SWISS AND UNITED STATES MONETARY POLICY:

HAS MONETARISM FAILED?

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1. Introduction

In the second half of the 1970s, central banks of a number of industrialized countries, including the United States and Switzerland, adopted growth targets for the domestic money stock. The shift to a monetary policy based on control of the money stock was widely regarded as a victory for monetarism. Monetarists had long advocated strict control of the growth in the money stock. In their opinion, inflation was due mainly to excessive money growth. Therefore, the fight against inflation was doomed to fail unless central banks were prepared to control tightly the growth in the domestic money stock. In order to strengthen monetary control, monetarists urged monetary authorities to adopt growth targets for the money stock.

There is little doubt that the adoption of monetary targets was an important prerequisite for waging a successful assault on inflation. In the United States, money stock targets were first introduced in 1975, when Congress instructed the Federal Reserve System to announce to the public regularly such targets. However, the introduction of money stock targets did not reflect strong monetarist sentiments in Congress (Hetzel, 1986b, p. 802), nor did it imply a fundamental shift in the operating procedures of the Fed. As had been the practice prior to 1975, the Fed continued to target the federal funds rate, the key U.S. money market rate. Until 1979, its commitment to money stock targets was not sufficiently strong to result in a significant decline in inflation. On the contrary, the rate of increase in U.S. consumer prices—which had accelerated intermittently since the mid-1960s—reached a peak of over 13 percent in 1979.

As a result of its failure to restrain inflation, the Fed in October 1979, decided to alter its operating

procedures. It felt that more faithful adherence to its monetary targets would strengthen its anti-inflationary policy for two reasons. First the lack of firm commitment to monetary targeting, coupled with an ever rising inflation rate, had created an inflationary psychology and a concomitant loss of confidence in the Fed's willingness to restore price stability. The change in operating procedures was designed "to establish a credible anti-inflationary stance for monetary policy" (Hetzel, 1986a, p. 22). Second, the Fed realized that a significant rise in interest rates was needed to eradicate inflation, but it was unsure about the size of the required increase. Money stock targets were regarded as a useful device for bringing about the required increase in interest rates. As a result of the change in operating procedures, the federal funds rate rose to almost 14 percent at the end of 1979 and reached a peak of over 20 percent early in 1981. With the help of this drastic increase in interest rates, the Fed managed to lower the inflation rate in the United States rather quickly. From 1979 to the end of 1982, consumer price inflation dropped by almost 10 percentage points to slightly over 4 percent, and remained at a level of 3 to 4 percent until 1985. The following year, it fell further as a result of the oil price decline.

In Switzerland, money stock targets were fixed for the first time at the end of 1974, a few months earlier than in the United States. As in the United States, the shift to monetary targeting was motivated by a desire to strengthen the central bank's anti-inflationary policy stance. In contrast to the United States, however, there was no tradition of interest rate targeting in Switzerland. The system of fixed exchange rates—which in Switzerland was in effect until January 1973—implied that movements in Swiss interest rates and prices could not be effectively controlled by the Swiss National Bank (SNB) but were determined in large measure by developments in other countries. The shift to a floating exchange rate severed the link between Swiss and foreign prices. Therefore, floating exchange rates enhanced considerably the scope for an effective anti-inflationary monetary policy. The SNB was sufficiently im-

pressed by monetarist ideas that it decided to opt for a policy approach of strictly controlling the growth in the domestic money stock. From 1975 to 1978, the SNB relied on yearly growth targets for the money stock M1. For reasons to be discussed later, the SNB did not set a money stock target in 1979. Since 1980, it has fixed yearly growth targets for the adjusted monetary base (see table). In contrast to the Fed—which tends to target a multitude of monetary aggregates—the SNB has consistently stuck to a single money stock target. The SNB's efforts to achieve price stability were successful insofar as it managed to lower consumer price inflation from over 10 percent in 1974 to roughly one percent in 1978. However, as I will show later, Swiss inflation rose again temporarily to over 7 percent in 1981, but in the meantime has fallen back to roughly one percent.

