal Reserve System and the private sector. This section illustrates the effects of two possible policy changes: explicit fees on reserve account overdrafts and interest-earning reserve balances required to cover part or all of daylight overdrafts.<sup>7</sup>

Federal Reserve policymakers have indicated that such changes would be adopted only after CHIPS has developed arrangements for ensuring the execution of payments on that system that they consider acceptable.<sup>8</sup> This section also illustrates the implications of such an arrangement for banks.

### *Explicit Pricing of Daylight Overdrafts of Reserve Accounts*

One way to reduce Federal Reserve risk would be to charge a fee on daylight overdrafts. If the fee were high enough, banks would reduce the size of their overdrafts by changing their practices for making payments.

*Responses of Banks to Pricing Daylight Overdrafts* — Perhaps the easiest and least expensive change for most of the relatively large banks would involve routing more of their wire transfers of funds through CHIPS rather than Fedwire. There are other ways for banks to reduce their reserve account overdrafts. They could purchase more of their federal funds as term federal funds or under rollover arrangements that involve paying a daily rate but eliminating the daily transfer of reserve balances. Pricing total daylight overdrafts of reserve balances (including book-entry overdrafts) would impose costs on the clearing banks, which they would pass on to the government securities dealers they serve. The dealers could reduce book-entry daylight overdrafts by building smaller inventories of securities during the day or holding larger inventories overnight. Banks that act as agents in issuing commercial paper could charge

<sup>5</sup>Humphrey (1986).

<sup>6</sup>Mengle (1989).

<sup>7</sup>For discussions of these possible changes from Federal Reserve sources, see Belton, et al. (1987), Corrigan (1987), Johnson (1988), Task Force (1988) and Mengle, et al. (1987). For discussions of these issues by those in the private sector, see Flannery (1987), Faulhaber, et al. (1989) and Large Dollar Payments System Advisory Group (1988). Governor Wayne D. Angell of the Federal Reserve Board has proposed another approach to revising policy on payments system risk. Under

the Angell proposal, the Federal Reserve would prohibit daylight overdrafts. Transfers of reserves that would make the reserve balance of a bank negative would be funded as discount window loans. To provide banks incentives to hold enough reserves to prevent overdrafts, the Federal Reserve would pay interest on excess reserves, but at a rate below the discount rate. See VanHoose (1988).

<sup>8</sup>Johnson (1988), p. 15.

issuers for the fees on overdrafts or delay payments to issuers until they receive payments from purchasers.

*Effects in Financial Markets* — Pricing daylight overdrafts could have a variety of indirect effects in the financial markets. Banks that lend in the overnight federal funds market could find that their reserves are being returned later the following day. The time value of intraday reserves might lead to the development of an intraday federal funds market, with lenders making reserve balances available to borrowers for only part of the business day. Some analysts think this could lead to greater variability in an overnight federal funds rate and other interest rates.<sup>9</sup>

Banks could limit the size of their daylight overdrafts by delaying wire transfers of funds for depositors that do not demand immediate delivery of funds; or, they might charge an extra fee to depositors that demand immediate delivery.

Clearing banks would charge government securities dealers for the cost of the fee on daylight overdrafts. Government securities dealers, in turn, would increase the transaction costs of buying and selling government securities. Interest rates on government securities would rise somewhat relative to yields on alternative investments, increasing the Treasury's cost of servicing the national debt.

How banks react to daylight overdraft fees could affect market yields on other financial instruments. For instance, the fee on overdrafts would increase the costs to banks acting as agents for firms that issue commercial paper. The responses by the agent banks could increase the costs to firms of raising funds by issuing commercial paper.<sup>10</sup>

### **Supplemental Balance Requirement**

The Federal Reserve could impose an implicit price on daylight overdrafts by requiring the banks

that overdraw their reserve accounts to hold supplemental reserve balances. These requirements would be set to cover part or all of their daylight overdrafts. The suggested interest rate to be paid on the supplemental balances would be slightly below the federal funds rate, thus creating an opportunity cost of holding supplemental reserves. This cost would have the same implications for bank behavior and financial markets as an equal explicit fee on daylight overdrafts.

The implications of a supplemental reserve requirement can be examined by adjusting the balance sheet entries in table 1. In this case, Bank A would be required to increase its average end-of-day reserve balance by \$15. A reserve balance of \$25 at the start of the day would eliminate the risk of Federal Reserve loss because Bank A's reserve balance would not fall below zero after the \$25 transfer.

The method by which Bank A raises the \$15 supplemental balance affects the distribution of potential losses among participants in the banking industry. Suppose, for example, Bank A sold some assets to obtain the \$15 in additional reserves. This response would raise the risk-adjusted capital ratio of Bank A, unless it shifted the remaining \$110 of other assets into categories with higher risk weights. A rise in Bank A's risk-adjusted capital ratio would reduce the FDIC's potential losses.<sup>11</sup>

Suppose, instead, that Bank A raises the \$15 in supplemental reserves by increasing federally insured deposits from \$100 to \$115. This response would increase the potential losses faced by the FDIC.<sup>12</sup>

Bank A also could raise the additional \$15 in the term federal funds market. The claims of those selling term federal funds to Bank A would be subordinate to the claims of Bank A's depositors. Thus, the supplemental balance requirement would shift risk to those banks supplying the term

<sup>9</sup>Task Force (1988), pp. 103–14.

<sup>10</sup>To illustrate the potential effects on the cost of issuing commercial paper, suppose the Federal Reserve charges 100 basis points at an annual rate on the maximum daylight overdraft of each bank. See Mengle, et al. (1987) for the basis for such a rate. If an agent bank continues the timing of payments described in appendix 2 in issuing and redeeming commercial paper, the overdrafts fee would cost \$54.79 per \$1 million of commercial paper issued and redeemed. If the banks pass this cost on to the issuers, the annual cost of raising funds by issuing commercial paper every 30 days would rise by 7 basis points.

<sup>11</sup>A risk-based capital ratio is calculated as a measure of capital divided by weighted assets, with weights assigned as approxi-

mations to relative risk. Reserves have a weight of zero. See "Proposals for International Convergence" (1988).

<sup>12</sup>Assume that these additional federally insured deposits have a zero reserve requirement. To illustrate the implications for FDIC risk, suppose that after Bank A transfers \$25 to Bank B, there is a public announcement of events that reduce the value of the assets of Bank A by \$15. Bank A fails and the FDIC becomes the receiver. As receiver, the FDIC obtains assets worth \$110 and assumes liabilities of \$115, for a net loss of \$5. In this case, therefore, the supplemental balance requirement shifts risk from the Federal Reserve to the FDIC.

federal funds, increasing the systemic risk in the banking system.

Of course, supplemental balance requirements also would give banks an incentive to reduce the size of the intraday movements in their reserve balances, since the interest rate paid on the balances would be below the marginal return on other assets and below the interest rate on federal funds. The supplemental balance requirement would be reduced to the extent that a bank kept its reserve balance positive throughout the business day. Suppose, for instance, that Bank A changes its intraday pattern of payments so that, with the supplemental requirement of \$15, its reserve balance never falls below \$5. The Federal Reserve might reduce its supplemental balance requirement to \$10, thus reducing the opportunity cost of Bank A.

### **Provisions for Settlement Finality of Payments over CHIPS**

Settlement finality would involve procedures for ensuring the execution of payments (avoid unwinding payments involving a defaulting bank) and the allocation of losses in the event of a default by a CHIPS participant.<sup>13</sup> If losses are spread widely among CHIPS participants, the failure of a CHIPS participant to meet its payment obligation would probably not cause other banks to fail.

The implications of settlement finality arrangements for payments system risk are illustrated using the balance sheet entries in table 2. In this

illustration, CHIPS is presumed to have formed a bankers' bank, which is a cooperative venture that performs banking services for CHIPS members. This institution processes payment messages for its members as debit and credit entries to their demand deposit accounts at the bankers' bank.<sup>14</sup> The illustration is based on some general principles of settlement finality arrangements that have been considered for several years.<sup>15</sup>

The hypothetical arrangement requires members of CHIPS as a group to pledge enough collateral with their bankers' bank to cover the largest net debit position of any one participant. This is based on the idea that a default by one large participant would disrupt the operation of CHIPS. Since there has never been a default by a CHIPS participant, however, a default by one large participant is an unlikely event. Collateral requirements for CHIPS participants in excess of the largest net debit of an individual CHIPS participant could be interpreted as an excessive degree of precaution.

In table 2, the largest net debit position is \$25. To cover this position (and to allow some margin for error), CHIPS requires each of the three banks to pledge \$10 of their interest-earning assets with CHIPS in the form of Treasury securities.

Suppose that after CHIPS processes the transactions described in table 2, an announcement indicates a \$15 loss in the value of Bank A's assets. Under the settlement finality arrangement, CHIPS would use the collateral posted by its participants to raise \$25, either by selling part of the collateral

<sup>13</sup>Discussions of the finality of payments on private wire transfer systems mention three aspects of finality. Sender finality makes each message over the payments system final when sent. Payment messages cannot be canceled later in the day. The rules for payment messages on CHIPS include sender finality.

Settlement finality refers to procedures that would ensure the settlement of payments if a participant defaults on its net debit at the end of the day. CHIPS does not have settlement finality procedures in place at this time. Under current procedures, CHIPS would cancel all payments by the bank that defaults, as well as all payments to that bank, and calculate new net debit or credit positions for the remaining participants. This section illustrates the implications of adopting a form of settlement finality.

Under receiver finality, credits to the deposit accounts of the customers of CHIPS participants would be final when the receiving banks receive payments messages over CHIPS. If a sending bank defaults, the receiving bank would have no recourse to its depositors. CHIPS rules do not include receiver finality. For additional discussion of these aspects of the finality of payments, see Humphrey (1986) and Belton, et al. (1987).

<sup>14</sup>CHIPS has considered developing a bankers' bank to ensure that payment obligations over CHIPS would be treated as net rather than gross obligations in the case of a default by a CHIPS participant. See Kantrow (1988). To illustrate the signifi-

cance of the distinction between gross and net obligations, suppose a bank fails while it is in a net credit position on CHIPS payments. If CHIPS obligations are treated legally as net obligations, CHIPS participants would make a payment to the receiver of the failed bank for the amount of the net debit position. The receiver of the failed bank might sue CHIPS participants based on gross obligations. Under a successful suit by the receiver, those that had sent payment messages to the failed bank would have to pay the gross amount of those payments, and those who received payment messages from the failed bank would become its general creditors for the amount of the gross transfers from the failed bank. This treatment of CHIPS participants would increase the recovery rate of the failed bank's other general creditors. There have been no such cases to indicate whether the courts would uphold payments to the receiver based on gross payments.

Suppose, in contrast, that CHIPS payments are processed through demand deposit accounts at the bankers' bank for CHIPS. Under that arrangement, the only claim of the receiver of the failed bank would be for the positive balance of the failed bank in its demand deposit account at the bankers' bank.

<sup>15</sup>Mengle (1989).

or using the securities as collateral for a loan at the Federal Reserve discount window. CHIPS would then transfer the \$25 to the reserve account of Bank B, facilitating the payment from Bank B to Bank C. In turn, the bankers' bank of CHIPS would hold the \$10 in collateral posted by Bank A and have a \$15 claim against Bank A as a general creditor. Losses on the \$15 claim against Bank A would thus be spread between Bank B and Bank C. Neither bank would be forced into bankruptcy by a complete loss on the \$15 claim.

From the Federal Reserve's perspective, this settlement finality arrangement is better than the procedure that currently would be used to deal with a default by a CHIPS participant — unwinding payments involving the bank. If this settlement finality arrangement were in place, the unwinding of payments, which would disrupt the flow of payments in the economy, could be avoided. If a discount window loan was necessary to avoid a liquidity crisis in the banking system, the collateral would be available through the CHIPS organization. The Federal Reserve would not have to decide which banks should receive discount window loans.

By making the risk to CHIPS participants more explicit, the arrangement would give CHIPS participants stronger incentives to exclude banks in relatively poor financial condition from their system. Banks that are excluded would route their wire transfers through Fedwire, thus reducing systemic risk. Finally, the spreading of potential losses would limit the chances of the failure of one bank causing others to fail. It is not possible to determine whether the risk of bank failure is lower under current CHIPS procedures or under this proposed procedure for settlement finality. Such a comparison depends on the extent to which depositors of CHIPS participants draw down the intraday credits to their demand deposit accounts and the success that banks would have in collecting from those depositors in case of a default by a CHIPS participant.

## CONCLUSIONS

All banks assume some risk by participating in the payments system. The payment practices that generate this risk were developed in an environment in which there was no interest charge on intraday credit and, until recently, no constraints on the magnitude of intraday credit. There have been no losses to the Federal Reserve or to mem-

bers of private wire transfer systems resulting from the daylight credit exposures. The Federal Reserve, however, has adopted a policy on payments system risk which includes limits on the daylight overdrafts of individual banks.

The Fed has been considering possible changes in its policy to reduce its own risk and provide incentives for banks to change the payment practices that tend to create the intraday risk exposures. One proposed approach involves a fee on daylight overdrafts of reserve accounts. A second approach, which involves an implicit price on daylight overdrafts, requires additional reserve balances at the banks which regularly overdraw their reserve accounts during the day. The Federal Reserve would pay interest on these supplemental reserve balances at a rate just below the federal funds rate. Under either approach, CHIPS would be required to work out an arrangement that is satisfactory to the Federal Reserve to ensure the finality of its payments.

The objective of changing the policy on payments system risk is to reduce the risk of the Federal Reserve without creating a large increase in systemic risk — the risk that the failure of one bank will cause the failure of other banks, thus disrupting the operation of the payments system. The type of settlement finality arrangement desired by the Federal Reserve would ensure the execution of payments over CHIPS in the event of a default by a CHIPS participant and spread any losses so widely among other CHIPS participants that one bank failure is unlikely to lead to the failure of other CHIPS participants.

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## Appendix 1

# Current Federal Reserve Policy on Payments System Risk

Currently, the Federal Reserve uses specific limits on daylight overdrafts of reserve accounts and net debit positions on private wire transfer systems to reduce payments system risk. The limits on net debit positions apply to any private wire transfer system that settles the net positions of its participants through transfers of balances in reserve or clearing accounts at Reserve Banks. Since CHIPS is the only such system in operation, the following description refers only to it, but would apply to any such system developed in the future.<sup>1</sup>

### **Bilateral Net Credit Limits on CHIPS**

The Federal Reserve requires each participant on CHIPS to set a limit on its net credit position on message transfers with each of the other participants in the system. Funds transfer messages that violate these bilateral net credit limits are rejected by the computer system that processes payment messages. CHIPS participants have had bilateral credit limits since October 1984.

### **Sender Net Debit Caps on CHIPS**

The Federal Reserve requires CHIPS to establish limits on the net debit positions of each partici-

pant with all other participants on the system. CHIPS sets this limit for each participant at 5 percent of the sum of all bilateral credit limits for that participant extended by all other CHIPS participants.<sup>2</sup> CHIPS established these sender net debit caps in October 1985.

### **Cross-System Caps**

Each bank that occasionally has daylight reserve overdrafts is required to adopt a cap on its cross-system daylight overdraft. Cross-system refers to the daylight overdraft position on Fedwire and CHIPS. The relevant overdraft position for this cap is the sum of a bank's funds-related overdraft of its reserve account and its net debit position on CHIPS at each moment during the day. Each bank sets its cap by placing itself in one of the possible categories indicated in table A1; banks are directed to consider their creditworthiness, credit policies and operational control and procedures. Each possible rating has corresponding caps for both the one day and two-week average maximum daylight overdraft, each as a percentage of primary adjusted capital. These percentages have been

<sup>1</sup>For an analysis of the effects of these credit limits on daylight overdrafts and the operation of the payments system, see Belton, et al. (1987).

<sup>2</sup>There are additional details involved in determining these limits. See Belton, et al. (1987).

Table A1

### Caps on Daylight Overdrafts Across Payments Systems (multiples of adjusted primary capital)

Self-assessment category	Cap applied to	Period caps in effect		
		March 27, 1986 to January 13, 1988	January 14, 1988 to May 18, 1988	May 19, 1988 to present
High	Two-week average	2.000	1.700	1.500
	Single day	3.000	2.550	2.250
Above average	Two-week average	1.500	1.275	1.125
	Single day	2.500	2.125	1.875
Average	Two-week average	1.000	0.850	0.750
	Single day	1.500	1.275	1.125
Limited	Two-week average	0.500	0.425	0.375
	Single day	0.500	0.425	0.375

NOTE: Adjusted primary capital for U.S.-chartered banks is the sum of primary capital less all intangible assets and deferred net losses on loans and other assets sold.

SOURCE: Federal Reserve Bulletin (November 1987), p. 843.

reduced over time to make them more effective in constraining overdrafts.

### *Book-Entry Securities Transfers*

In calculating the relevant measure of overdrafts for the cross-system caps, the Federal Reserve nets

out the value of book-entry securities credited to the account of the bank. This step exempts daylight overdrafts generated through securities transactions from the limits imposed by the caps. The Federal Reserve has allowed this distinction to avoid disrupting the market for U.S. government securities.

## Appendix 2 Additional Illustrations of Payments and Risk

### *Transfers for Depositors Over Fedwire*

Wire transfers of funds for depositors may cause banks to overdraw their reserve accounts, as table A2 illustrates. A depositor instructs Bank A to pay

\$25 to a depositor of Bank B in the form of a wire transfer. Since the initial reserve balance is only \$10, the \$25 transfer makes the reserve account of Bank A overdrawn by \$15. As in table 1 in the text, an announcement of a \$15 decline in the value of the assets of Bank A would force the Federal Reserve to absorb a \$5 loss.

Table A2

**Risk Created by Transferring Depositor's Funds over Fedwire**

Balance sheets at start of day:

Bank A				Bank B			
Reserves	\$ 10	Deposits	\$100	Reserves	\$ 10	Deposits	\$100
Other assets	100	Net worth	10	Other assets	100	Net worth	10

Bank A sends \$25 of depositor's money to Bank B over Fedwire:

Bank A				Bank B			
Reserves	-\$ 15	Deposits	\$ 75	Reserves	\$ 35	Deposits	\$125
Other assets	100	Net worth	10	Other assets	100	Net worth	10

Value of other assets at Bank A reduced by \$15:

Bank A				Bank B			
Reserves	-\$ 15	Deposits	\$ 75	Reserves	\$ 35	Deposits	\$125
Other assets	85	Net worth	-5	Other assets	100	Net worth	10

**Securities Transfers**

A few banks incur large daylight overdrafts because of the transactions they conduct for customers that deal in U.S. government securities. These transactions warrant special examination. A few large banks (called clearing banks) specialize in serving government securities dealers; these banks generate a large share of the total daylight overdrafts of bank reserve accounts. In the second quarter of 1988, for example, four clearing banks accounted for about 70 percent of the daylight overdrafts attributable to transactions in book-entry securities.

**Business Practices of Dealers and Clearing Banks** — Government securities dealers who buy and sell securities for their customers have no direct access to the book-entry system for transferring ownership of government securities. Instead, they maintain book-entry securities accounts and demand deposit accounts with commercial banks

that serve as their clearing banks for securities transfers.