United States and Swiss experience clearly suggests that a monetarist approach to policymaking has helped to curb the unacceptably high inflation rates of the 1970s. Nevertheless, central banks, including the Federal Reserve System and the Swiss National Bank, have been reluctant to go very far in endorsing monetarist prescriptions. Monetarists themselves doubt that their ideas have really penetrated central banks. The well-known monetarist Karl Brunner (1983, pp. 53-55), for example, denies that central banks have shifted to a monetarist policy regime, despite some rhetoric to the contrary, since their "strategy and tactics remain far removed from monetarist ideas." In his view, the SNB is the only central bank that comes close to pursuing monetarist policies. Not only have monetarists failed to convert many central bankers to their cause, but in recent years there has been a growing tendency among central banks—especially in the Anglo-Saxon countries—to return to more traditional operating procedures and to discard whatever monetarist policy ingredients they may have absorbed in the 1970s and early 1980s. The Fed's monetarist policy experiments, in particular, were rather short-lived; only three years after adopting its new operating procedures, the Fed began to express doubts about the wisdom of focussing attention on money growth and partly returned to a policy of targeting short-term interest rates.[1] It felt that money growth was not a

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[1] Most monetarists deny that the monetary policies pursued by the Fed in the period 1979-82 should be regarded as a monetarist experiment (e.g., Poole, 1982, 1985; Friedman, 1983, 1984; Brunner, 1983; Olsen, 1986). McCallum (1985, p. 573) shares this view, but feels "that the period [1979-82] did, nevertheless, involve a greater degree of commitment to money stock targets than existed during any previous period of comparable duration."

MONETARY GROWTH: TARGETED AND EFFECTIVE

	Target Variable[a]	Target[b]	Effective[b]
1975	M1	6	4.4
1976	M1	6	7.7
1977	M1	5	5.5
1978	M1	5	16.2
1979	–	–	–
1980	M0	4[c]	–0.6[c]
1981	M0	4	–0.5
1982	M0	3	2.6
1983	M0	3	3.6
1984	M0	3	2.5
1985	M0	3	2.2
1986	M0	2	2.0
1987	M0	2	

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[a] M1: Currency, as well as demand deposits with banks and the postal giro system, held by the nonbank public. For M1 only end-of-month data are available.

M0: Adjusted monetary base, defined as the sum of deposits of banks with the SNB and the aggregate banknote circulation, adjusted for the end-of-month bulge in SNB credit to banks. The data on the monetary base are published in the form of monthly averages of daily figures.

[b] Arithmetic mean of monthly year-on-year growth rates.

[c] Average percentage increase over the November 1979 level.

reliable guide to policymakers intent on maintaining a reasonable degree of price stability. Exclusive reliance on money growth as a policy indicator, the Fed maintained, might induce central banks to pursue overly expansionary or restrictive monetary policies. Therefore, it was necessary to monitor a wide variety of policy indicators, in addition to money growth. The Fed was not alone in becoming disillusioned with money stock targeting. Similar problems arose in the United Kingdom, Canada, and other countries.

Recent difficulties with money stock targeting have led many observers of monetary policy to question the validity of monetarist prescriptions. The popular press, in particular, is replete with stories about the death or failure of monetarism. These observers tend to overlook the fact that there still are some central banks that feel quite comfortable with money stock targeting. The Swiss National Bank continues to regard money stock targets as the center-piece of its

monetary policy. Similarly, there has been little dissatisfaction with money stock targets in Germany and Japan. Therefore, the question arises whether such a harsh verdict on the usefulness of monetarist prescriptions is really justified. In the remainder of my paper, I shall attempt to answer this question in light of United States and Swiss experience. Most monetarists would probably agree that the following five propositions form the nucleus of their doctrine:

- Inflation is mainly a monetary phenomenon.
- The velocity of money is reasonably stable in the absence of major shocks to the money supply.
- Price stability should be the principal objective of monetary policy.
- Some monetarists also argue that central banks should adopt operating procedures designed to control the monetary base.
- Monetary policy should be based on rules, such as money stock targets, rather than central-bank discretion.

2. Inflation and Money

As to the first proposition, monetarists argue that—over long periods of time—inflation tends to be closely and positively correlated with the trend growth in the money stock. However, the two magnitudes need not be closely linked over short periods since inflation tends to react to changes in money growth with a long and variable time lag. While monetarists stress the importance of money growth as a source of inflation, they do not claim that inflation is exclusively a monetary phenomenon. For example, Brunner (1983, p. 50) explicitly allows for the possibility that such non-monetary disturbances as a change in the price of oil may alter temporarily the inflation rate.

The monetarist proposition as to a close long-run relationship between money and prices is no longer a very controversial issue. It is now accepted by many non-monetarists although there continues to be disagreement about the importance of non-monetary causes of inflation. Furthermore, most central bankers today would agree with the monetarists' claim that excessive money growth has been an important—if not the principal—driving force behind inflation. As a matter of fact, the first monetarist proposition has now become part of the conventional wisdom of central banks. In this regard, monetarism—far from being dead—has strongly shaped the behavior of central banks. In my opinion, central banks would hardly have succeeded in their fight against inflation had they kept completely aloof from monetarist doctrine.

If central banks have qualms about the first monetarist proposition, the reason is not that they question the *existence* of a link between money and prices, but that they harbor doubt about the *stability* of this link. It is one thing to observe that in the past inflation was closely related to money growth It is another thing to forecast accurately future inflation from current money growth on the basis of past experience. As regards the central bank's ability of forecasting future inflation, Swiss and United States experiences have been rather different in recent years.
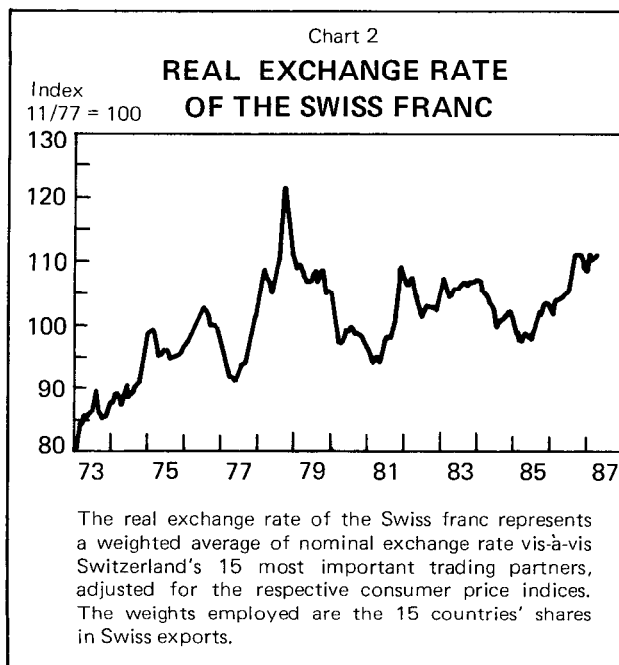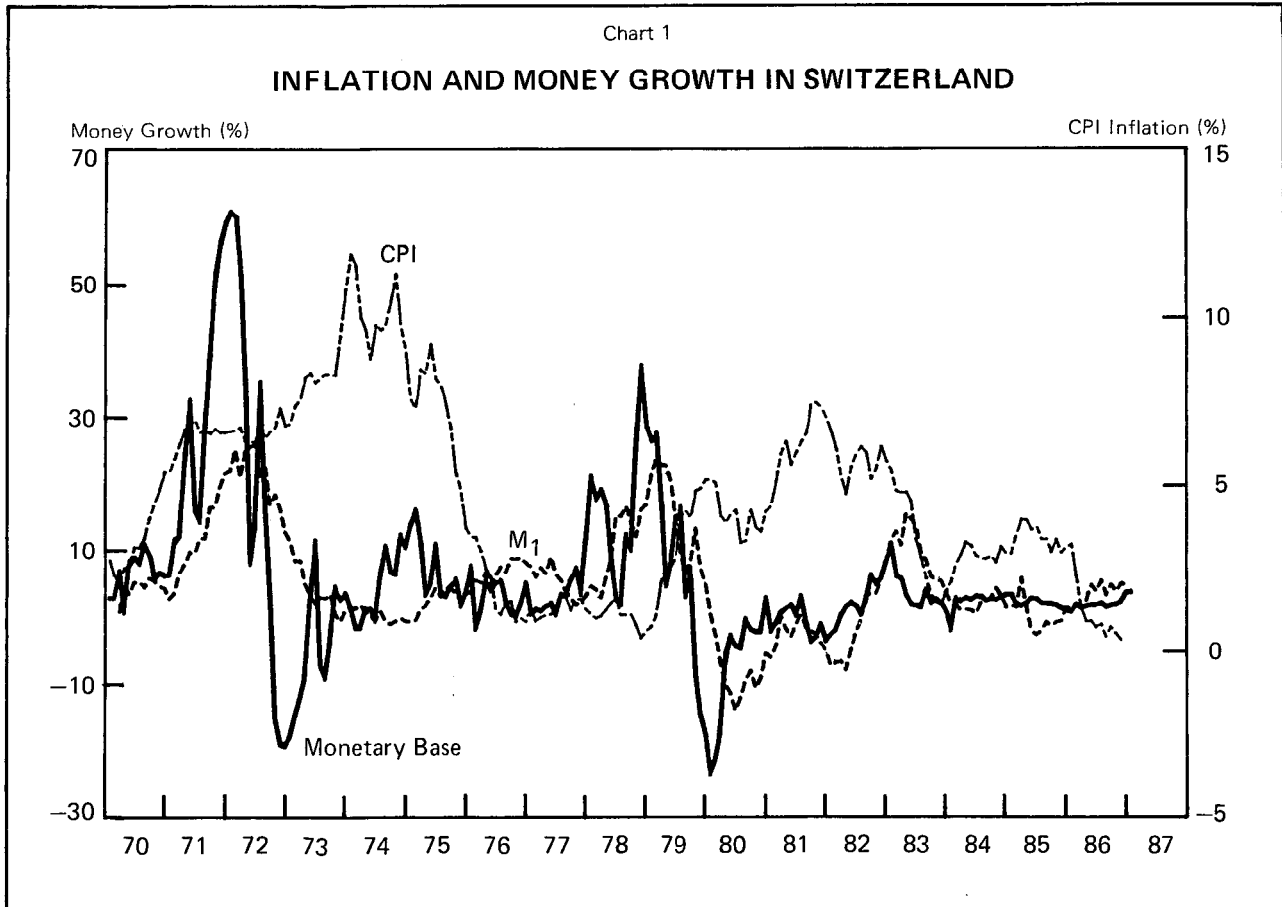
The behavior of Swiss inflation and money growth is described by Chart 1. The inflation rate—measured in terms of consumer prices—is related to the two monetary aggregates that have served as target variables in Switzerland. The chart shows for each month the percentage change in the respective variable over the preceding year. As indicated by Chart 1, there is a fairly close positive correlation between the growth in the Swiss adjusted monetary base and the money stock M1, with M1 tending to lag movements in the monetary base by a few months. Furthermore, Swiss consumer price inflation typically responds to major changes in money growth with a lag of two to three years.