Daylight overdrafts of the clearing banks' reserve accounts reflect the practices of the government securities dealers in managing their inventories of government securities. Dealers hold large inventories of securities during the day to meet the anticipated demands of their customers. To minimize the cost of holding the inventories, the dealers sell most of their securities by the end of the day through repurchase agreements. The investors who enter into these agreements "own" the securities overnight and "resell" them to dealers early the next day. Thus, the dealers build their inventories of government securities in the morning of each business day by receiving securities returned by the overnight repo investors and buying additional securities offered for sale.<sup>1</sup>

The following features of the business practices of government securities dealers explain why they generally wait until early afternoon to begin run-

<sup>1</sup>For a more complete discussion of the practices of clearing banks and dealers, see Association of Reserve City Bankers (1986).

ning down their inventory of securities. Salesmen for a dealer make commitments to deliver specific securities to its customers by the end of the day. The dealer is then vulnerable to losses if it cannot fulfill these commitments. The customers receive interest on the promised securities for that day, even if the dealer does not make delivery. The customers, however, make payments to the dealers only when the securities are delivered. The dealer would fail to make delivery if it could not locate the desired securities in its inventory or in the market, or if it sent the wrong securities to a customer and had them returned. Each dealer attempts to minimize the probability of such "fails" by waiting until early afternoon to direct its clearing bank to send its securities to the book-entry accounts of the banks that serve the customers that have bought them.

Another reason the dealers hold their securities until early afternoon involves potential profits from special orders. On some days, certain issues of government securities are in relatively high demand. The dealers can make larger profits if they have securities available to meet these special orders. In contrast to the specific requirements for special orders, dealers may substitute a wide variety of securities as acceptable collateral for repos.

#### **Effects on Intraday Reserve Balances —**

These dealer practices affect the intraday patterns of their demand deposit balances and the reserve balances of the clearing banks that serve them. When a repo investor returns the securities to the dealer, there is an increase in the securities account of the dealer at its clearing bank and an equal reduction in its demand deposit account. On the books of the Federal Reserve, there is an increase in the securities in the book-entry account of the clearing bank and a reduction in the reserve account of the clearing bank. The same transactions occur when the dealer buys securities to hold in its inventory that day. The dealer builds its inventory of securities by overdrawing its demand deposit account during the day. The dealers do not control the timing of these inflows of securities to their accounts and the outflows from their demand deposit accounts, since the party that holds the securities initiates the transfer of securities and reserves through the Fedwire system.

The process of overdrawing reserve and deposit accounts is reversed later in the day as the dealers sell their inventories of securities. The reserve

accounts of the clearing banks rise as the book-entry securities are transferred to the accounts of other banks and reserve balances are simultaneously transferred to the accounts of the clearing banks. The timing of transactions in book-entry securities for the dealers causes the reserve accounts of the clearing banks to be overdrawn by billions of dollars during part of the day.

**Implications for Risk**— The clearing banks extend credit to government securities dealers during the day by allowing them to overdraw their demand deposit accounts. The banks limit their risk by obtaining a lien against the securities held for the account of the dealers. Thus, a clearing bank could claim the securities credited to the account of a dealer to cover any losses on its deposit overdraft.<sup>2</sup>

The Federal Reserve has considered various methods of establishing liens against the securities in the book-entry accounts of banks but has not initiated such collateral arrangements. Thus, the Fed is vulnerable to losses on the full amount of a bank's reserve overdraft, whether the overdraft was generated through funds transfers or transactions in book-entry securities.<sup>3</sup>

The risk implications of book-entry overdrafts can be illustrated by examining the balance sheet entries in table A2. Bank A is a clearing bank for a government securities dealer. The dealer receives \$25 in book-entry securities and has its demand deposit account debited by \$25, leaving it overdrawn at that time. Suppose the dealer goes bankrupt after this transaction is completed. Bank A claims the \$25 in securities that were credited to the securities account of the dealer to cover any possible losses on the deposit overdraft. The bank is spared any losses, and the Federal Reserve suffers no losses.

This book-entry daylight overdraft, however, does leave the Federal Reserve vulnerable to a loss on the reserve overdraft. Suppose that after the dealer receives the \$25 in book-entry securities, there is an announcement that implies a \$15 loss in the value of the other assets of Bank A, as in the other illustrations. Under current arrangements, the Fed has no claim on the \$25 in book-entry securities that had been transferred to Bank A, to offset its \$5 loss. Thus, collateral agreements between clearing banks and the dealers make Federal Reserve losses due to defaults by government securities dealers unlikely, but the daylight reserve

<sup>2</sup>Task Force (1988), p. 69.

<sup>3</sup>Task Force (1988), p. 70–72.



Table A3

### The Effects of Issuing Commercial Paper on the Balance Sheet of an Agent Bank

Balance sheets at start of day:

Bank A				Bank B			
Reserves	\$ 10	Deposits	\$100	Reserves	\$ 10	Deposits	\$100
Other assets	100	Net worth	10	Other assets	100	Net worth	10

Bank A transfers \$25 to Bank B, credited to the account of the firm that issues commercial paper:

Bank A				Bank B			
Reserves	-\$ 15	Deposits	\$100	Reserves	\$ 35	Deposits	\$125
Reserves receivable	25			Other assets	100	Net worth	10
Other assets	100	Net worth	10				

Bank A receives \$25 from purchaser of commercial paper:

Bank A				Bank B			
Reserves	\$ 10	Deposits	\$100	Reserves	\$ 10	Deposits	\$100
Reserves receivable	0			Other assets	100	Net worth	10
Other assets	100	Net worth	10				

overdrafts of the clearing banks expose the Fed to potential losses in the event of large, unanticipated declines in the value of the assets of the clearing banks themselves.

A lien by the Federal Reserve against the book-entry securities in the accounts of the clearing banks might have little practical significance in limiting Fed risk. Suppose the public learns during the day that a clearing bank may be bankrupt. Would the Federal Reserve suddenly seize the book-entry securities in the account of the clearing bank? Doing so would disrupt the business of the government securities dealers served by the clearing bank and, given the high concentration of business among clearing banks, would disrupt trading in the whole government securities market. The Fed and the other federal supervisory authorities have been reluctant to close large com-

mercial banks because of their effects on other depository institutions and the financial markets in general. A lien on the book-entry securities of banks might make the supervisory authorities more reluctant to close a large bank that also serves as a clearing bank for government securities dealers.

### Issuing and Redeeming Commercial Paper

The timing of payments by banks involved in issuing and redeeming commercial paper creates reserve overdrafts.<sup>4</sup> Several banks act as agents for firms that issue commercial paper. The agent banks collect funds from those purchasing the commercial paper and transfer them to the accounts of those firms issuing the paper. When the paper matures, the agent banks collect from the

<sup>4</sup>For a discussion of how daylight overdrafts reflect transactions in commercial paper and other financial instruments, see Large-Dollar Payments System Advisory Group (1988).

paper issuers and make payments to the holders of the paper.

When a firm issues commercial paper, the agent bank generally pays the firm before it receives payment from those buying the paper. During the period between the payment to the issuer and the receipts from the purchasers, the reserve account of the agent bank falls by the amount of the funds raised by issuing the commercial paper. The reserve balance of the agent bank also falls by the face amount of the issue when the paper matures; the agent bank generally makes payment to those holding the paper before receiving payment from the issuer.

The effects of these transactions on the balance

sheet of the agent bank are illustrated in table A3. A firm raises \$25 by issuing commercial paper. Bank A is the agent bank, and both the issuer and purchaser of the paper have their demand deposit accounts at Bank B. Early in the day on which the commercial paper is issued, Bank A transfers \$25 to Bank B, to be credited to the demand deposit account of the issuer. After that transaction, the reserve account of Bank A is overdrawn by \$15. In this example, the offsetting transaction is a \$25 increase in an account called "reserves receivable." Later that day, the purchaser of the paper arranges for Bank B to send \$25 to Bank A over Fedwire, eliminating the reserve overdraft by the end of the day. As in the other balance sheets, the Federal Reserve is a general creditor of Bank A while its reserve account is overdrawn.

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# Federal Budget Trends and the 1981 Reagan Economic Plan

**I**N EARLY 1981, a newly inaugurated Ronald Reagan announced an economic plan which included goals of "an immediate, substantial, and sustained reduction in the growth of federal expenditures [and] a significant reduction in federal tax rates . . ."<sup>1</sup> After two terms in office, it seems time to examine the original Reagan budget plan in light of the actual performance over the 1980s. Although the budget plan had far-reaching economic and social consequences, this article focuses on the extent to which the initial budget projections were realized.<sup>2</sup>

First, the 1981 economic setting, which provided the underlying rationale for the Reagan plan, is summarized. Then, because the budget and economic conditions are interrelated, the 1981 economic assumptions are examined in retrospect. This is followed by a comparison of planned and realized changes in federal outlays and receipts. The article concludes with an evaluation of the 1981 budget plan.

## THE 1981 ECONOMIC FORECAST IN RETROSPECT

When the Reagan administration began preparing its budget in late 1980 and early 1981, the U.S. economy was recovering from a brief recession in the first half of 1980. Output was growing sluggishly for a recovery phase of the business cycle, unemployment was well above 7 percent of the labor force and productivity, as measured by output per hour, was declining. Prices generally were increasing at double-digit rates and interest rates reflected the high rate of inflation. The federal budget deficit for fiscal 1980 was \$60 billion and the outgoing administration's estimate for 1981 was about \$55 billion.

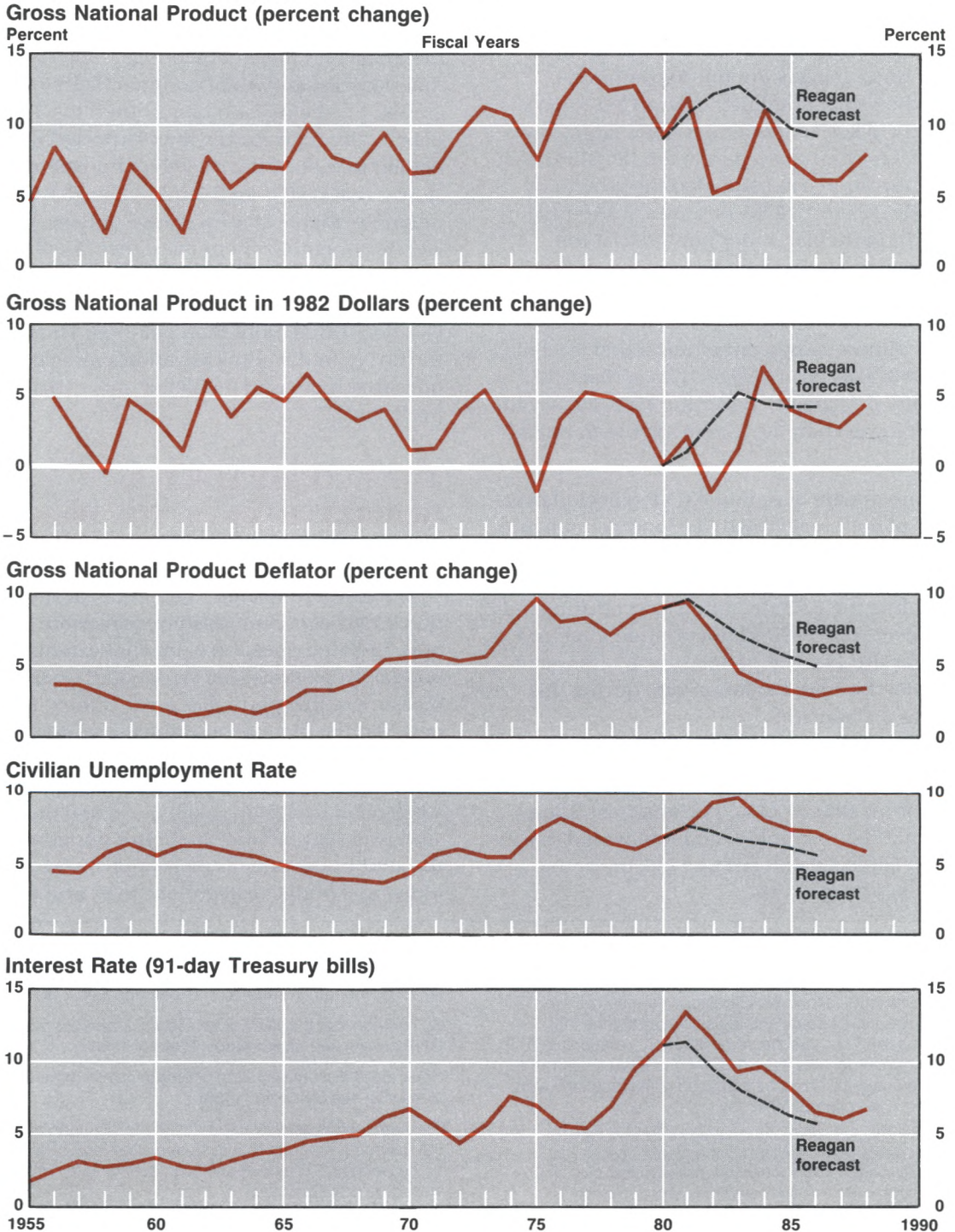
The incoming president described the situation as "the most serious set of economic problems since the 1930s."<sup>3</sup> The most important cause of these problems, he suggested, was the government itself: through taxes, spending, regulatory policies and monetary policies, it had sacrificed

<sup>1</sup>*America's New Beginning . . .* (1981), pp. 1–3. For further details, see Office of Management and Budget (1981a) and Carlson (May and November 1981).

<sup>2</sup>For more extensive analyses of the Reagan years, see Boskin (1987), Mills and Palmer (1984), Modigliani (1988) and Niskanen (1988).

<sup>3</sup>*America's New Beginning . . .* (1981), p. 4.

# Figure 1 Actual Movements vs. Reagan Forecasts of Key Economic Variables



long-term growth and price stability for ephemeral short-term goals. To combat these problems, the administration proposed a program that was intended to:

restore fiscal integrity; increase incentives for saving, investment, and production; attain monetary and financial stability; and enhance the role of the marketplace as the principal force in the allocation of resources.<sup>4</sup>

An important part of every budget program is the set of underlying economic assumptions.<sup>5</sup> Figure 1 shows the administration's 1981 forecasts for a variety of key economic variables along with their actual performance. As the top tier shows, the administration overestimated the growth in nominal GNP from 1980 to 1986 by a substantial amount.<sup>6</sup> In particular, it did not forecast the 1981–82 recession nor did it foresee the sharp reduction in nominal GNP growth after 1984. By 1986, the cumulative error for GNP was over \$800 billion, or almost 20 percent of the actual level of GNP in 1986. This error reflected an actual GNP growth rate of 7.8 percent over the 1980–86 period, quite a bit lower than the assumed growth rate of 11 percent.<sup>7</sup>

The overestimate of nominal GNP reflected overestimates of both real growth (second tier of figure 1) and inflation (third tier of figure 1). The cumulative error in forecasts of real GNP by 1986 was 7 percent while the GNP deflator was overestimated by 11 percent. The 1981 administration forecast for inflation for the 1980–86 period was a 7.1 percent annual rate; the actual inflation rate during this period was 5.1 percent.<sup>8</sup>

The fourth tier of figure 1 indicates that the unemployment rate was underestimated in each of the years from 1981 to 1986. The administration forecast that the unemployment rate would rise in 1981, then fall to 5.6 percent by 1986; the actual 1986 rate was 7.1 percent.

Finally, as indicated in the bottom tier of figure 1, the Treasury bill rate was also underestimated. The Reagan administration forecast a steady decline in the Treasury bill rate from more than 11 percent in 1980 to 5.7 percent in 1986; the actual rate rose sharply in 1981, before falling to 6.4 percent in 1986.

These key economic variables generally moved unfavorably during the 1980–86 period in terms of their effect on the federal budget. The slower-than-forecast growth of nominal GNP slowed the growth of receipts and contributed to a larger deficit. Although slower-than-expected inflation helped to reduce the growth of budget outlays, slower real GNP growth and higher-than-forecast unemployment rates increased outlays, particularly for unemployment insurance. Meanwhile, the higher-than-expected Treasury bill rate also boosted outlays, especially when the government was borrowing more than planned. Thus, most of the errors in the administration's forecast were ones that increased the deficit more than projected.<sup>9</sup>

## THE BUDGET TOTALS: REALIZATIONS VS. THE REAGAN PLAN

As figure 1 indicated, the Reagan administration's 1981 economic assumptions were erroneous. A related question is to what extent were the budget projections also erroneous? An obvious measure of this particular error is the difference between the planned and the actual surplus/deficit. Figure 2 shows the size of this discrepancy. The Reagan plan projected a steady move toward a balanced budget by 1986; the actual deficit for 1986 was \$221 billion.<sup>10</sup> To better understand why the 1981 budget plan's projections were in error, individual budget categories are examined below.<sup>11</sup>

<sup>4</sup>*Ibid.*, p. 9.

<sup>5</sup>Although such assumptions are absolutely necessary to project outlays and receipts, economic conditions themselves are influenced by congressional and legislative decisions that affect the budget. This was the administration's reasoning in 1981; its budget programs were designed to have a favorable effect on the economy. In fact, its economic assumptions were so optimistic, it felt compelled to say:

Indeed they do represent a dramatic departure from the trends of recent years — but so do the proposed policies. In fact, if each portion of this comprehensive economic program is put in place — quickly and completely — the economic environment could improve even more rapidly than envisioned in these assumptions. [*Ibid.*, p. 25.]

<sup>6</sup>Generally, from this point on, all references to years are to fiscal years, i.e., the 12-month period ending September 30.

<sup>7</sup>Such a projection was not unusual in early 1981. For example, the Congressional Budget Office projected a 1980–86 nominal GNP growth rate in excess of 11 percent. See CBO (1981).

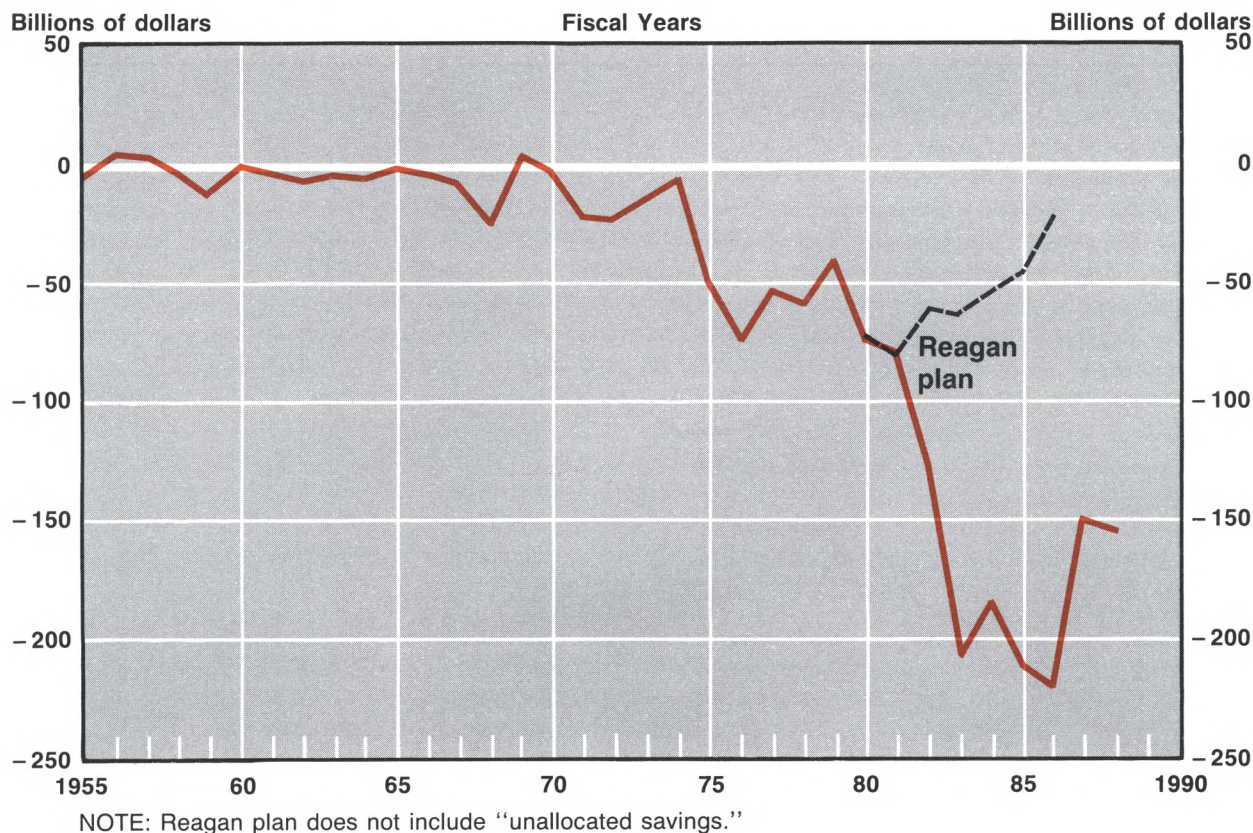
<sup>8</sup>By comparison, the CBO projected a 2.8 percent rate of real GNP growth and an 8.5 percent rate of inflation.

<sup>9</sup>For a statistical investigation of bias in government economic forecasts, see Belongia (1988).

<sup>10</sup>Throughout this article references to the "Reagan plan" are to the spending program that *excluded* what they called "unallocated savings." These were cuts in spending for which detail was to be provided later.

<sup>11</sup>The results of an alternative analysis using a small model of budget determination appears in appendix A.

## Figure 2 Federal Surplus/Deficit



### Outlays

One major objective of Reagan's economic program was to

reduce the rate at which government spending increases. . . . Thus, the badly needed effort to "cut" the budget really refers to reductions in the amount of increase in spending requested from one year to the next.<sup>12</sup>

The 1981 program for reducing the growth of outlays was subject to some confusion, however, because a target ceiling was set which included substantial "unallocated savings" that were to be specified later. In the following discussion, these unallocated savings are ignored.

Figure 3 shows the Reagan plan for real federal outlays along with actual real outlays. Total outlays in real terms clearly did not slow as much as planned. From 1976 to 1980, the average growth rate of real federal outlays was 3.5 percent. The actual rate of increase from 1980 to 1988 was 2.9 percent, only slightly slower than from 1976 to 1980 and well in excess of the 1.1 percent rate that the administration had projected in 1981.

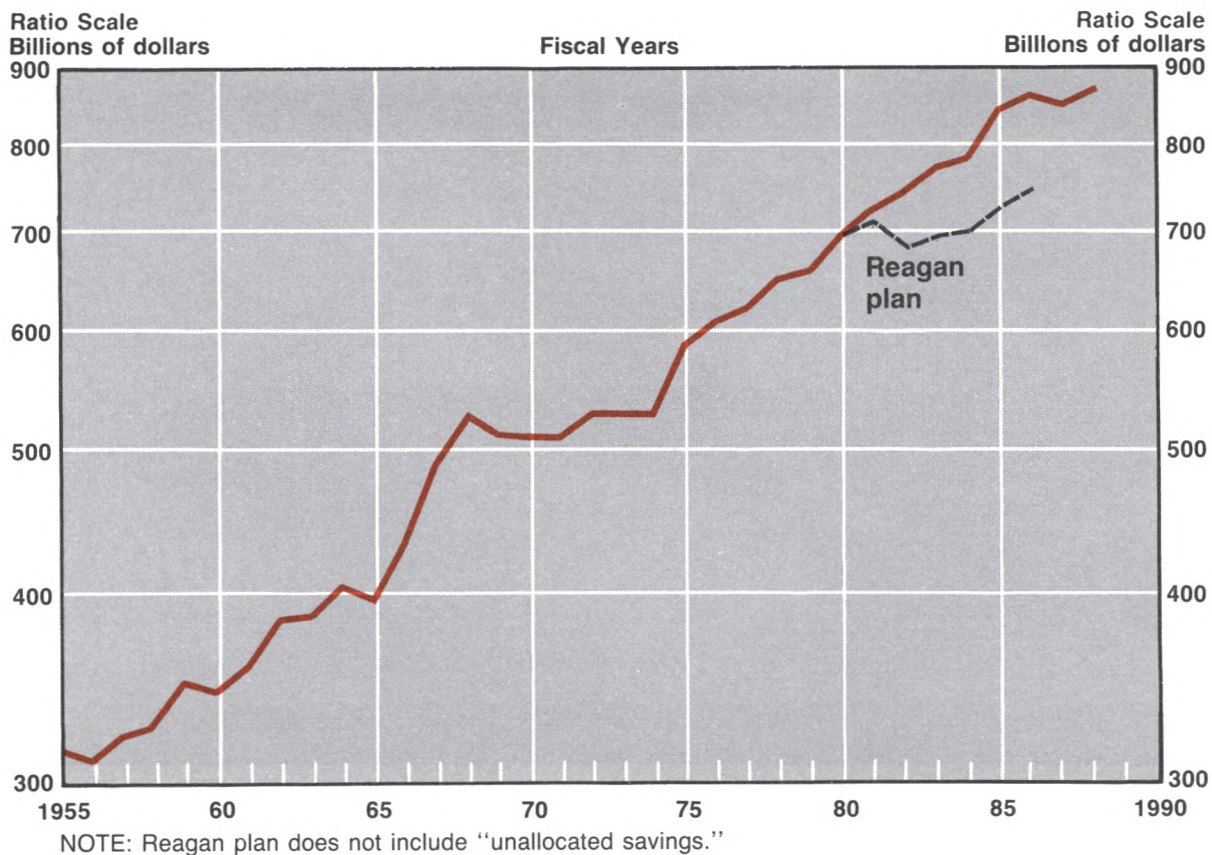
As figure 4 shows, another way to summarize budget trends is to examine the ratio of outlays to GNP. From 1955 to 1980, the ratio of total outlays to GNP rose, albeit irregularly.<sup>13</sup> Although the Reagan plan intended to reverse this trend sharply after 1981, this did not occur.<sup>14</sup>

<sup>12</sup>*America's New Beginning* . . . (1981), p. 10.

<sup>13</sup>This irregular movement reflects, among other factors, the business cycle as it affects both GNP and total outlays.

<sup>14</sup>The discrepancy in the 1980 ratio between the Reagan plan and the realized outcome reflects the upward revisions of GNP that have occurred since 1981.

**Figure 3**  
**Total Outlays (constant 1982 dollars)**



## Receipts

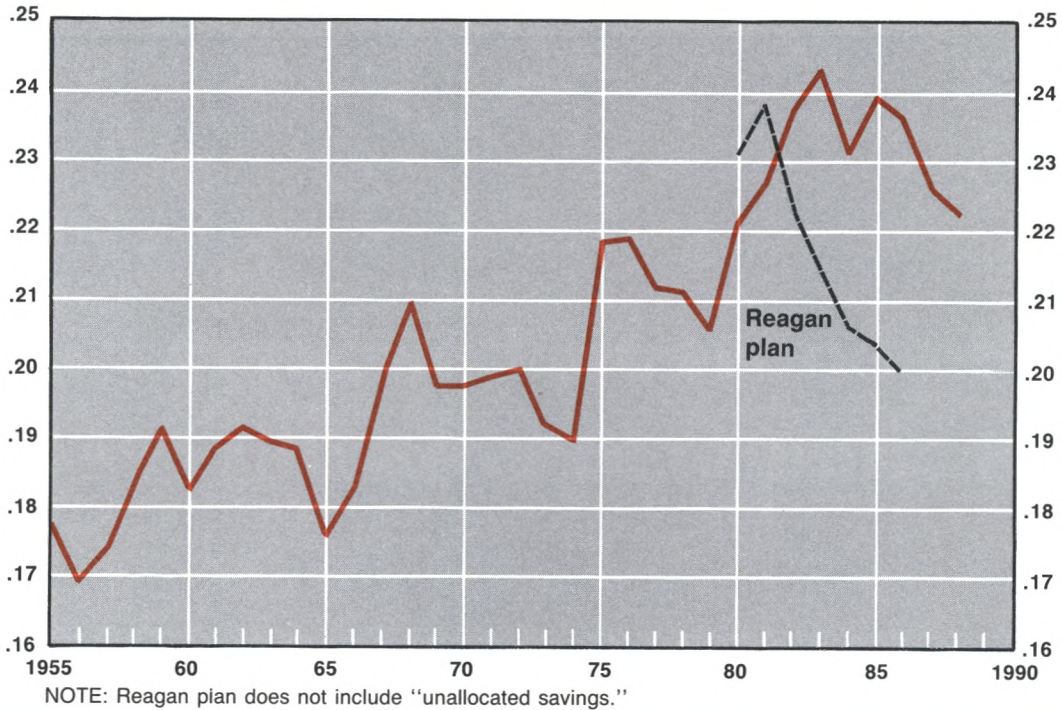
Another key part of the 1981 economic program was a set of tax proposals that was intended "to improve the after-tax, after-inflation rewards to work, saving, and investment."<sup>15</sup> Among these proposals were reductions in marginal tax rates for individuals of 10 percent a year for three years starting July 1, 1981. For corporations, the chief feature of the proposed tax changes was an accelerated recovery rate for the cost of machinery and equipment and certain structures to be phased in over five years. In general, the effect of the proposed tax changes was to slow the growth of federal receipts by reducing the role of individual income taxes and corporate income taxes in the revenue structure.

Figure 5 shows the Reagan plan for total receipts along with actual receipts, both converted to constant 1982 dollars. Clearly, the trend of real total receipts slowed after 1981 and was much slower than planned. Real receipts plummeted in 1982 and 1983 due both to the reduction in tax rates and the 1981–82 recession. Since then, receipts have grown faster than in the 1981 Reagan forecast; because they fell so much in 1982 and 1983, however, their 1986 level was still below that projected by the administration in 1981.

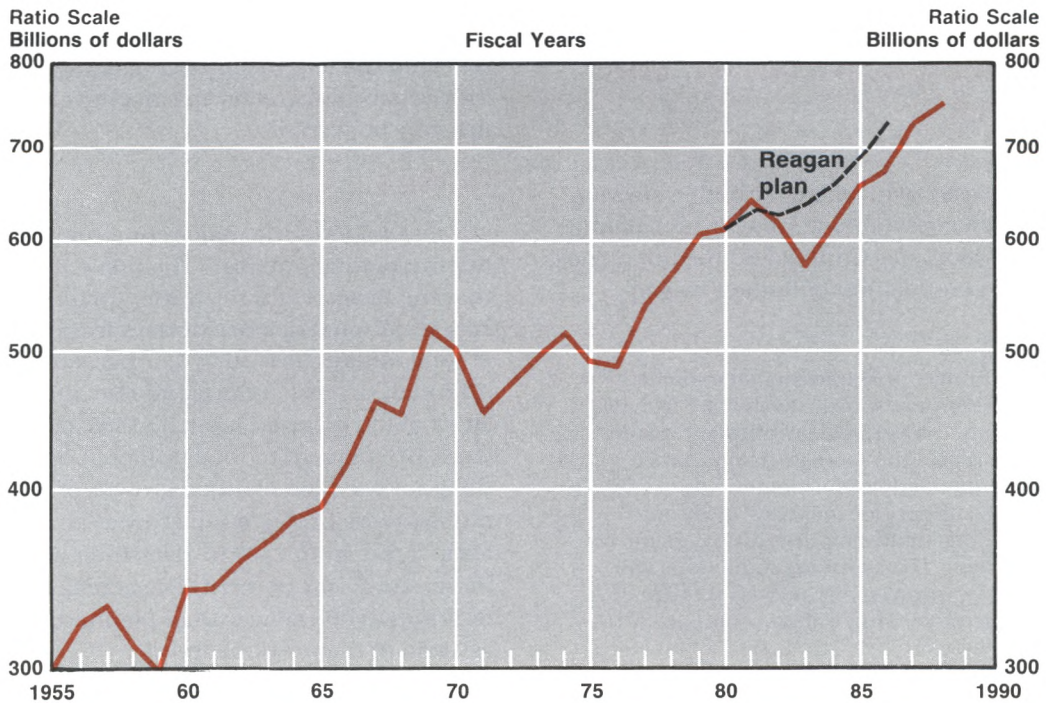
When total receipts are charted relative to GNP (figure 6), the difference between what was planned in 1981 and what actually happened is quite pronounced. In an alternative way, this difference shows the influence of the recession and how it suppressed federal receipts relative to GNP.

<sup>15</sup>*America's New Beginning* . . . (1981), p. 9.

**Figure 4**  
**Total Outlays Relative to Gross National Product**

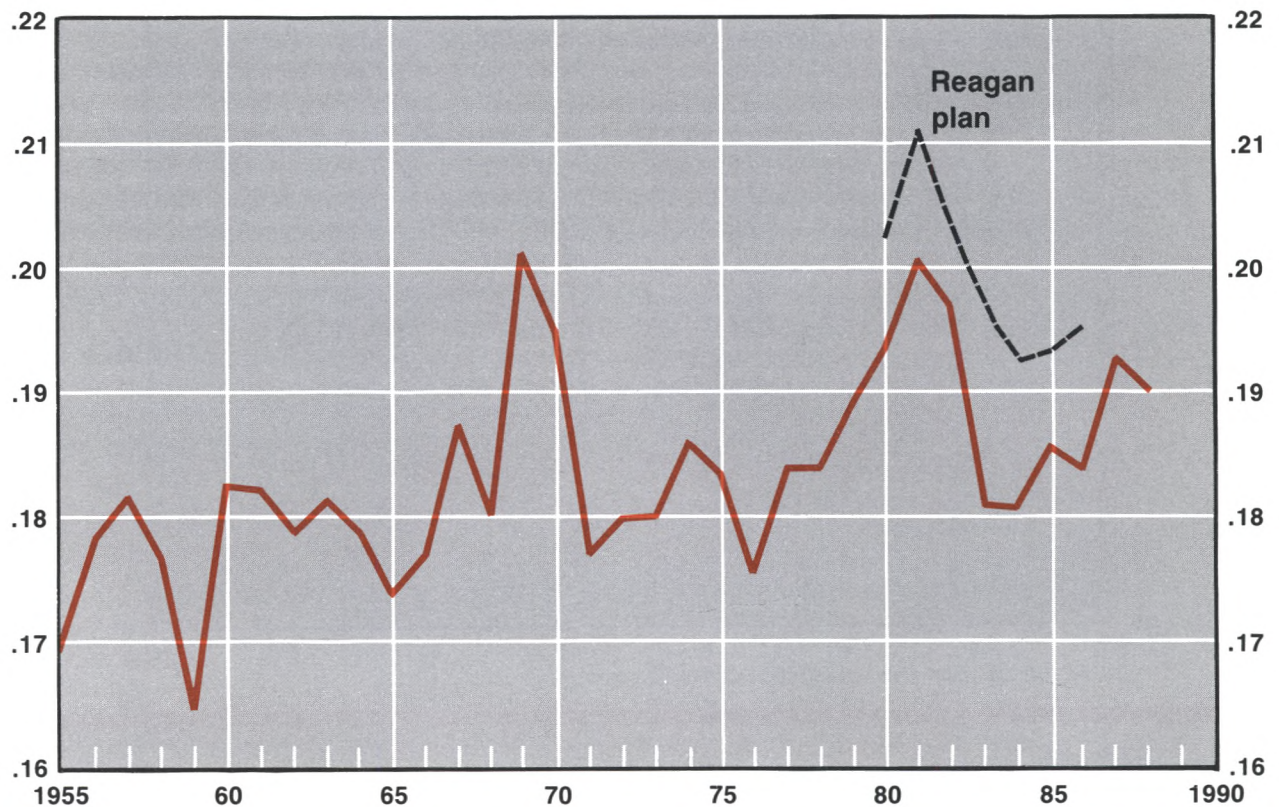


**Figure 5**  
**Total Receipts (constant 1982 dollars)**





**Figure 6**  
**Total Receipts Relative to Gross National Product**



### THE COMPOSITION OF THE BUDGET: REALIZATIONS VS. THE REAGAN PLAN

The 1981 Reagan plan called for both a slowing in the growth of government outlays and a change in the composition of spending and receipts. The change in the composition of outlays was intended to:

shift Federal budget priorities so that Federal resources are spent for purposes that are truly the responsibility of the national government . . . our budget plans reflect the increased importance attached to national defense, maintain the Federal Government's support for the truly needy, and fulfill our responsibilities for interest payments on the national debt. The spending reductions will restrain Federal involvement in areas that are properly left to State and local governments or to the private sector.<sup>16</sup>

The projected composition of total receipts reflected the two major tax changes: tax relief for individuals and greater tax incentives for investment by businesses.

### Outlays

Table 1 shows the major components of outlays relative to total outlays.<sup>17</sup> The first column shows that the Reagan administration planned to increase national defense outlays from 22.9 percent of total outlays in 1980 to 35.7 percent in 1986. Although defense outlays did rise, the increase fell short of the planned level; by 1986, defense outlays were 27.6 percent of total outlays. Looking at it in a different way, the planned growth of real defense outlays were projected to grow at an 8.6 percent annual rate from 1980 to 1986; their actual rate of increase was 6.2 percent. The actual defense build-up, while slower than planned, did mark a reversal of the previous trend.

<sup>16</sup>*Ibid.*, p. 11.

<sup>17</sup>See appendix B for additional detail on these components.

Table 1  
Composition of Federal Outlays (percent of total)

Year	National defense		Payments to individuals		All other grants		Net interest		All other	
	Actual	Reagan plan	Actual	Reagan plan	Actual	Reagan plan	Actual	Reagan plan	Actual	Reagan plan
1955	62.4%		20.9%		2.3%		7.2%		7.2%	
1960	52.2		26.2		4.9		7.5		9.2	
1965	42.8		28.0		6.1		7.3		15.8	
1970	41.8		33.1		7.9		7.4		9.9	
1975	26.0		46.2		10.0		7.0		10.8	
1980	22.7	22.9%	47.0	45.7%	10.1	9.6%	8.9	8.8%	11.4	13.0%
1981	23.2	23.9	47.7	46.8	8.5	8.1	10.1	9.4	10.4	11.8
1982	24.8	26.5	47.8	47.4	6.7	6.6	11.4	9.6	9.2	9.9
1983	26.0	29.3	48.9	47.3	6.3	5.9	11.1	8.9	7.7	8.6
1984	26.7	31.0	46.9	47.6	6.2	5.4	13.0	8.2	7.1	7.8
1985	26.7	34.0	45.0	46.9	6.1	4.9	13.7	7.3	8.5	6.9
1986	27.6	35.7	45.4	46.4	6.0	4.7	13.7	6.5	7.3	6.8
1987	28.1		46.7		5.2		13.8		6.3	
1988	27.3		46.9		5.1		14.3		6.5	

The nondefense portion of the budget was reduced, but, again, not to the extent that was planned. The plan called for nondefense outlays to fall to 64.3 percent of the total by 1986; the actual proportion was 72.4 percent. Table 1 provides further detail on nondefense outlays. While the plan for payments to individuals, relative to total outlays, seems close to the mark, the growth rate comparison shows a different story. Individual payment outlays rose faster than planned in real terms; the planned increase was a 1.6 percent average annual rate from 1980 to 1986 compared with the actual 2.8 percent rate of increase.