From Chart 1, it may be seen that money growth accelerated sharply early in the 1970s. The huge bulge in money growth reflected the SNB's obligation to defend a fixed exchange rate in the face of massive inflows of speculative foreign capital. This was followed by a substantial acceleration of inflation in 1973 and 1974. After the shift to a floating exchange rate at the beginning of 1973, money growth came to an abrupt halt, with the inflation rate starting to decline rapidly toward the end of 1974. The drop in the inflation rate was supported by a strong upvaluation of the Swiss franc both in nominal and real terms (Chart 2). In 1978, the real upvaluation began to reach levels that seriously jeopardized the competitive position of Swiss industry and raised the prospect of a drastic slump in domestic economic activity. For this reason, the SNB— reluctantly—decided to abandon its money stock target and to set a target for the exchange rate of the Swiss franc vis-à-vis the Deutsche mark. As a result of the policy shift, the real upvaluation of the Swiss franc was partly reversed in 1979 and 1980.

The need for stabilizing the exchange rate triggered a new burst of money growth, which in turn led to a resurgence of inflation in 1980 and 1981.[2] As indicated by the table, the money stock target

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[2] The temporary rise in inflation in 1979 was due largely to the second oil price shock.

Chart 1

INFLATION AND MONEY GROWTH IN SWITZERLAND

Money Growth (%)

CPI Inflation (%)

Chart 2

REAL EXCHANGE RATE OF THE SWISS FRANC

Index 11/77 = 100

The real exchange rate of the Swiss franc represents a weighted average of nominal exchange rate vis-à-vis Switzerland's 15 most important trading partners, adjusted for the respective consumer price indices. The weights employed are the 15 countries' shares in Swiss exports.

for 1978 was overshot by a wide margin. However, the departure from a monetarist policy course was only temporary. In 1979, the SNB returned to a policy of controlling money growth, but a new target was not announced until the end of that year. The slowdown in money growth was followed by a renewed decline in the inflation rate starting toward the end of 1981. A remarkable feature of this disinflationary episode was the sluggish response in the inflation rate to the policy shift. From 1981 to 1983, the inflation rate rapidly fell to roughly 3 percent and remained at approximately that level until the beginning of 1986, when the oil price collapse led to a further decline in the inflation rate. On the basis of past experience, I would have expected the inflation rate to continue its downward course in 1984. Thus, while Swiss experience points to a fairly close link between money growth and the inflation rate, this relationship may have become somewhat less stable in the last three years.