For the category of "all other grants" (the third column of table 1), the planned decline was realized in the first two years, but not afterward. Although grants in real terms fell rather dramatically at a 4.8 percent rate from 1980 to 1986, this was still less than the 10.7 percent rate of decline planned by the 1981 administration.

The fourth column of table 1 shows the most dramatic departure from the 1981 plan. Net interest outlays were forecast to decline sharply; instead, however, they rose sharply. Because this component of outlays cuts across all factors that affect the budget and reflects the general interaction of the budget with the economy, this forecast error serves as a summary measure of the accuracy of both the budget plan and the economic

forecast.<sup>18</sup> Because outlays grew faster than planned while receipts rose more slowly, net interest outlays were twice as large as planned in 1981. Errors in receipts (overestimated) and outlays (underestimated), combined with an underestimate of interest rates, produced these large errors.

The final "all other" category of outlays shows a decline very close to, but generally somewhat less than planned.

### Receipts

Table 2 shows the components of receipts relative to the total. The first column, individual income taxes, reflects the ambitious nature of the 1981 tax proposal. The administration proposed a 30 percent reduction in marginal tax rates for individuals over a three-year period beginning July 1, 1981. Marginal rates were to be reduced from an existing range of 14 percent to 70 percent to a range of 10 percent to 50 percent by January 1, 1984. This proposal was expected to reduce individual income taxes from near 47 percent of total receipts in 1980 to 43.9 percent in 1983; the percentage was then forecast to rise to 46.7 in 1986 because of its expected stimulus to activity via incentives to work and invest.

The general movement of individual income taxes relative to the total went according to plan;

<sup>18</sup>See appendix A.

Table 2

**Composition of Federal Receipts (percent of total)**

Year	Individual income taxes		Corporation income taxes		Social insurance taxes		Excise taxes		Other	
	Actual	Reagan plan	Actual	Reagan plan	Actual	Reagan plan	Actual	Reagan plan	Actual	Reagan plan
1955	43.8%		27.3%		12.1%		13.9%		2.9%	
1960	44.0		23.2		15.9		12.6		4.2	
1965	41.8		21.8		19.0		12.5		4.9	
1970	46.9		17.0		23.0		8.1		4.9	
1975	43.9		14.5		30.3		5.9		5.4	
1980	47.2	46.9%	12.5	12.4%	30.5	30.9%	4.7	4.7%	5.1	5.1%
1981	47.7	46.2	10.2	10.8	30.5	31.1	6.8	7.3	4.8	4.7
1982	48.2	44.3	8.0	9.6	32.6	33.0	5.9	8.6	5.4	4.5
1983	48.1	43.9	6.2	9.7	34.8	33.8	5.9	8.0	5.1	4.6
1984	44.8	44.1	8.5	9.3	35.9	34.2	5.6	7.6	5.2	4.9
1985	45.6	45.1	8.4	8.4	36.1	34.8	4.9	7.0	5.1	4.6
1986	45.4	46.7	8.2	7.7	36.9	34.8	4.3	6.4	5.2	4.3
1987	46.0		9.8		35.5		3.8		4.9	
1988	44.1		10.4		36.8		3.9		4.8	

the timing, however, was substantially different for several reasons. One of these was the timing of the actual legislation. What's more, an unanticipated recession occurred, and the anticipated boom in economic activity that was expected to follow on the heels of the tax program failed to develop.

The second column of table 2 summarizes corporate income taxes. Again, the Reagan plan was broadly realized. Corporate taxes were reduced and their role in the tax system was reduced, at least through 1986. The planned and the actual percentages were quite close in 1986, although the actual path of arrival from 1981 to 1986 was somewhat different than planned. Corporate income taxes were severely affected by the 1981–82 recession, dropping as a percentage of total receipts in 1982–83. Despite the erroneous economic forecast, however, the general contours of the Reagan corporate tax plans were realized. This pattern has been reversed since 1986, however; the Tax Reform Act of 1986 tightened provisions for accelerated depreciation of plant and equipment and repealed the investment tax credit. These results have cancelled, to some extent, the effects of the 1981 tax act.

The evolving role of social insurance contributions in the tax system is shown in the third column of table 2. The actual ratio followed the plan very closely through 1982, but moved well above the forecast after that. This divergence reflected mainly the 1983 social security amend-

ments that accelerated collections to keep the social security program afloat.

The fourth column of table 2 shows the proportion of excise taxes to total receipts. The 1981 Reagan administration forecast a sharp increase in 1981 and 1982, followed by a steady decline. This general pattern occurred, except that the peak was in 1981 and was at a much lower level than forecast. The discrepancy between what was planned and what actually occurred was mainly the result of much smaller than expected gains from the windfall profits tax; oil price forecasts were erroneous.

Finally, the "all other" category, which is unimportant relative to the total, was underestimated. The major taxes in this category are estate and gift taxes, customs duties and Federal Reserve deposits. The dollar amount of all other receipts was forecast accurately; because the total was overestimated (figures 5 and 6), however, "all other" receipts as a proportion of the total was underestimated.

### **SUMMARY EVALUATION OF 1981 REAGAN BUDGET PLAN**

Table 3 summarizes the 1981 Reagan budget plan and compares its individual components with trends prior to 1981 and what actually occurred after 1981. Rates of change for budget totals

Table 3

**Federal Budget Trends and the Reagan Plan (constant fiscal year 1982 prices, annual rates of change)**

	1976-80 Trend	1981 Reagan plan 1980-86	1980-88 Trend	Consistent with Reagan plan? <sup>1</sup>
<b>Outlays</b>				
Total	3.5%	1.1% <sup>2</sup>	2.9%	No
Defense	1.7	8.6	5.6	Yes
Nondefense	4.1	-1.8	2.0	No
Payments for individuals	2.7	1.6	2.6	No
All other grants	1.6	-10.7	-5.5	Yes
Net interest	9.6	-5.5	9.1	No
All other	8.7	-9.2	-3.9	Yes
<b>Receipts</b>				
Total	5.8	3.0	2.6	Yes
Individual income	7.6	2.9	1.7	Yes
Corporate income	3.0	-4.8	0.3	No
Social insurance	5.8	5.1	5.0	Yes
Excise	0.8	8.5	0.2	No
All other	2.3	0.2	1.9	No

<sup>1</sup>If 1980-1988 trend is closer to Reagan plan than to 1976-80 trend, yes; otherwise, no.

<sup>2</sup>Including "unallocated savings," the rate of change was 0.3 percent.

and their major components are calculated from the constant dollar measures. A broad judgment is reached on whether actual performance was consistent with the Reagan plan depending on whether the actual 1980-88 trend was closer to the Reagan plan than the prior 1976-80 trend.

The 1980-88 total outlay performance was inconsistent with the 1981 plan. Although the annual growth rate of total real outlays slowed from a 3.5 percent rate to a 2.9 percent rate, this was still substantially above the Reagan estimate of 1.1 percent. Total real receipts, on the other hand, grew at a rate consistent with the 1981 plan; they actually slowed more than planned because of the 1981-82 recession.

An examination of the growth of the components of real outlays shows that some moved in a direction consistent with 1981 plan. Real defense outlays did not rise as much as planned; however, their growth accelerated substantially from the 1976-80 period. Although real nondefense outlays grew much more slowly, the Reagan plan called for a decline. The components of real nondefense outlays showed mixed results. Growth in real payments for individuals and net interest slowed only slightly. The other two categories, however,

showed a sharp reversal from the prior four years, although not as much as was planned.

Though real total receipts moved consistently with the Reagan plan, the components of the total showed mixed results. Real individual income taxes rose more slowly than planned, chiefly because economic growth was overestimated, but their growth was down sharply from the 1976-80 trend. Real corporate income taxes slowed, but not to the extent outlined in the 1981 plan. Real social insurance contributions grew at rates very close to what was forecast in 1981. Both the excise and "all other" components of total receipts were estimated incorrectly, but this had little consequence since they are such small proportions of total receipts.

## CONCLUSION

In 1981, the newly inaugurated Reagan administration formulated a budget plan designed to slow the growth of government and boost incentives (via taxes) to save, invest and work. Included in the projections was a movement toward a balanced federal budget by 1986. The actual rise in the federal deficit since 1981, culminating with a \$221

billion deficit in 1986, suggests that the Reagan budget program failed. Examination of the factors contributing to the deficit as well as the composition of both outlays and receipts, however, indicates broadly why this result occurred and points out that there were a number of successes as well as failures when individual components of the federal budget are considered.

Total receipts in 1986 were overestimated by about \$170 billion, mainly because the 1981–82 recession was not anticipated. The major tax proposals were adopted, although not in their exact form nor according to the proposed timetable. Because of differences in timing and subsequent legislation, the actual composition of total receipts varied somewhat from the 1981 projections. The direction of movement, however, was generally as projected for individual income taxes, corporate income taxes and social insurance contributions. The largest error in the projected composition of total receipts was for excise taxes, chiefly because the forecast of oil prices was in error with the result that the windfall profits tax did not produce revenues as expected.

Total outlays were underestimated by about \$30 billion in 1986 (or more than \$70 billion if the 1981 estimate includes “unallocated savings”). Further examination of outlays revealed a \$73 billion error in the projection of net interest. This error was largely offset, however, because the actual defense build-up fell about \$69 billion below projections by 1986. The noninterest portion of nondefense spending was underestimated by \$15 billion, or 5 percent.

In general, if one looks at budget outlays, the Reagan program enjoyed some success: the decline in the relative role of defense outlays was reversed; payments for individuals relative to total outlays continued roughly as planned; all other grants and the residual category of “all other out-

lays” continued to decline from their peaks in the late 1970s or 1980. The major exception to the 1981 plan was the rise in net interest outlays produced by failures to forecast the 1981–82 recession (which slowed the growth of receipts), the level of interest rates, and the cumulative effect on outlays of compounding interest on a growing national debt.<sup>19</sup>

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<sup>19</sup>See appendix A and Carlson (1984).

## Appendix A

### The Impact of Economic Assumptions on the 1981 Reagan Budget Plan

An alternative method of evaluating the 1981 budget plan is to simulate the effect on the budget of economic conditions different from those assumed in planning the budget. An updated version of a budget model previously presented in this *Review* was used to do this.<sup>1</sup> The model consists of three parts: an estimate of the impact of inflation and real growth on both (1) primary receipts and (2) primary outlays, and (3) an estimated equation for net interest outlays. The latter reflects the indirect effects of inflation and real

growth on receipts and outlays as well as the effect of interest rate changes.

First, the 1981 Reagan budget plan was separated into primary receipts, primary outlays and net interest (see table A1). The effects of actual inflation, real growth and interest rates then were calculated, yielding simulated values of primary receipts and outlays and interest cost for the 1981–86 period. These simulation results are shown in table A2.

Table A1  
The 1981 Reagan Budget Plan (billions of dollars)

Year	Primary receipts	Primary outlays	Primary surplus/deficit	Federal Reserve deposits	Total receipts	Net interest	Total outlays	Surplus/deficit
1980	\$508.3	\$541.4	\$ -33.1	\$11.8	\$520.1	\$52.5	\$593.9	\$ -73.8
1981	587.7	614.7	-27.0	12.6	600.3	64.1	678.8	-78.5
1982	637.0	643.8	-6.8	13.3	650.3	68.2	712.0	-61.7
1983	694.0	703.5	-9.5	15.1	709.1	68.9	772.4	-63.3
1984	752.2	756.1	-3.9	18.5	770.7	67.8	823.9	-53.2
1985	831.2	830.2	1.0	18.7	849.9	64.9	895.1	-45.2
1986	921.3	898.4	22.9	18.9	940.2	62.8	961.2	-21.0

Table A2  
The 1981 Reagan Budget Plan: Simulated<sup>1</sup> (billions of dollars)

Year	Primary receipts	Primary outlays	Primary surplus/deficit	Federal Reserve deposits <sup>2</sup>	Total receipts	Net interest	Total outlays	Surplus/deficit
1980	\$508.3	\$541.4	\$ -33.1	\$11.8	\$520.1	\$ 52.5	\$593.9	\$ -73.8
1981	591.2	613.4	-22.2	12.8	604.0	70.9	684.3	-80.3
1982	616.0	650.2	-34.2	15.2	631.2	86.5	736.7	-105.5
1983	611.1	711.3	-100.2	14.5	625.6	97.0	808.3	-182.7
1984	638.6	747.6	-109.0	15.7	654.3	111.3	858.9	-204.6
1985	689.0	810.4	-121.4	17.1	706.1	124.3	934.7	-228.6
1986	725.5	864.7	-139.2	18.4	743.9	134.5	999.2	-255.3

<sup>1</sup>Using actual values of economic variables (real growth, inflation and interest rates)

<sup>2</sup>Actual

<sup>1</sup>See Carlson (1984), appendix B, for a summary of the model. The only difference from that model is that the interest cost equation was reestimated with data through 1986. For an extended discussion of the role of economic assumptions in budget estimates, see Carlson (1983).

Table A3

**Actual Budget Results (billions of dollars)**

Year	Primary receipts	Primary outlays	Primary surplus/deficit	Federal Reserve deposits	Total receipts	Net interest	Total outlays	Surplus/deficit
1980	\$505.3	\$538.4	\$ -33.1	\$11.8	\$517.1	\$ 52.5	\$ 590.9	\$ -73.8
1981	586.5	609.5	-23.0	12.8	599.3	68.7	678.2	-78.9
1982	602.6	660.7	-58.1	15.2	617.8	85.0	745.7	-127.9
1983	586.1	718.5	-132.4	14.5	600.6	89.8	808.3	-207.8
1984	650.8	740.7	-89.9	15.7	666.5	111.1	851.8	-185.3
1985	717.0	816.9	-99.9	17.1	734.1	129.4	946.3	-212.3
1986	750.7	854.3	-103.6	18.4	769.1	136.0	990.3	-221.2
1987	837.3	865.2	-27.9	16.8	854.1	138.6	1003.8	-149.7

The results indicate that had the 1981 budget plan been fully implemented, it would have yielded a deficit of about \$255 billion in 1986. These results are based on the actual course of inflation, real growth and interest rates from 1981 to 1986. Since the actual 1986 deficit was \$221 billion (see table A3), apparently the 1981 program was not implemented as planned. Specifically, from 1981 to 1986, neither total receipts nor pri-

mary outlays increased to the extent originally planned; total outlays increased more than planned because of large errors in estimating net interest. Thus, the actual behavior of key economic variables "overexplains" the deficit. That is, if primary receipts and outlays had performed according to the 1981 plan, the 1986 deficit would have been much larger than it turned out to be.

## Appendix B

### Composition of Federal Outlays

Federal outlays can be classified in terms of two analytical structures: budget function and major program category. The functional classification presents outlays according to the purpose that a federal program is intended to serve. These functions include, for example, national defense, international affairs, energy programs, transportation, health, income security, etc. Two additional categories — net interest and undistributed offsetting receipts — do not address specific functions, but are included to cover the entire budget.

The classification of federal outlays by major program category focuses on the method of carrying out an activity. The major program categories are national defense, benefit payments for individuals, grants to state and local governments (other than for benefit payments), net interest and all other outlays. National defense and net interest correspond to the functional categories of the same name, but the remaining major program categories do not correspond to a simple summing of functional categories. Nonetheless, approximations can be made. The accompanying table groups 1988 outlays by function to provide added information about the major program categories discussed in the text.

Table B1

#### 1988 Federal Outlays (billions of dollars)

Category	Amount
Total	\$1,064.0
National defense	290.4
Benefit payments for individuals <sup>1</sup>	501.4
Health and medicare	123.4
Social security	219.3
Income security	129.3
Veterans benefits and services	29.4
Other grants to state and local governments <sup>1</sup>	50.0
Natural resources and environment	3.7
Agriculture	2.1
Transportation	18.1
Community and regional development	4.3
Education, training, employment and social services	19.9
General government	1.9
Net interest	151.7
All other <sup>1</sup>	70.4
International affairs	10.5
General science, space and technology	10.8
Energy	2.3
Natural resources and environment	10.9
Agriculture	15.1
Commerce and housing credit	18.8
Transportation	9.2
Community and regional development	1.0
Education, training, employment and social services	12.0
Administration of justice	9.2
General government	7.6
Undistributed offsetting receipts	-37.0

<sup>1</sup>Amounts shown are the sums for the functions listed under them and differ slightly from the categories discussed in the text.



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# An Introduction to Non-Tariff Barriers to Trade

**R**ESTRICTIONS on international trade, primarily in the form of non-tariff barriers, have multiplied rapidly in the 1980s.<sup>1</sup> The Japanese, for example, began restricting automobile exports to the United States in 1981. One year later, the U.S. government, as part of its ongoing intervention in the sugar market, imposed quotas on sugar imports.

The increasing use of protectionist trade policies raises national as well as international issues. As many observers have noted, international trade restrictions generally have costly national consequences.<sup>2</sup> The net benefits received by protected domestic producers (that is, benefits reduced by lobbying costs) tend to be outweighed by the losses associated with excessive production and restricted consumption of the protected goods. Protectionist trade policies also cause foreign adjustments in pro-

duction and consumption that risks retaliation by the affected country.

As a type of protectionist policy, non-tariff barriers produce the general consequences identified above; however, there are numerous reasons, besides their proliferation, to focus attention solely on non-tariff barriers.<sup>3</sup> Non-tariff barriers encompass a wide range of specific measures, many of whose effects are not easily measured. For example, the effects of a government procurement process that is biased toward domestic producers are difficult to quantify. In addition, many non-tariff barriers discriminate among a country's trading partners.

This discrimination violates the most-favored-nation principle, a cornerstone of the General Agreement on Tariffs and Trade (GATT), the multinational agreement governing international trade. Not only does the most-favored-nation

<sup>1</sup>See Page (1987) for a general discussion indicating that the proliferation of trade restrictions in recent years has taken the form of non-tariff, as opposed to tariff, barriers. A recent Congressional Budget Office study (1987) notes that the average tariff rate for most developed countries is less than 5 percent. There is no evidence of rising tariff rates or coverage. For example, U.S. tariff revenue as a percentage of total imports has changed very little between 1975 (3.9%) and 1986 (3.6%). See the *Statistical*

*Abstract of the United States* (various editions) for the figures for other years.

<sup>2</sup>For example, see Coughlin et al. (1988).

<sup>3</sup>See chapter 1 in Laird and Yeats (forthcoming) for a discussion of the policy issues raised by non-tariff barriers.

principle require that a country treat its trading partners identically, but it also requires that trade barrier reductions negotiated on a bilateral basis be extended to all GATT members. By substituting bilateral, discriminatory agreements for multilateral approaches to trade negotiations and dispute settlement, countries raise doubts about the long-run viability of GATT.

This paper provides an introduction to non-tariff barriers. We begin by identifying numerous non-tariff barriers and document their proliferation. We then use supply and demand analysis to identify the general effects of two frequently used non-tariff barriers: quotas and voluntary export restraints. Next, we consider why non-tariff barriers are used instead of tariffs. A brief history of GATT's attempts to counteract the expansion of non-tariff barriers completes the body of the paper.

## **NON-TARIFF BARRIERS: TYPES AND USE**

A tariff is a tax imposed on foreign goods as they enter a country; non-tariff barriers, on the other hand, are non-tax measures imposed by governments to favor domestic over foreign suppliers. Non-tariff barriers encompass a wide range of measures. Some have relatively unimportant trade effects. For example, packaging and labeling requirements can impede trade, but usually only marginally. Other non-tariff measures such as quotas, voluntary export restraints, trade restraints under the Multifiber Arrangement, non-automatic import authorizations and variable import levies have much more significant effects.<sup>4</sup> These "hard-core" non-tariff measures are designed to reduce imports and, thereby, benefit domestic producers. The discussion below focuses on these hard-core barriers.

### **Quotas**

A quota is simply a maximum limitation, specified in either value or physical units, on imports of a product for a given period. It is enforced through licenses issued to either importers or exporters and may be applied to imports from specific countries or from all foreign

countries generally. Two examples illustrate these different characteristics. The United States imposes a general quota on dried milk imports; licenses are granted to certain U.S. trading companies, who are allowed to import a maximum quantity of dried milk based on their previous imports. In a different situation U.S. sugar imports are limited by a quota that specifies the shares of individual countries; the right to sell sugar to the United States is given directly to the governments of these countries.

### ***Voluntary Export Restraints and the Multifiber Arrangement***

Voluntary export restraints, which are nearly identical to quotas, are agreements between an exporting and an importing country limiting the maximum amount of exports in either value or quantity terms to be sold within a given period. Characterizing these restraints as "voluntary" is somewhat misleading because they are frequently designed to prevent official protective measures by the importing country. In the 1980s, for example, exports by the Japanese automobile industry to the United States and the United Kingdom have been limited "voluntarily" to prevent the governments of these countries from directly limiting imports of Japanese autos.

An example of a voluntary export restraint on a much broader scale is the Multifiber Arrangement. Originally signed in 1974 as a temporary exception to GATT and renewed three times since, the Multifiber Arrangement allows for special rules to govern trade in textiles and apparel. Under this agreement, quotas are set on most imports of textiles and apparel by developed countries from developing countries, while imports of textiles and apparel from other developed countries except Japan are not subject to any restrictions. Multilateral voluntary export restraint agreements are frequently called "orderly marketing agreements."

### ***Non-Automatic Import Authorizations***

Non-automatic import authorizations are non-tariff barriers in which the approval to import is not granted freely or automatically. There

<sup>4</sup>This subset of non-tariff barriers is taken from Laird and Yeats (forthcoming). This subset excludes a number of non-tariff barriers that can also have sizeable effects. Among these are government procurement policies, delays

at customs, health and sanitary regulations, technical standards, minimum import price regulations, tariff quotas and monitoring measures. See appendix 4 in Laird and Yeats for a glossary of terms associated with non-tariff barriers.

are two general categories of non-automatic licensing.

Discretionary licensing, often called liberal licensing, occurs when an importer's government must approve a specific import; however, precise conditions to ensure approval are not specified. Frequently, this form of licensing is used to administer quantitative limits. Under the current restraints on U.S. imports of steel, a domestic user can request authorization to exceed the maximum import limitation if the specific product is unavailable domestically at a reasonable cost. Exactly how availability and cost considerations affect the probability of an approval are left to the discretion of the authorities.

The second category of non-automatic import licensing requires the importer to meet specific conditions, such as minimum export performance, the use of the imported good for a specific purpose or required purchases of domestic products. In an export-import linkage scheme, a firm's value of imported components is limited to a maximum percentage of the value of its exports. This measure is intended to improve a country's trade balance and protect domestic producers of components.<sup>5</sup> Export-import linkage requirements are numerous. For example, in Yugoslavia during the early 1980s, authorized importers of automobiles were required to export goods totaling at least 30 percent of the value of each imported automobile.<sup>6</sup>

### *Variable Import Levies*

Variable import levies are special charges set to equalize the import price of a product with a

domestic target price. The levies are variable so that as the world price of a product falls (rises), the levy rises (falls).<sup>7</sup> The result is that price changes in the world market will not affect directly the domestic price. These measures are an integral aspect of the European Community's Common Agricultural Policy. For example, in March 1987, the European Community's price for wheat was \$8.53 per bushel, while the world price was \$1.95 per bushel. Prospective importers were faced with a levy of \$6.58 per bushel.<sup>8</sup>

### *The Use and Expansion of Non-Tariff Barriers*

In a current study, Laird and Yeats (forthcoming) measure the share of a country's imports subject to hard-core non-tariff barriers. Because countries frequently impose non-tariff barriers on the imports of a specific good from a specific country, but not on imports of the same good from another country, they disaggregated each country's imports by both product and country of origin to permit calculation of the total value of a country's imports subject to non-tariff barriers. Each country's "coverage ratio" is simply the value of imports subject to non-tariff barriers divided by the total value of imports.<sup>9</sup>

Table 1 shows the trade coverage ratio for 10 European Community and six other industrial countries for 1981 and 1986. In computing this ratio, the 1981 and 1986 non-tariff measures are applied to a constant 1981 trade base. Thus, the figures identify changes in the use, but not the intensity, of specific non-tariff measures, while holding constant the effects of trade changes.

<sup>5</sup>See Herander and Thomas (1986) for a theoretical demonstration that an export-import linkage scheme might not improve a country's trade balance.

<sup>6</sup>For details on the policies of Yugoslavia as well as numerous other countries, see "Survey of Automotive Trade Restrictions Maintained by Selected Nations" (1982).

<sup>7</sup>Variable import levies, which are actually variable tariffs, are considered non-tariff barriers in this study for two reasons. First, the international trade literature generally characterizes variable import levies as non-tariff barriers. See Nogués et al. (1986) for another list of non-tariff barriers that includes variable import levies. Second, Laird and Yeats (forthcoming) provide the most up-to-date data on non-tariff barriers and we have no way to remove variable import levies from their data.

<sup>8</sup>The numerical example is from Coughlin and Carraro (1988).

<sup>9</sup>One weakness of the coverage ratio as a measure of protectionism is that more-restrictive non-tariff barriers tend to

receive a lower weight in the construction of the coverage ratio than less-restrictive ones. For example, a non-tariff barrier that eliminated all imports of a good from a country would have a smaller impact on the coverage ratio than a less-restrictive measure. Assume that one country's imports are valued at \$100, \$15 of which comes from country A, and there are no non-tariff barriers. In this case, the coverage ratio is zero. Suppose that a non-tariff barrier is now imposed on imports of goods from country A. In the first case, assume that imports from country A decline from \$15 to \$10; alternatively, suppose that imports decline from \$15 to zero. The non-tariff barrier in the second case is more restrictive; however, the change in the coverage ratio does not reflect this fact. The coverage ratio becomes 10.5 percent ( $\$10/\$95$ ) in the first case and zero percent ( $\$0/\$85$ ) in the second. Thus, the "intensity" of the protection provided by non-tariff barriers is not measured accurately by this coverage ratio. An alternative measure focusing on the share of trade "affected" by non-tariff barriers, which also highlights the proliferation of non-tariff barriers, can be found in Laird and Yeats (1989).

Table 1

### Non-tariff Trade Coverage Ratios for OECD Countries

Importer <sup>1</sup>	Trade Coverage Ratio <sup>2</sup>		
	1981	1986	Difference
Belgium-Luxembourg	12.6%	14.3%	1.7%
Denmark	6.7	7.9	1.2
Germany, Fed. Rep.	11.8	15.4	3.6
France	15.7	18.6	2.9
Greece	16.2	20.1	3.9
Great Britain	11.2	12.8	1.6
Ireland	8.2	9.7	1.5
Italy	17.2	18.2	1.0
Netherlands	19.9	21.4	1.5
EC (10) <sup>3</sup>	13.4	15.8	2.4
Switzerland	19.5	19.6	0.1
Finland	7.9	8.0	0.1
Japan	24.4	24.3	-0.1
Norway	15.2	14.2	-1.0
New Zealand	46.4	32.4	-14.0
United States	11.4	17.3	5.9
All above	15.1	17.7	2.6

NOTE: Non-tariff measures include variable import levies, quotas, non-automatic import authorizations including restrictive import licensing requirements, quantitative "voluntary" export restraints and trade restraints under the Multifiber Arrangement.

<sup>1</sup>The following Organization for Economic Cooperation and Development (OECD) countries — Australia, Canada and Sweden — were excluded from the computations because of problems in compiling their non-tariff measures.

<sup>2</sup>The share of total imports (by value) subject to hard-core non-tariff measures. In computing this index, 1981 and 1986 non-tariff measures are applied to a constant 1981 trade base. Petroleum products have been excluded from the calculations.

<sup>3</sup>European Community intra-trade is excluded.

SOURCE: Laird and Yeats (forthcoming).

A number of facts emerge. First, the coverage ratio varies substantially across countries. In 1981, the coverage ratio ranged from 6.7 percent in Denmark to 46.4 percent in New Zealand and, in 1986, from 7.9 percent in Denmark to 32.4 percent in New Zealand. Second, for most countries, the coverage ratio has increased. This caused the coverage ratio using the world trade figures of all 16 countries to increase from 15.1 percent in 1981 to 17.7 percent in

1986. Third, the United States had the largest percentage-point increase, as its coverage ratio increased from 11.4 percent in 1981 to 17.3 percent in 1986. The 5.9 percentage-point increase was more than double the increase for all countries.

Laird and Yeats provide evidence that exports from developing countries to industrial countries are affected to a larger extent than trade among industrial countries. For example, the 1981 trade coverage ratio was 18.8 percent for developing country exports to industrial countries and 14.3 percent for intra-industrial country trade. A similar pattern prevailed in 1986 with a coverage ratio of 20.6 percent for developing country exports to industrial countries and 17.5 percent for intra-industrial country trade.<sup>10</sup>

Table 2 contains coverage ratio data on a product basis. As a result of the Multifiber Arrangement, trade in textiles and clothing is subject to non-tariff barriers. For example, slightly more than one-third of European Community and U.S. imports of textiles are affected, while approximately two-thirds of European Community and three-quarters of U.S. imports of clothing are affected. Since these goods are among the most important manufactured exports from developing countries, coverage ratios for imports from developing countries relative to industrial countries tend to be higher.

Table 2 also identifies some other manufactured goods affected substantially by non-tariff barriers, especially iron and steel and transport equipment. More than three-quarters of U.S. imports of iron and steel and more than 40 percent of transport equipment are affected. The corresponding figures for the European Community are 46.2 percent and 23.6 percent.

While trade in manufactured goods is affected substantially by non-tariff barriers, trade in agricultural goods is affected to an even greater extent. The coverage ratios for agricultural goods shown in table 3 are substantially above those for manufactured goods shown in table 2. The agricultural coverage ratios frequently exceed 70 percent; see, for example, the U.S. ratios for sugar and honey (91.9 percent), dairy products (87.8 percent) and oil seeds and nuts (74 percent). Even higher agricultural coverage

<sup>10</sup>While this differential may reflect discrimination directed at developing countries, another interpretation is that the differential is product-based. Chow and Kellman (1988), for

example, show that the relatively higher tariff rates faced by developing countries can be explained by product characteristics.

Table 2

### Coverage Ratios of Selected Non-tariff Measures on Selected Manufactured Goods: 1986

SITC	Description	EC (10) <sup>1</sup>	Switzerland	Finland	Japan	Norway	New Zealand	United States
61	Leather products	7.7%	30.8 %	0.0%	47.0 %	0.0%	59.9%	0.0%
62	Rubber products	9.1	0.0	0.0	13.6	0.7	53.9	0.0
63	Wood and cork	1.0	1.9	0.0	0.0	0.0	53.0	0.0
64	Paper and articles	5.9	0.0	0.0	0.0	0.0	48.6	0.0
65	Textiles	34.7	0.0	1.6	55.5	6.1	27.4	34.5
66	Cement, clay and glass	2.9	0.0	0.0	24.1	0.0	54.5	0.1
67	Iron and steel	46.2	1.0	0.0	0.0	0.0	64.1	76.3
68	Non-ferrous metals	0.8	1.9	3.5	0.4	0.0	8.7	0.0
69	Metal manufactures, n.e.s.	2.1	5.6	0.0	1.0	0.0	35.3	11.0
71	Non-electric machinery	3.1	4.7	0.0	4.4	0.0	35.9	0.0
72	Electric machinery	11.1	0.0	0.0	0.3	0.0	64.0	1.4
73	Transport equipment	23.6	84.7	0.0	17.3	0.0	22.1	41.1
81	Plumbing & lighting fixtures	0.0	0.0	0.0	0.0	0.0	68.2	0.0
82	Furniture	0.3	0.0	0.0	0.0	0.1	0.0	1.1
83	Travel goods	0.9	53.0	0.0	0.0	0.0	100.0	18.9
84	Clothing	65.7	18.6	12.1	11.3	86.5	52.2	76.4
85	Footwear	11.3	74.6	0.0	6.9	0.3	82.9	0.1
86	Instruments	3.8	0.0	0.0	14.1	0.0	5.3	0.0

NOTE: See table 1 for the list of hard-core non-tariff measures. The coverage ratio is, for each given product and country, the imports subject to a hard-core non-tariff measure divided by total imports.

<sup>1</sup>European Community intra-trade is excluded.

SOURCE: Laird and Yeats (forthcoming).

Table 3

### Coverage Ratios of Non-tariff Measures on Selected Agricultural Goods: 1986

SITC	Description	EC (10) <sup>1</sup>	Switzerland	Finland	Japan	Norway	New Zealand	United States
00	Live animals	60.2%	100.0%	95.3%	1.2%	98.0%	0.0%	0.0%
01	Meat	77.8	97.8	89.3	65.7	99.7	14.4	0.0
02	Dairy products	99.7	45.5	100.0	73.2	82.1	12.7	87.8
03	Fish and seafood	4.6	58.3	9.7	100.0	80.4	3.6	0.0
04	Cereals and preparations	96.9	87.8	83.4	32.5	100.0	5.1	0.0
05	Fruits and vegetables	36.0	44.8	51.6	18.3	100.0	39.2	0.9
06	Sugar and honey	85.8	0.0	89.1	84.6	100.0	0.9	91.9
07	Coffee and cocoa	17.5	0.0	0.0	0.0	100.0	0.9	2.3
08	Animal feeds	11.9	30.9	5.3	13.7	92.7	16.9	0.3
09	Food preparations	10.2	13.4	0.0	17.3	100.0	73.7	0.4
11	Beverages	24.9	76.4	88.0	70.7	100.0	5.6	0.0
12	Tobacco	0.0	0.0	0.0	84.3	0.0	5.1	0.0
21	Hides and skins	0.0	99.1	0.0	18.1	0.0	0.0	3.2
22	Oil seeds and nuts	24.8	56.0	100.0	4.3	100.0	0.0	74.0
23	Rubber	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	Wood and cork	0.6	39.6	0.0	0.0	0.0	2.4	0.0
25	Pulp and paper	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	Silk, wool, cotton, etc.	9.0	24.8	0.0	1.2	4.6	16.4	2.1
29	Crude animal & vegetable matter	19.0	78.0	5.3	51.8	69.1	11.2	11.0

NOTE: See table 1 for the list of hard-core non-tariff measures. The coverage ratio is, for each given product and country, the imports subject to a hard-core non-tariff measure divided by total imports.

<sup>1</sup>European Community intra-trade is excluded.

SOURCE: Laird and Yeats (forthcoming).

Table 4  
The Use of Selected Non-tariff Measures

Importer	Share of Imports Facing NTMs, 1981 <sup>1</sup>					Change in the Share of Imports Facing NTMs, 1981-86 <sup>2</sup>				
	QUOT	VER	MFA	NAIA	VIL	QUOT	VER	MFA	NAIA	VIL
Belgium-Luxembourg	0.3%	5.1%	1.2%	5.7%	5.2%	1.1%	2.2%	0.0%	0.0%	0.0%
Denmark	0.3	2.6	2.3	1.1	1.4	0.1	1.2	-0.1	0.0	0.0
Germany, Fed. Rep.	0.5	3.0	4.9	3.0	2.0	0.4	2.0	-0.6	0.0	0.0
France	5.8	1.2	1.8	7.1	2.2	1.6	1.8	0.0	0.0	0.0
Greece	8.2	4.8	1.2	3.9	3.8	0.4	4.4	0.0	0.0	0.0
Great Britain	2.2	2.0	2.9	5.1	4.4	-0.9	2.3	0.0	0.0	0.0
Ireland	0.1	4.6	1.3	2.2	2.2	0.1	1.5	0.0	0.0	0.0
Italy	7.5	0.8	1.8	7.0	6.6	0.6	1.2	-0.1	0.0	0.0
Netherlands	0.4	2.0	3.0	14.0	6.3	2.5	3.6	-0.2	0.0	0.0
EC (10) <sup>3</sup>	2.6	2.3	3.0	5.6	3.7	0.5	2.1	-0.2	0.0	0.0
Switzerland	2.5	0.0	0.4	2.8	0.5	0.0	0.0	0.0	0.0	0.0
Finland	0.9	0.0	0.2	6.7	1.8	0.0	0.0	0.1	0.0	0.0
Japan	14.2	0.0	0.0	7.7	1.8	0.1	0.0	0.0	0.0	0.0
Norway	5.2	0.0	0.0	2.2	0.0	-0.5	0.0	0.0	1.1	0.0
New Zealand	25.3	0.0	0.0	25.6	0.0	1.6	0.0	0.0	-8.8	0.0
United States	0.5	6.9	3.2	0.0	0.0	1.5	4.4	0.0	0.0	1.4
All above	4.0	3.1	2.3	4.2	2.0	0.7	2.2	-0.1	-0.1	0.4

<sup>1</sup>Petroleum products have been excluded from the calculations. The abbreviations for the non-tariff measures are as follows: QUOT—quotas; VER—voluntary export restraints; MFA—restrictions under the Multifiber Arrangement; NAIA—non-automatic import authorizations; and VIL—variable import levies.

<sup>2</sup>The change is the 1986 share less the 1981 share.

<sup>3</sup>European Community intra-trade is excluded.

SOURCE: Laird and Yeats (forthcoming).

ratios are found for the European Community and Japan.

Another dimension of the use of non-tariff barriers concerns differences in the use of specific barriers across countries. Table 4 shows the share of imports (by country) that faced different non-tariff measures in 1981 and how this share changed by 1986. A number of facts emerge. In 1981, non-automatic import authorizations and quotas affected the largest share of imports when all 16 countries are considered; by 1986, this was no longer the case. Voluntary export restraints, whose use in the United States, Greece, the Netherlands and Great Britain rose substantially, affected the largest share of imports (5.3 percent) by 1986. Meanwhile, the share of imports affected by quotas rose from 4 percent in 1981 to 4.7 percent by 1986.

Comparisons of the specific measures across countries indicate that voluntary export restraints were used more extensively by the United States than by other countries. By 1986,

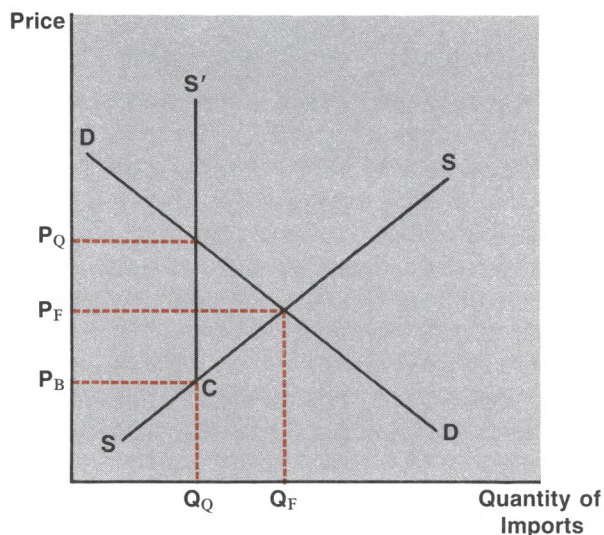
11.3 percent of U.S. imports were affected by voluntary export restraints; Greece, with 9.2 percent, had the next-highest share of its imports affected by these restraints.

### SUPPLY AND DEMAND ANALYSIS USING QUOTAS AND VOLUNTARY EXPORT RESTRAINTS

Although the quantitative effects of non-tariff barriers are not always easily identified and measured, a theoretical identification of their major effects can be derived using supply and demand analysis. We begin by examining the effects of a quota, then discuss how a voluntary export restraint can be analyzed similarly.

In figure 1, DD represents the U.S. import demand curve for some good produced by U.S. and foreign producers. The foreign supply curve (that is, the supply curve for imports into the United States) for the good is SS. With free trade, the United States will import  $Q_F$  units of the good and pay a price per unit of  $P_F$ .

Figure 1  
The Price and Quantity Effects of a Quota and a Voluntary Export Restraint



Now, suppose that an import quota of  $Q_Q$  is imposed by the United States. This restriction causes the import supply curve to become vertical at the restricted quantity. Thus, the import supply curve is the kinked curve  $SCS'$ . The restriction reduces the quantity of imports from  $Q_F$  to  $Q_Q$ , the domestic price to rise from  $P_F$  to  $P_Q$  and the foreign price to decline from  $P_F$  to  $P_B$ .<sup>11</sup> The higher domestic price reduces total U.S. consumption of the good, but increases U.S. production; thus, U.S. producers of the good benefit at the expense of U.S. consumers in general. The difference between what domestic and foreign consumers pay,  $P_B P_Q$ , is a premium per unit of imports that can be appropriated by exporters, importers or government. The method used to allocate import licenses determines the distribution of these premiums among the potential claimants.

A voluntary export restraint has the same general effects as an equivalent quota. A volun-

tary export restraint reduces the quantity of imports, which, in turn, causes the domestic price to rise and the foreign price to fall as shown in figure 1. Again, the higher domestic price benefits U.S. producers of this good at the expense of U.S. consumers. Finally, the difference between what domestic and foreign consumers pay,  $P_B P_Q$ , is a premium per unit of imports that can be captured by exporters, importers or government.

While the supply and demand analysis isolates the major effects of two frequently used non-tariff barriers, it conveys virtually no information about either the magnitude of the costs and benefits of non-tariff barriers or their dynamic consequences.<sup>12</sup> Various case studies, however, have provided estimates of these costs and benefits. A review of this literature can be found in Laird and Yeats. Two case studies are provided in the shaded inserts on pages and as examples of such analyses. The first example examines the impact of the U.S. quota on sugar imports; the second examines the effect of the U.S.-Japanese agreement to limit Japanese automobile exports to the United States.

As a protectionist policy, non-tariff barriers are a method for redistributing wealth from consumers in general to selected firms and workers. This redistribution is abetted by consumer ignorance and the costs of mobilizing an effective force to counteract protectionist demands. As Coughlin et al. (1988) have demonstrated recently, the benefits received by selected groups of firms and workers are far outweighed by the costs borne by the rest of the population.

## WHY USE NON-TARIFF BARRIERS INSTEAD OF TARIFFS?

Since non-tariff barriers have been used increasingly in recent years, an obvious question is why non-tariff barriers rather than tariff bar-

<sup>11</sup>Figure 1 can also be used to illustrate a variable import levy. While a quota limits the quantity of imports, a variable import levy is used to fix the price. Assuming a target (domestic) price of  $P_Q$ , when world prices fall below this price, the levy will be altered automatically to maintain the price of  $P_Q$ . Thus, no matter how far world prices decline, the quantity of imports will not rise above  $Q_Q$ . Consequently, a variable import levy and a quota have the same effect, even though they are implemented differently.

<sup>12</sup>Theoretical research on the impact of non-tariff barriers has explored various issues that we do not mention in the

text, two of which are mentioned below. Since many markets for internationally traded goods are imperfectly competitive, a standard topic in introductory international trade texts is to identify the effect of an import quota in the presence of monopoly. See Krugman and Obstfeld (1988) for an elementary discussion. Since voluntary export restraints discriminate among trading partners, the effects of this differential treatment have been explored. See Jones (1984) for such an analysis.

## A Voluntary Export Restraint in Practice: The U.S.-Japanese Automobile Agreement

One well-known example of a voluntary export restraint is the Japanese restraint on automobile exports to the United States. In early 1981, the Japanese imposed restraints to preempt more restrictive measures advocated by many, especially labor groups, within the United States.<sup>1</sup> These protectionist pressures increased during the late 1970s and early 1980s as automobile sales by U.S. producers declined and foreign producers captured larger shares of the U.S. market.

Collins and Dunaway (1987), as well as many others, estimated the effects of the restraints. These authors examined the restraints from 1981 to 1984. The examination revealed that the expected results did materialize.

With the restraints, the prices paid by U.S. consumers for Japanese automobiles rose. This reduced the competitive pressures on U.S. producers and non-Japanese exporters to the United States with the effect of increasing prices for these automobiles, but not as much as the rise in Japanese prices. The higher automobile prices reduced U.S. purchases, but the effects on U.S. and non-Japanese producers were mitigated by the relatively larger rise in the prices of Japanese automobiles and the resulting shift away from Japanese automobiles.

The restraints also induced quality changes as Japanese producers shifted their mix of exports toward larger and more luxurious models that generated more profits per unit. In addition, more "optional" equipment was installed in each unit. Consequently, the average transaction price of Japanese automobiles increased because of the pure price effect as well as the quality effects associated with the restraints.

In fact, the factors underlying the price change affect the prices of all automobiles

sold in the United States and complicate the estimation. For all new cars sold in 1984, Collins and Dunaway (1987) estimated an average increase of \$1,649 (17 percent), which consisted of a pure price effect of \$617 per car and a quality effect of \$1,032 per car. The higher price led to a reduction in 1984 purchases of approximately 1.5 million.

As suggested above, the export restraints had differential effects. For example, the price increase for domestically produced automobiles of \$1,185 (12 percent) was less than the increase for imports from Japan of \$1,700 (22.5 percent). This relative price change allowed the U.S. producers to increase their market share by 6.75 percentage points, enough to leave domestically produced unit sales unchanged despite a decline of unit sales in the United States. Thus, the U.S. reduction in 1984 purchases of 1.5 million was borne by foreign producers. These production changes were estimated to generate increased U.S. automotive employment in a range from 40,000 to 75,000 jobs.

The higher automobile prices represent one facet of the losses for consumers. The pure price effect caused U.S. consumers to suffer a loss of consumers' surplus of \$6.6 billion in 1984. In addition, U.S. consumers were worse off to the extent that quotas limited their range of automotive choices. Purchases of increased quality resulting from the quota totaled \$10.75 billion in 1984. The welfare loss associated with these quality expenditures was not estimated, but it is clear that this loss is possibly greater than the loss associated with the pure price effect.

The losses of U.S. consumers are primarily transfers from consumers to domestic and foreign producers. Estimates of the benefits for domestic and foreign producers hinge on

<sup>1</sup>Feenstra (1985) provides numerous details concerning legislation designed to restrict imports. In early 1981, Sens. Danforth and Bentsen introduced a bill to restrict automobile imports from Japan to 1.6 million units annually during 1981-83, which is very close to the volun-

tary export restraint of 1.68 million. Other proposed legislation was more restrictive in providing for smaller import quotas and in specifying the minimum content of American parts and labor for automobiles sold in the United States.



the assumption about the distribution of the pure price effects. If the export restraints led to equivalent pure price effects on domestic and imported cars, then U.S. producers gained \$5 billion in 1984 and foreign producers gained \$1.5 billion. Of the foreign producers' gain, Japanese producers received \$1 billion. On the other hand, if the export restraints led to equivalent quality effects, then U.S.

producers gained \$1.25 billion in 1984 and foreign producers gained \$5.5 billion. Of the foreign producers' gain, Japanese producers received \$5.25 billion. If accurate, this figure provides an obvious reason why the Japanese government continued the restraints beyond early 1985 when the Reagan administration decided not to request an extension of the agreement.<sup>2</sup>

<sup>2</sup>In early 1985, the Reagan administration decided that the domestic automobile industry had adjusted to foreign competition and announced they would not ask for an extension. Nevertheless, in early 1985, the Japanese government extended the restraints through early 1987 at a level 24 percent above the previous

level and in 1987 extended the restraints for another year without a further increase in the ceiling. The unilateral decision to extend the restraints is a clear indication that the Japanese, especially automobile producers, were benefiting from the restraints.

riers have become so popular.<sup>13</sup> A review by Deardorff (1987) concludes that there currently is no definitive answer to this question; however, numerous reasons have been suggested.

### *The Impact of GATT: An Institutional Constraint on the Use of Tariffs*

GATT is an institution whose original mission was to restrict the use of tariffs. Given this constraint, policymakers willing to respond to protectionist demands were forced to use non-tariff devices. Thus, in this case, non-tariff barriers are simply a substitute for tariffs. In fact, research by Ray (1981) indicates that non-tariff barriers have been used to reverse the effects of multilateral tariff reductions negotiated under GATT.<sup>14</sup>

### *Certainty of Domestic Benefits*

Deardorff (1987) suggests that non-tariff barriers are preferred to tariffs because policymakers and demanders of protection believe that the effects of tariffs are less certain. This perception could be due to various reasons, some real and some illusory. For example, it may be much easier to see that a quota of 1 million limits automobile imports to 1 million than to demonstrate conclusively that a tariff of, say, \$300 per car would result in imports of only 1 million automobiles.

In part, doubts that tariffs will have the desired effect is based on the possibility of actions that could be taken to offset the effects of higher tariffs. For example, the imposition of a tariff may induce the exporting country to subsidize the exporting firms in an attempt to reduce the tariff's effectiveness. The effects of quotas, on the other hand, are not altered by such subsidies.<sup>15</sup>

<sup>13</sup>Dating from Bhagwati's seminal discussion in 1965, comparisons of the theoretical effects of tariffs and non-tariff barriers have been a frequent topic in the international trade literature. Under various circumstances, a tariff and a specific non-tariff barrier, say, a quota, can cause different final prices and production despite reducing trade by equal amounts. These circumstances produce what is termed nonequivalence. Tariffs and quotas are equivalent when markets are perfectly competitive. In this case, there is no reason to prefer one to the other.

Bhagwati (1965, 1968) has demonstrated that the equivalence of tariffs and quotas breaks down in imperfectly competitive markets. Numerous situations can be characterized as imperfectly competitive. To date, however, the literature has provided no compelling reasons for preferring non-tariff over tariff barriers. For a recent example from this literature, see Krishna (1985).

<sup>14</sup>A question remains, however, as to why the framers of GATT chose to focus primarily on tariffs rather than non-tariff barriers.

<sup>15</sup>Deardorff's (1987) review provides another perspective on the role of uncertainty. The optimality of trade policy tools has been explored extensively using trade models with uncertainty. These models, which rely on risk aversion (that is, an individual requires a higher expected return as compensation for an increase in risk) and uncertainty originating outside a country, conclude that quotas are preferred to tariffs. The country is insulated from the uncertainty stemming from randomness in world prices or import supply curves by a quota that stabilizes the price and quantity of imports. One problem with this explanation, however, is that the quota is instituted before the uncertain state of the world is known, while in the real world protection is generally provided after a change in the world market.

## A Non-Tariff Barrier in Practice: The U.S. Sugar Import Quota

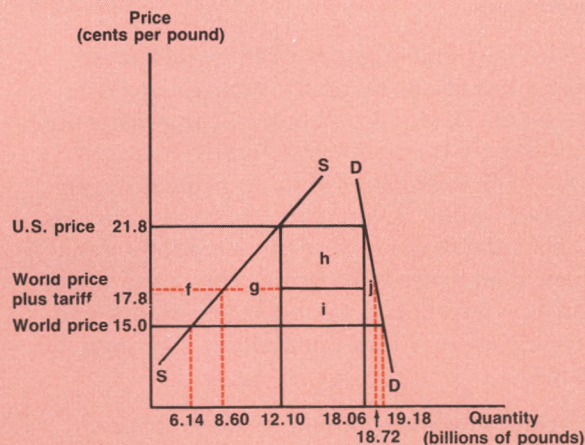
Since 1982, the United States has imposed quotas on sugar imports to support a domestic price guarantee by the federal government that exceeds world market levels.<sup>1</sup> The high price has stimulated U.S. sugar production and shifts in demand toward other sweeteners, which has necessitated large reductions in sugar import quotas in recent years.

Tarr and Morkre (1984) estimated the costs of the sugar import quota for fiscal year 1983 (October 1982-September 1983). Actually, the quota is combined with a tariff, so tariff revenues as well as quota revenues arise. The quota revenues are captured by 24 foreign countries who have the right to sell sugar in the United States.

Figure 2 illustrates some of the effects of the U.S. trade restrictions in 1983. The lines SS and DD are the U.S. supply and demand curves for sugar. The world price was 15 cents per pound, and U.S. purchases were assumed to have no effect on this price. With free trade, U.S. production, consumption and imports would have been 6.14 billion pounds, 19.18 billion pounds and 13.04 billion pounds. To raise the internal (U.S.) price to 21.8 cents per pound, a tariff of 2.8 cents per pound and a quota of 5.96 billion pounds were used. The value of the quota is 4.0 cents per pound, because 2.8 cents per pound of the 6.8 cents per pound differential between the U.S. price and the world price is due to the tariff.

The welfare effects of the trade restrictions are indicated by the areas f, g, h, i and j. The price-increasing effects of the trade restrictions cause consumers to suffer a loss of consumer surplus equal to \$1.266 billion, the sum of areas f, g, h, i and j.<sup>2</sup> Producers gain, in the form of producer surplus, area f whose value is \$616 million. The U.S. government also gains \$167 million in tariff reve-

Figure 2  
The Effects of Trade Restrictions on the U.S. Sugar Market



Source: Krugman and Obstfeld (1988).

nue, which is represented by area i. Consequently, the net effect for the United States is a loss of \$483 million, which is the sum of areas g, j and h. Area g is the loss due to inefficient production and area j is the loss due to inefficient consumption. Area h, which is equal to \$238 million, is the value of the import licenses received by foreign suppliers. In other words, the quota entails a transfer from U.S. consumers to foreign producers of \$238 million.

The preceding analysis, while effectively highlighting the winners and losers from the U.S. sugar program, is not the entire story. These estimates pertain to one year only. Since the U.S. sugar policy is ongoing, the losses are ongoing as well. In addition, important dynamic interrelationships between policy changes and production and trade changes exist.

<sup>1</sup>Maskus (1987) concluded that U.S. sugar production and trade have been directed by government policies almost continuously for 200 years.

<sup>2</sup>Tarr and Morkre's (1984) estimate of the consumer cost of the U.S. sugar program is consistent with other

studies. Maskus (1987) surveyed studies of the costs borne by U.S. consumers and found estimates ranging from \$1 billion to \$2.7 billion.

Maskus (1987) has identified a number of the dynamic consequences of the U.S. sugar program, many stemming from the fact that sugar has several close substitutes. Corn sweeteners, non-caloric sweeteners, honey and specialty sugars are all close substitutes. Higher sugar prices have induced the production of alternative sweeteners that compete with and, consequently, threaten U.S. sugar producers.

The fact that sugar is used in different goods has set in motion a number of adjustments. Examples abound of the distortions induced by the artificially high U.S. sugar price. For example, the large price differential between U.S. and foreign sugar provides a cost advantage to foreign, especially Canadian, food-processing firms. The sugar policy can be viewed as a tax on U.S. refiners and processors that was not levied on foreign firms.

Trade flows responded to these price changes as a rapid expansion in imports of sugar-containing goods ensued. In fact, the differential between U.S. and world sugar prices became so large at one time that sugar-containing goods were imported solely for their sugar content. For example, during 1985, world sugar prices declined so sharply that, in June 1985, the U.S. sugar price was 776 percent of the world price. This difference induced some firms in the United States to import Canadian pancake mix, which was not subject to the quota, and process it to extract the sugar.

The induced changes in production and trade have forced a number of additional U.S. actions to maintain the sugar prices. For fiscal year 1985, the U.S. sugar import quota was reduced 17 percent. This was followed by reductions of 27.6 percent in 1986 and 45.7 percent in 1987. Trade restrictions on sugar substitutes also have resulted. Two of these are: 1) an emergency ban on imports of certain syrups and blended sugars in bulk in June 1983; and 2) emergency quotas on a broad range of sugar-containing articles in both bulk and retail forms in January 1985.

The increasingly restrictive import barriers have produced tensions with numerous exporters of sugar, most of whom are developing countries. To conform with the General Agreement on Tariffs and Trade, the import quotas must be applied in a non-discriminatory fashion. The United States applied this provision by basing its quota allocation on imports during the relatively free-market period of 1975-81. Attempts to maintain constant shares for most countries, however, ran into practical problems. Countries experiencing rapid growth in sugar exports to the United States between 1975 and 1981 were subjected to substantial cuts between the end of the free-market period and the beginning of the quotas. For example, sugar exports from Honduras were reduced from 93,500 tons in 1981 to 28,000 tons in 1983.

The effect of this cut was mitigated somewhat in 1983 when the United States transferred 52 percent of Nicaragua's quota to Honduras, an action that simultaneously punished the Sandinista regime and rewarded a neighboring state thought to be in danger from the Nicaraguan-supported rebellion. This action violated GATT rules and generated much criticism of the United States. Such a quota system increases the likelihood that trade policy is used for noneconomic reasons.

The lessons from the U.S. sugar program are straightforward. First, significant costs have been imposed on U.S. consumers. Second, the resulting distortions in economic incentives have harmed U.S. producers dependent on sugar. Third, economic responses to the legislation have revealed a number of loopholes that have necessitated additional restrictions and distortions so that U.S. sugar producers could continue to benefit. Fourth, U.S. attempts to ensure fairness have necessitated substantial resources to ascertain production and trade behavior. Finally, the program has been used for political purposes to reward and punish foreign countries.

## *Benefits to Other Parties*

The supply and demand analysis of quotas and voluntary export restraints highlights the difference per unit of import between what domestic and foreign consumers pay. This price differential reflects the extent of the gains that are available for some group to appropriate. With tariffs, the price differential is captured by the domestic government in the form of tariff revenue. With non-tariff barriers, the domestic government is not a direct beneficiary unless it sells the rights to import to the highest bidders. Otherwise, domestic importers, foreign exporters and foreign governments capture these gains. The potential distribution of these benefits can influence the domestic government's choice between tariff and non-tariff barriers.

With voluntary export restraints, the price differential identified above is typically captured by the exporting firms from the foreign country. This result may reduce the likelihood that the foreign country will retaliate against such restrictions. Given certain demand conditions in both the U.S. and foreign markets, voluntary export restraints can entail a substantial redistribution from consumers in the importing country to selected producers in the exporting country. For example, Collyns and Dunaway (1987) estimate that the U.S.-Japanese voluntary export restraint on automobiles yielded increased benefits to selected Japanese auto producers ranging from \$1 billion to \$5.25 billion in 1984.

Hillman and Ursprung (1988) extend the preceding idea using a simple model of trade policy formulation in which a democratic government is choosing between a tariff and a

voluntary export restraint.<sup>16</sup> A simplification in this model, whose importance is discussed below, is that rival political candidates place no value on tariff revenue. Assume a voluntary export restraint and a tariff generate identical domestic producer benefits. Politicians will support the voluntary export restraint over the tariff because the voluntary export restraint generates benefits for foreign producers that, in turn, can be appropriated partially by the politicians in the form of campaign contributions. On the other hand, the tariff revenue is assumed to have no value for politicians. Candidates for elective office are viewed as announcing trade policy positions to maximize campaign contributions from domestic and foreign producer interests.

In addition to increasing the probability that protectionism will take the form of voluntary export restraints rather than tariffs, the argument reveals a way that political candidates can personally capture revenues that, with tariffs, would have accrued to the domestic government. Nonetheless, the assumption about the perceived value of tariff revenue to politicians and the fact that consumer interests are ignored in the analysis suggests one should be cautious in generalizing this result.

The possible benefits to domestic politicians of using non-tariff rather than tariff barriers are not restricted to campaign contributions. For example, a tariff is an explicit tax on consumers while a quota is an implicit tax on them. Policymakers might find it easier to support quotas and other non-tariff barriers because they will not be directly associated with a tax increase that consumers, as voters, might resist.<sup>17</sup>

<sup>16</sup>Husted (1986) also connects foreign lobbying to the domestic economy. He finds that the dollar value of foreign lobbying in the United States is small relative to other traded service flows and that the returns to foreign lobbying generate large returns. For example, Husted calculated that the expenditure in the United States of \$1.4 million on foreign lobbying by the world automobile industry came primarily from Japan. Given the estimates by Collyns and Dunaway (1987) and others indicating Japanese automobile rents exceeded \$1 billion in 1984, U.S. politicians do not appear to be capturing much of these rents.

<sup>17</sup>A neglected issue in the preceding comparison of non-tariff barriers with tariffs is the distribution of these restrictions across industries. While Ray (1981) found that non-tariff barriers and tariffs are biased toward industries in which the United States has a comparative disadvantage,

he also found some major differences. Tariffs are biased toward low-skill rather than capital-intensive industries and are unrelated to product heterogeneity and the geographical dispersion of domestic production facilities. On the other hand, non-tariff barriers are biased toward capital-intensive industries producing fairly homogeneous products. Production in these industries tends to be distributed across regions consistent with the distribution of population.

## GATT AND NON-TARIFF BARRIERS

The history of multilateral trade negotiations dealing with non-tariff barriers is brief.<sup>18</sup> Multilateral trade negotiations are conducted under the auspices of the General Agreement on Tariffs and Trade, which was created shortly after World War II. GATT, a term that encompasses the multilateral agreement governing international trade, the bodies administering the agreement, and all associated trade-related activities, has focused on the reduction of tariff rather than non-tariff barriers. To date, seven rounds of GATT negotiations have been completed, with the first six concerned almost exclusively with tariffs.<sup>19</sup>

### *The Tokyo Round*

The Tokyo Round, the most recently completed round lasting from 1973 to 1979, was a comprehensive effort to reduce trade obstacles stemming from tariffs and non-tariff measures. New or reinforced agreements, called "codes," were reached on the following non-tariff measures: 1) subsidies and countervailing duties; 2) government procurement; 3) technical standards; 4) import licensing procedures; 5) customs valuation; and 6) anti-dumping.<sup>20</sup>

The code on subsidies and countervailing duties prohibits direct export subsidies, except under certain situations in agriculture. This code is noteworthy in extending GATT's prohibition of export subsidies to trade in raw materials. Because nearly all governments subsidize domestic producers to some extent, the code established criteria to distinguish between a domestic and an export subsidy. Domestic subsidies that treat domestic and export activities identically are generally allowed. Countervailing duties, which are tariffs to offset a subsidy received by a foreign exporter, are prohibited

unless the subsidized goods are shown to be causing (or threatening) "material" injury to a domestic producer. This code also allows a country to seek redress for cases in which another country's subsidized exports displace its exports in third-country markets.

The code on government procurement states that, for qualifying nonmilitary purchases, governments (including government-controlled entities) must treat foreign and domestic producers alike. In addition to resolving disputes, the code establishes procedures for opening and awarding bids.

The code on technical standards attempts to ensure that technical regulations and product standards such as labeling, safety, pollution and quality requirements do not create unnecessary obstacles to trade. The code does not specify standards; however, it establishes rules for setting standards and resolving disputes.

The code on import licensing procedures, similar to the code on technical standards, is not spelled out in detail. Generally speaking, governments stated their commitment to simplify the procedures that importers must follow to obtain licenses. Reducing delays in licensing and paperwork are two areas of special interest.

The code on customs valuation established a uniform system of rules to determine the customs value for imported goods. This code uses transaction prices to determine value and is designed to preclude the use of arbitrary values that increase the protective effect of a tariff rate.

Finally, the anti-dumping code prescribes rules for anti-dumping investigations, the imposition of anti-dumping duties and settling disputes. The standards for determining injury are clarified. This code obligates developed countries to treat developing countries preferentially.

<sup>18</sup>For a brief history of multilateral trade negotiations, as well as details on the current negotiations, see *The GATT Negotiations and U.S. Trade Policy*, a 1987 study by the Congressional Budget Office. For additional details on the current multilateral negotiations, see Anjaria (1986) and the 1987 report by the United States International Trade Commission, *Operation of the Trade Agreements Program*.

<sup>19</sup>The sixth round, known as the Kennedy Round, marked the first time for a GATT agreement on non-tariff barriers. Agreements were reached on an anti-dumping code and the elimination the U.S. system of American Selling

Prices, which applied a tariff rate for certain imports to an artificially high dutiable value. The dutiable value was set equal to the price of a competing good produced domestically instead of to the import's actual invoice price. This system was applied to a small portion of total imports, primarily benzenoid chemicals and rubber footwear. Both agreements were blocked by Congress, but were accepted in the next round of negotiations.

<sup>20</sup>Non-tariff barriers were also reduced in civil aircraft and selected agricultural goods, primarily meat and cheese.

## The Uruguay Round

The Tokyo Round codes have relied on good-faith compliance, which has tended to undermine their effectiveness. Streamlining and resolving disputes is a priority during the current round of multilateral negotiations, the Uruguay Round. The Tokyo Round codes will be reviewed and possibly modified during the Uruguay Round. In particular, broadening the government procurement code to include service contracts will be discussed. Concerning the technical standards code, agreements dealing with the mutual acceptance of test data generated by other parties and the openness of the activities of standards bodies will be sought. A major issue in the anti-dumping code is how to handle input dumping (that is, export sales of products that contain inputs purchased at dumped prices).

The Uruguay Round, begun in September 1986, has and will discuss a number of non-tariff barrier issues, many of which extend beyond the codes of the Tokyo Round. Trade issues involving agriculture and services (banking, construction, insurance and transportation) are of paramount importance. The United States has proposed the elimination of all trade- and production-distorting agricultural policies. While the major agricultural nations have agreed to the principle of liberalizing agriculture, the sweeping nature of the U.S. proposal has been resisted by some nations, especially the European Community. With respect to services, the primary goal is to establish principles for extending GATT coverage to this trade.

A recent study by the Congressional Budget Office (1987) predicts that the performance of the Uruguay Round will be judged largely on its handling of non-tariff barrier issues. GATT has not effectively combatted rising non-tariff barriers for many reasons. Two reasons are that the effects of non-tariff barriers are less transparent than the effects of tariffs and, in many cases, non-tariff barriers are designed to satisfy a domestic rather than an international objective. A major obstacle is determining at what point a national economic policy, whose international effects are somewhat uncertain, becomes an internationally unacceptable non-tariff barrier. These national economic policies have frequently resulted from the lobbying efforts of strong domestic constituencies such as agricultural interests. Thus, major trade policy

reform will be met with much resistance from these groups.

## CONCLUSION

Non-tariff barriers have effects similar to those of tariffs: they increase domestic prices and impede trade to protect selected producers at the expense of domestic consumers. As shown in the case studies of sugar and automobiles, they also have other effects, generally adverse.

Despite the adverse national consequences, the use of non-tariff barriers has increased sharply in recent years. The chances for a reversal of this trend appear to be small. The variety of non-tariff measures, the difficulties of identifying and measuring their effects and the benefits received by specific groups combine to make a significant reduction of non-tariff barriers in the ongoing Uruguay Round negotiations unlikely.

The original mission of GATT, which has been largely achieved, was to reduce tariffs. The question, however, of why policymakers have preferred to use non-tariff barriers rather than tariffs in recent years remains. The more certain protective effects of non-tariff barriers is one plausible explanation. A second explanation, which focuses on the distribution of the benefits, is that the benefits of non-tariff barriers can be captured by foreign producers and domestic politicians. Such an allocation of benefits increases the probability that the political process generates larger amounts of non-tariff barriers relative to tariffs. A final explanation is that their adverse effects are generally less obvious to consumers than the effects of tariffs.

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# Can a Central Bank Influence Its Currency's Real Value? The Swiss Case

**T**HE SWISS National Bank (SNB) is one of the few central banks that conducts monetary policy by announcing and generally achieving a targeted growth rate for the money stock. Policy is conducted in this manner because SNB officials, believing that excessive growth in the money stock is the cause of inflation, have established long-run price stability as the central bank's primary objective. Moreover, because large, unexpected changes in money growth are thought to create uncertainty that can raise real interest rates and reduce output, SNB officials believe the average rate of money growth not only should be low (to achieve low inflation rates) but stable as well.<sup>1</sup> Thus, in Switzerland, both rapid money growth and large, unexpected changes in the money stock have been rare.

The historical evidence clearly indicates that SNB actions have met their objectives: growth in the monetary base since 1982, for example, has been targeted at rates between 2 percent and 3 percent and has been, on average, 2.4 percent over these seven years. The average rates of inflation and real Gross Domestic Product (GDP)

growth over the same seven years have been 2.0 percent and 2.3 percent, respectively.

Despite its commitment to money growth targets, the SNB realizes Switzerland is a small open economy that exports about 40 percent of Gross National Product (GNP). Thus, domestic real activity can be affected adversely by appreciations of the Swiss franc that raise the real price of Swiss goods to foreign buyers relative to prices charged by competing foreign suppliers. If, for example, Swiss exporters respond to an exchange rate appreciation by reducing Swiss franc prices (which will maintain the foreign currency price of their goods), the quantity of exports sold will not change but their profit margins will shrink. On the other hand, if exporters maintain current Swiss franc prices, the prices paid by foreign buyers will rise (because of the exchange rate appreciation) and the quantity of exports sold will decline.<sup>2</sup> These specific effects on Swiss exporters pose a policy problem because, in the aggregate, they are likely to cause some reduction in real GNP growth.

<sup>1</sup>See, for example, the arguments put forth by Mascaro and Meltzer (1983).

<sup>2</sup>Whether profits rise or fall will depend on the elasticity of demand for exports. See Belongia and Hermann (1989) for

some estimates of the responsiveness of Swiss exports to exchange rate changes.



What makes the Swiss case interesting in this context is that a central bank committed to money growth targets and a low, stable inflation rate made an abrupt, but temporary, policy shift because of exchange rate pressures. Specifically, the SNB abandoned its money growth targets in 1978-79 in an attempt to reduce the real value of the Swiss franc in foreign exchange markets and avert a recession.<sup>3</sup> As figure 1 shows, the franc had appreciated sharply both against the Deutschmark (DM) and the dollar, which represent the two most important currencies for Swiss trade. In response to this currency appreciation, the Swiss monetary base was expanded at an annual rate of 95 percent between July 1978 and January 1979.

The rapid money growth and exchange rate movements shown in the figure provide a case study to help answer the type of question faced by many countries, including the United States, in recent years: If the real value of a nation's currency has risen "too high," over what time horizon and by what amount can actions by the central bank reduce the real exchange rate?<sup>4</sup> In this article, we use the Swiss experience over the period of flexible exchange rates and some orthodox results from economic theory to suggest general conclusions about the effects of monetary actions on the real exchange rate.

## NOMINAL AND REAL EXCHANGE RATES

The real exchange rate is defined as the nominal spot rate adjusted for price level differences across countries. If purchasing power parity (PPP) conditions were met continuously, the real exchange rate would be constant. Because economic developments often

affect the nominal spot rate and price levels across countries with different lags and in different ways, however, the real exchange rate generally varies through time. Movements in the real exchange rate, therefore, represent those changes in the nominal rate that cannot be attributed to inflation differentials. Specifically, changes in the real exchange rate reflect structural changes in real economic performance across countries.

Distinguishing between the real and nominal exchange rate is crucial to any analysis of the effects of exchange rate movements because only changes in a currency's real value affect trade flows. A change in the nominal exchange rate alone will not affect trade flows; the potential benefits from importing Swiss goods due to the decline in the franc's nominal value will be offset exactly by the higher prices for Swiss goods that caused the nominal depreciation.<sup>5</sup> Thus, if a central bank's actions are intended to influence trade flows — not simply to change the relationship between foreign and domestic price levels — the analysis must focus on what happens to the real exchange rate.<sup>6</sup> Moreover, because we are interested in how monetary actions might affect the real exchange rate, we must examine economic models that permit central bank actions to do so.

## THEORETICAL MODELS OF EXCHANGE RATE RESPONSES TO MONETARY CHANGES

Establishing a relationship between changes in the money stock and real economic magnitudes produces some conflict among competing economic theories. One class of models posits different speeds of adjustment across markets

<sup>3</sup>See Rich and Béguelin (1985, p. 85) for a discussion of this episode and, in particular, SNB reference to a DM/Swiss franc exchange rate lower bound of 0.80 (their footnote 9).

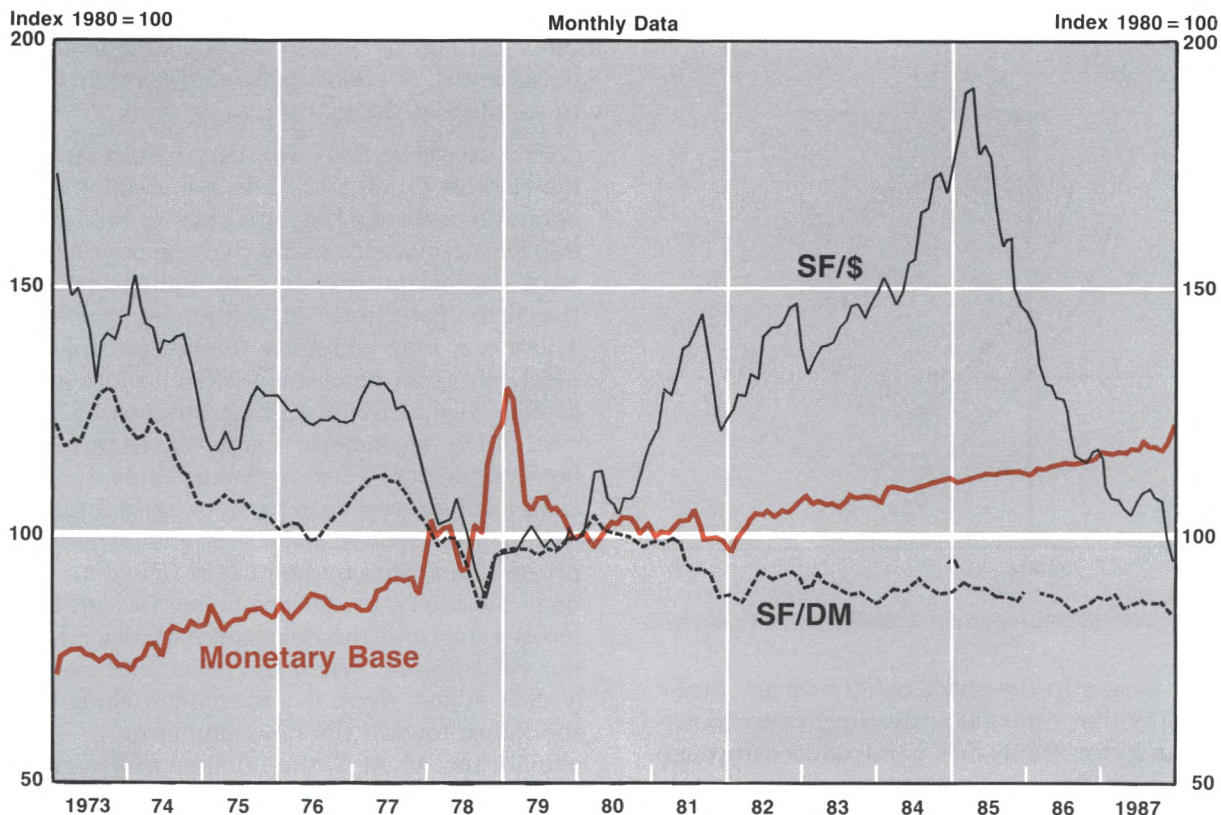
<sup>4</sup>Note that, in many respects, the Swiss debate parallels that of the United States in the early 1980s. During that period, analysts discussed the relationships between exchange rates and exports [see, for example, Batten and Belongia (1986)] and the appropriate responses of both the Federal Reserve and foreign central banks to a rising dollar [see Batten and Kamphoefner (1982) and Batten and Ott (1984)]. This attempt to change the level of the exchange rate is to be contrasted with efforts to reduce exchange rate volatility. Gartner (1987) offers some evidence on the latter case for the SNB.

<sup>5</sup>Unless we are dealing in very special cases—such as a world with indexed contracts or no unexpected price

changes—nominal exchange rate changes also will be changes in the real exchange rate. For some simple expositions of these relationships and the distinction between real and nominal exchange rates, see Batten and Luttrell (1982) and Batten and Belongia (1986).

<sup>6</sup>At least two important issues are ignored from this perspective. First, the rapid money growth associated with the 1978-79 intervention was followed by a rapid increase in the Swiss inflation rate. Second, Swiss importers and consumers, who benefit from a higher exchange rate, will be made worse off if the exchange rate declines. Thus, a discussion of the *net* benefit of a lower exchange rate is considerably more complicated than a narrow focus on the welfare of Swiss exporters alone.

Figure 1  
**Real Exchange Rate of the Swiss Franc/\$, Swiss Franc/DM  
 and the Swiss Monetary Base**



in response to a monetary change. In this case, real magnitudes can be affected by fully-anticipated monetary changes because, say, prices of financial assets react more quickly than prices of durable goods and, as a consequence, relative prices, output and other real magnitudes may be affected in the short run. Another class of models hypothesizes that fully anticipated events will not affect real variables because they already will incorporate these expectations into current values. Thus, only "shocks" or "surprises" are allowed to affect real magnitudes. Despite their particular differences, however, models from both classes predict that monetary changes will affect real variables only temporarily.<sup>7</sup> We discuss specific models of each type in the sections below.

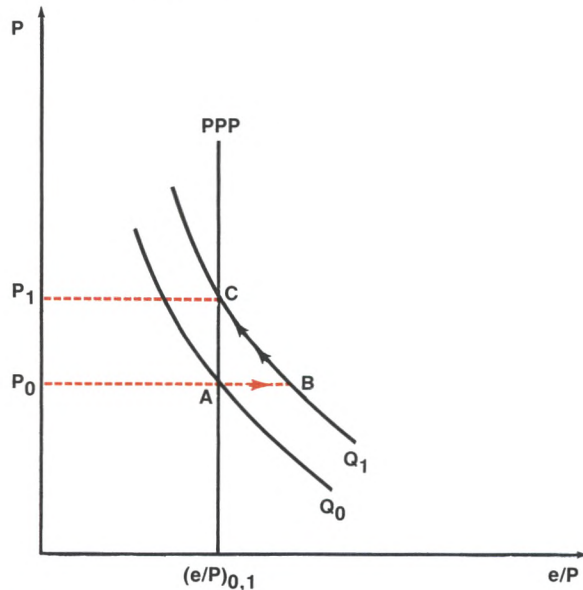
### ***Fully Anticipated Monetary Changes: The Dornbusch Model***

One model that relates exchange rate movements to actual changes in the money stock is the Dornbusch (1976) model of overshooting real exchange rates. The model is derived for a small country whose actions cannot affect the world economy; moreover, it is assumed that perfect capital mobility exists (that is, interest rate parity holds continuously) and people form expectations rationally. The model includes a money market with a standard money demand function and a market for domestic goods.

In the long run, this model assumes that exchange rates will be consistent with purchasing

<sup>7</sup>Note that this also implies trade will be affected, if at all, only temporarily and after some lag.

Figure 2  
Exchange Rate Adjustments in the  
Dornbusch Model



power parity. In the short run, however, the possibility that exchange rates may overshoot their long-run PPP values is introduced through different speeds of adjustment in financial and goods markets.

Figure 2 illustrates the effects of a monetary change on the real exchange rate,  $e/P$ , (the price of the foreign currency divided by the domestic price level; the foreign price level is assumed to be constant) and the domestic price level,  $P$ . At all points on  $Q_0$ , the money market is in equilibrium, that is, interest rate parity holds. The goods market equilibrium is represented by the vertical line labeled PPP because, on this line, purchasing power parity holds. Moreover, it is assumed that the goods market equilibrium occurs for a given real exchange rate. A monetary expansion implies that  $Q_0$  shifts upward to  $Q_1$ . The new long-run equilibrium, at point C, is given by the intersection of PPP and  $Q_1$  at the same real exchange rate but a higher domestic price level. This implies that an expansionary monetary policy change does not affect real variables in the long run.

The transition from the old to the new equilibrium, however, does not take place through a depreciation of the nominal exchange rate that

is exactly in line with increases both in the domestic price level and the domestic nominal interest rate. In the short run the money market will dominate the goods market because it reacts instantaneously to a monetary change and finds its new equilibrium immediately. The goods market, however, is out of equilibrium in the short run because price adjustments lag and the quantity of goods demanded exceeds quantity supplied at the existing price level.

This excess liquidity will cause short-term interest rates to fall and, thus, will make the domestic currency less attractive to hold. Furthermore, investors know that the currency must depreciate to restore an equilibrium between the goods market and money market. Therefore, they will move to shift portfolios immediately from domestic assets into foreign assets. This portfolio shifting, induced by the excess supply of domestic currency, will cause both nominal and real exchange rates to depreciate until interest rate parity is reestablished. At this intermediate stage of the adjustment process, indicated by point B in figure 2, domestic interest rates are below foreign interest rates, and the domestic price level has not yet adjusted. When the price level eventually does adjust, there is a movement along  $Q_1$  in the figure toward the new long-term equilibrium, C. At C, the nominal exchange rate has depreciated but the real exchange rate has returned to its initial value.

The mechanics of the Dornbusch model—specifically, the initial adjustment from point A to point B followed by the permanent, long-run adjustment to point C—imply that the SNB can influence real exchange rates in the short run at the price of a temporary inflation. The model also indicates that, in the long run, monetary policy has no effect on real exchange rates. Both conclusions are valid, however, only if other central banks do not offset the measures taken by the SNB. Overall, given certain simplifying assumptions, the Dornbusch model offers two testable propositions: Do monetary actions cause changes in the real exchange rate and, if so, over what period of time?

### **An Alternative Model of the Real Exchange Rate: The Influence of Unexpected Monetary Changes**

Another strategy in modeling the real exchange rate, consistent with the earlier discus-

sion and following the asset approach to exchange rate determination, has been to focus on *unexpected* changes in assorted macroeconomic variables. In contrast to the Dornbusch model, which allows actual differences between domestic and foreign variables to have short-run real effects through adjustment lags, other models have focused on differences between actual and expected values of explanatory variables in foreign and domestic economies. In this case, although differences in the commodity market and currency market adjustment processes still may be important, the emphasis is directed more to the influence of "surprises" on the exchange rate. Variables included, among others, have been unexpected changes in the money stock, the government budget surplus (or deficit) and real GNP.

In each case, the variables for these models were thought to determine or measure differences in real activity across countries so that an unexpected change in them would signal a reassessment of real performance across countries and, hence, a reassessment of relative currency values. Despite their theoretical appeal, however, models of this type have had limited success in explaining substantial amounts of the variation in real exchange rates. Surveys by Bomhoff and Korteweg (1983) and Bomhoff (1987) have provided economic and econometric reasons to explain the decided empirical failures of theoretical exchange rate equations.

For our interest in the narrow issue of SNB monetary policy and the real exchange rate, a model adopted by Hooper (1983) and Shafer and Loopesko (1983) offers a straightforward approach. Starting with conditions of uncovered interest parity and a long-run equilibrium current account balance of zero, an expression for the log of the real exchange rate (RER) can be written as:

$$(1) \text{ RER} = (r - \pi^e) - (r^* - \pi^{e*}) + \alpha \Sigma \text{CAB},$$

where  $r$  and  $\pi^e$  denote the nominal interest rate and expected inflation, respectively,  $*$  denotes a foreign variable and  $\alpha \Sigma \text{CAB}$  is the cumulative current account balance. Thus, the log of the real exchange rate is stated as a positive func-

tion of both the domestic-foreign real interest differential and the cumulative current account balance.

Equation 1 in its current form, however, is not directly useful for our purposes because the policy question applies to *changes* in the real exchange rate, not its level. Moreover, we are interested only in the simple bivariate relationship between monetary actions and exchange rate changes. Finally, and perhaps most important, equation 1, as written, has no specific reference to monetary policy actions.

To apply equation 1 to the current investigation of monetary policy's influence on the real exchange rate, the CAB term was dropped and the remaining terms were differenced so that changes in the real exchange rate were related to changes in the real interest differential.<sup>8</sup> That is:

$$(2) \Delta \text{RER} = \Delta(r - \pi^e) - \Delta(r^* - \pi^{e*}).$$

After these simplifying assumptions and manipulations, we have, in equation 2, reduced the problem to one in which changes in either the domestic or foreign real interest rates, or both, cause a change in the real exchange rate.<sup>9</sup>

To allow a role for monetary policy actions in equation 2, a long history of economic literature suggests that unexpected changes in money growth can affect the real interest rate, at least temporarily, by altering inflationary expectations or through a liquidity effect. Moreover, if equation 2 is a generally correct expression for the real exchange rate, an announced, credible policy by the SNB to increase money growth to reduce the franc's real value should have no effect because rational agents will incorporate the information into revised expectations for higher future inflation and, as a consequence, higher nominal interest rates and a lower nominal exchange rate. But, with all nominal magnitudes adjusting by the exact amounts and without lags, there is no latitude for a temporary change in the real exchange rate.

Because this second model suggests that fully anticipated monetary policy actions will leave

<sup>8</sup>Dropping this variable is justified on two grounds. First, the Swiss current account balance has been nearly constant over time such that variations in it are unlikely to be an important source of exchange rate fluctuations. The second reason is the theoretical result that it is a persistent change in CAB — not its level — which will affect the real exchange rate. For a discussion of this independence

of a stable CAB *level* and the exchange rate, see Mussa (1985).

<sup>9</sup>This abstracts from the special case in which the domestic and foreign rates change in a way that leaves the differential unchanged.

the real interest differential and, hence, the real exchange rate unaffected, equation 2 suggests that a successful attempt by the SNB to reduce the franc's real value must be both unanticipated and not offset by the actions of other central banks. Whether the predictions of either model are supported by the data is investigated in the next section.

## EMPIRICAL ADAPTATION

Because the sole question of interest is whether monetary actions, however measured, affect the real exchange rate, we did not attempt to estimate structural equations derived from either of the theoretical models discussed earlier. Instead, we chose to examine statistical tests that indicate whether monetary actions "cause" a change in the real exchange rate.<sup>10</sup> Moreover, because Swiss monetary actions that, *ceteris paribus*, would affect the real exchange rate may be offset by actions of other central banks, our causality tests were estimated based on *differences* between changes in the growth rates of the monetary base across countries.

The general form of the equations estimated for these tests is depicted as:

$$(3) \Delta RER_t = a + \sum_{i=0}^p b_i B_{t-i} + \sum_{j=1}^q c_j \Delta RER_{t-j} + \varepsilon_t$$

where RER is the real Swiss franc/DM or Swiss franc/dollar exchange rate, B is a measure of relative monetary actions,  $a$ ,  $b_i$  and  $c_j$  are coefficients to be estimated and  $\varepsilon_t$  is a random error term. Lag lengths for the explanatory variables,  $p$  and  $q$ , were chosen by a final prediction error (FPE) criterion.<sup>11</sup> The real exchange rates used are monthly averages of the Swiss franc/dollar and Swiss franc/DM nominal rates adjusted by ratios of the respective countries' consumer price indexes. The monetary base

was chosen as the basic measure of monetary actions in all three countries. By allowing contemporaneous values of monetary actions to enter these regressions, we explicitly assume that monetary policy decisions are exogenous.

To test the Dornbusch model, the B variable in equation 3 was measured as the difference between Swiss and German or Swiss and U.S. monetary base growth rates. For the second model, measures of unexpected changes in the base growth rates were needed. In fact, the relationships discussed earlier indicated that B should be represented as the difference between Swiss and German or Swiss and U.S. monetary surprises. To construct these measures, second differences of logarithms were used to represent unanticipated changes in each individual monetary base series. Then these individual series were used to construct the differences between Swiss and German or Swiss and U.S. monetary policy surprises.<sup>12</sup>

The relationships described by equation 3 were estimated with monthly data over a 1973-86 sample period; the results are shown in table 1. Section A of the table, based on differences between actual growth rates of the monetary base across countries, indicates a marginally significant effect of monetary actions on the real Swiss franc exchange rate. The FPE criterion, picked only contemporaneous measures of monetary actions as the best representation of the model in the U.S. case; for the German case, contemporaneous and two lagged values of relative monetary actions were chosen.<sup>13</sup> Although this variable was marginally significant in the U.S. case, the sign of the estimated coefficient for relative monetary actions is incorrect. Since theory suggests a positive response for this specification of the data, (relatively faster Swiss money growth will increase the number of Swiss francs per dollar) the negative sign in the U.S. case is puzzling. For the German case, the estimated coefficients

<sup>10</sup>See Jacobs, et al. (1979) for some of the more common critiques of causality testing. Also see Zellner (1979) for a more general discussion of causality tests and their application. Although Fratianni, et al. (1987) apply this testing procedure to the money-exchange rate relationship, their study does not include the Swiss franc and uses the nominal, rather than real, exchange rate.

<sup>11</sup>See, for example, Batten and Thornton (1985).

<sup>12</sup>These measures of unanticipated monetary changes should be "white noise," series whose movements cannot be explained by their own past behavior or the behavior of other variables. Tests for white noise indicated that the

second differences of logarithms of each country's monetary base series had this characteristic.

<sup>13</sup>An alternative would be to estimate models for a variety of lag lengths and look for patterns in the results. This also was done for all pairs of possible lags, up to 12 months, for both the monetary variable and the exchange rate (144 regressions for each of the four equations reported). The general finding was that significant effects of monetary actions—whether actual or unanticipated—were found for all lag pairs up to six months.

Table 1

### Estimated Relationships Between Monetary Actions and Changes in the Real Swiss Franc Exchange Rate

#### A. The Effects of Actual Monetary Actions (B is specified as $\Delta \ln \text{SWMB} - \Delta \ln \text{USMB}$ or $\Delta \ln \text{SWMB} - \Delta \ln \text{GEMB}$ )

$$\text{Swiss franc/\$ : } \Delta \ln \text{RER}_t = -0.002 - 0.172 (B_t) + 0.310 \Delta \ln \text{RER}_{t-1}$$

(1.02)      (1.85)      (4.21)

$$\frac{R^2}{R} = 0.11$$

$$\text{Swiss franc/DM : } \Delta \ln \text{RER}_t = -0.001 + 0.043 (B_t) - 0.036 (B_{t-1}) + 0.149 (B_{t-2}) + 0.449 \Delta \ln \text{RER}_{t-1} - 0.197 \Delta \ln \text{RER}_{t-2}$$

(1.04)      (0.99)      (0.84)      (3.48)      (5.98)      (2.60)

$$\frac{R^2}{R} = 0.20$$

#### B. The Effects of Relative Monetary Surprises (B is specified as $\Delta \Delta \ln \text{SWMB} - \Delta \Delta \ln \text{USMB}$ or $\Delta \Delta \ln \text{SWMB} - \Delta \Delta \ln \text{GEMB}$ )

$$\text{Swiss franc/\$ : } \Delta \ln \text{RER}_t = -0.002 - 0.148 (B_t) + 0.330 \Delta \ln \text{RER}_{t-1}$$

(0.75)      (2.17)      (4.51)

$$\frac{R^2}{R} = 0.12$$

$$\text{Swiss franc/DM : } \Delta \ln \text{RER}_t = -0.001 + 0.015 (B_t) - 0.032 (B_{t-1}) + 0.095 (B_{t-2}) + 0.080 (B_{t-3}) + 0.460 \Delta \ln \text{RER}_{t-1}$$

(1.39)      (0.39)      (0.70)      (2.06)      (2.07)      (5.98)

$$- 0.178 \Delta \ln \text{RER}_{t-2}$$

(2.29)

$$\frac{R^2}{R} = 0.20$$

NOTE: Absolute values of t-statistics are in parentheses.

for the contemporaneous and last lag of the B variable take the expected positive sign but only the latter term is significantly different from zero. In general, the conclusion seems to be that differences between actual monetary changes across countries have weak, short-lived and unpredictable effects on the real exchange rate.

Interpreting these inconsistent results is made somewhat easier, however, by returning to figure 1 and some points made earlier in the paper. The figure shows that the large increase in the Swiss monetary base during 1978-79 was associated with temporary appreciations of both the dollar and DM against the Swiss franc. This

relatively small and short-lived effect was followed, however, by two distinctly different paths for the dollar and DM against the Swiss franc, with the dollar rising sharply until early 1985 and the DM returning to a path of small, gradual depreciations. Also recall that the SNB discussed its policy stance over this interval in terms of a 0.8 lower bound for the Swiss franc/DM exchange rate. The DM, of course, dominated other currencies in SNB decisions because Germany is Switzerland's largest trading partner. Overall, these bits and pieces of evidence—the path for the Swiss franc/DM exchange rate in the figure, SNB policy statements regarding a Swiss franc/DM objective, and the “correct” sign for monetary actions in the Swiss

franc/DM equation—suggest that SNB actions designed to reduce the franc's real value did have some weak effect relative to its target currency.<sup>14</sup> That effect, however, was dissipated quickly.

Section B of the table, which redefines the monetary variable as the difference between unanticipated monetary changes across countries, shows monetary effects that are more strongly significant but still of puzzling signs. The chosen lag lengths are relatively short, suggesting the transitory nature of monetary actions on the real exchange rate.

Nonetheless, the general results again are problematic. Theory suggests that an unexpected increase in Swiss base growth that is larger than an unexpected change in foreign base growth in the same direction should be related positively to a change in the real exchange rate specified as franc/foreign currency. Thus, the positive signs in the German case are consistent with this result while the negative sign for lagged relative monetary surprises in the U.S. case is not. The inconsistent U.S. result, as in the previous case, might be explained by the instruments and objectives argument discussed in footnote 14. Even the German result is troublesome, however, in that *lagged* values of monetary surprises have a significant impact on the real exchange rate. Presumably, a surprise should have its effect felt only in the period it occurs but, in this case, its effects occur only with lags of two and three months. As with the results in Section A of the table, these results indicate significant but unpredictable influences of monetary actions on the real exchange rate.

## CONCLUSIONS

Ten years ago, the SNB temporarily abandoned its monetary targets and pursued what has been interpreted as a successful intervention to reduce the Swiss franc's real value and restore export sector competitiveness. Although economic theory generally suggests that such an intervention—even when other central banks

cooperate—may have little effect on the currency's real value, economic policy summits over recent years often have discussed the possibility of coordinated monetary actions to affect exchange rates. In this context, the Swiss experience presents an interesting case study of monetary effects on exchange rates.

Our empirical evidence suggests that monetary actions might be related significantly to real exchange rate movements in the short run. The trouble with this result is that these effects appear to be unpredictable and not entirely consistent with standard models of exchange rate determination. Causality tests indicated that changes in relative money growth rates between countries—whether actual or unanticipated—influence the real exchange rate for up to six months. But while short-run relationships are consistent with the conclusion that monetary actions are not likely to have exchange rate effects of a size or duration that will bring about substantial increases in exports, the conclusions for policymakers are less clear. The lack of consistency in the sign of the relationship between monetary actions and exchange rates across countries does not give a clear signal as to which monetary action should be taken to produce a given exchange rate response.

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<sup>14</sup>A basic rule for policy actions is that policymakers must have at least as many instruments as the number of objectives they hope to achieve. The SNB has only one instrument—the monetary base—and could use it to achieve *one* exchange rate objective, such as the Swiss franc/DM rate. Without more instruments, however, it

could not simultaneously move to hit a Swiss franc/dollar objective. This lack of instruments to hit multiple objectives could explain the "correct" results for the Swiss franc/DM causality tests and the anomalous results for the Swiss franc/dollar case.

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