In contrast to Switzerland, the United States has been plagued by serious instabilities in the link between inflation and money growth, especially since
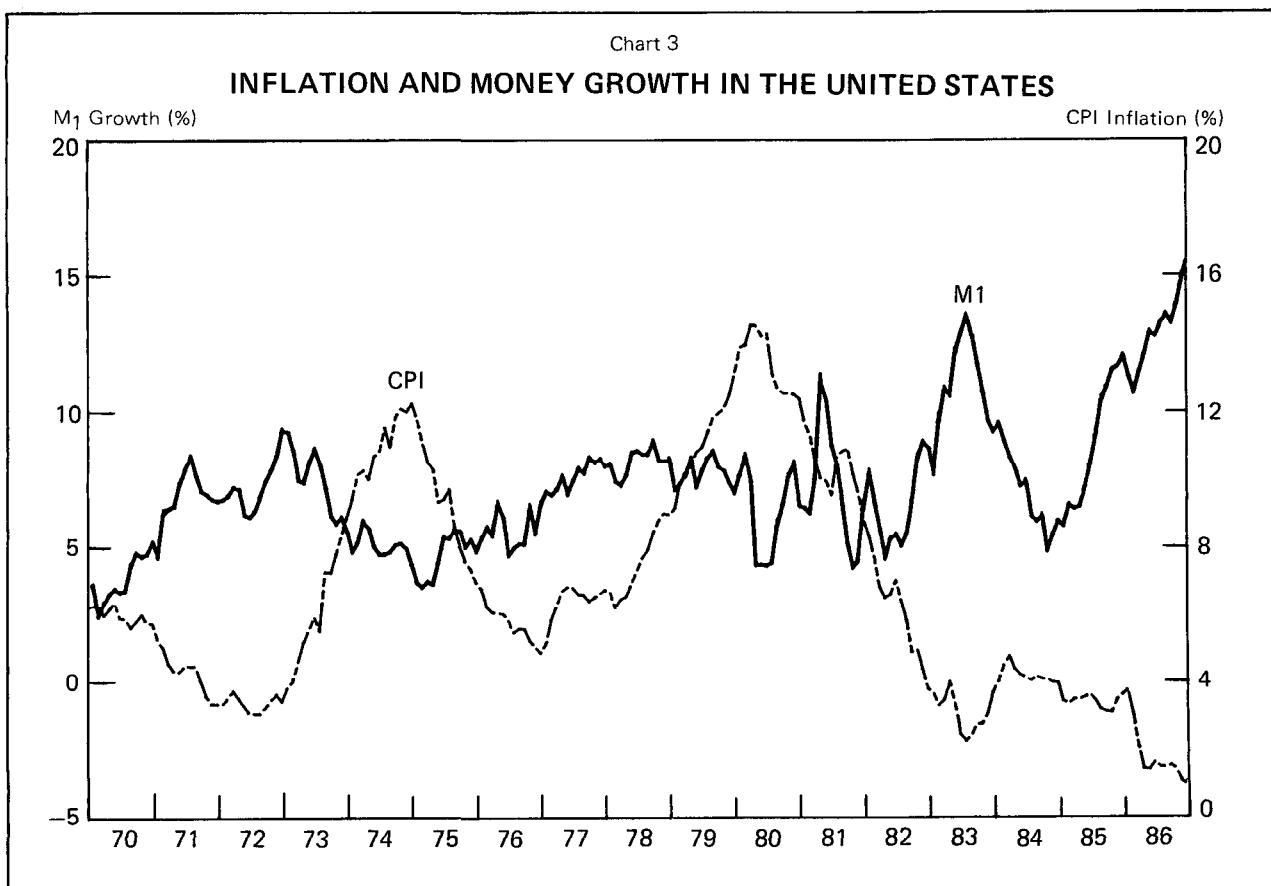
the beginning of the 1980s. Chart 3—which is constructed in the same way as Chart 1—shows the relationship between U.S. consumer price inflation and the growth in the money stock M1. The focus on M1 is justified on the ground that the Fed until very recently regarded Ml as the key target variable.[3] As indicated by Chart 3, until the end of the 1970s, the relationship between inflation and money growth in the United States corresponded to that observed for Switzerland, except for a somewhat speedier response in the U.S. inflation rate to changes in money growth. However, around 1980, a major shift in the patterns of U.S. inflation and money growth occurred. While the policy switch of 1979 elicited a dramatic fall in the inflation rate, money growth did not decline very much. Furthermore, although money growth from 1982 onwards accelerated again strongly by leaps and bounds, inflation tended to decrease further. Thus, in contrast to Switzerland, prices in the United States in recent years have increased far less than would be expected on the basis of past experience.
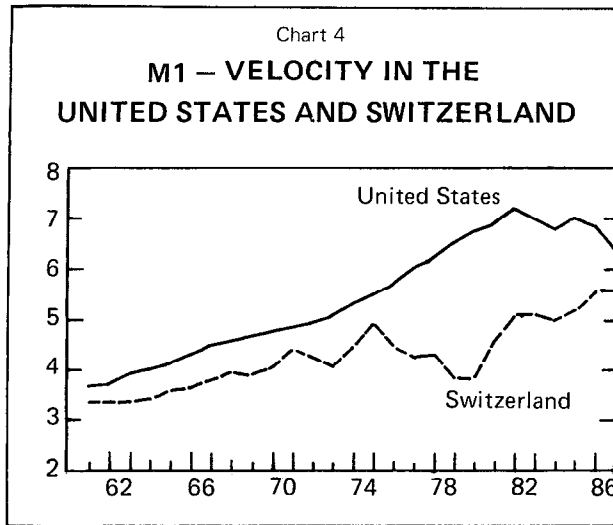
[3] Although the Fed did not specify a target range for M1 in 1987, it appears that the U.S. central bank will continue to monitor that aggregate closely (see Volcker, 1987, p. 8).

3. The Stability of Velocity

Similar conclusions may be drawn from a comparison of velocity movements in the United States and Switzerland. In countries featuring a close relationship between inflation and money growth, one would also expect the velocity of money to behave in a stable and predictable manner. Chart 4 illustrates the behavior of U.S. and Swiss velocities, defined as the ratio of nominal final demand to the nominal money stock M1. Velocities are expressed in terms of final demand because in both countries M1-demand seems to be more stably related to that variable than to GNP.[4] Moreover, to reduce noise

[4] As regards the performance of final demand as an independent variable in money demand functions, see Radecki and Wenninger (1985) for the United States and Vital (1978, p. 97) for Switzerland. The measure of final demand underlying Chart 4 is nominal GNP plus imports of goods and services. This measure is commonly employed in studies of Swiss money demand and velocity. It should be noted, however, that the measure of final demand underlying Chart 4 differs somewhat from those found in studies of U.S. money demand and velocity. Radecki and Wenninger rely on a concept of final demand defined as GNP less inventory investment less net exports. The same concept is used by Haraf (1986). Gordon (1985, p. 63), by contrast, defines final demand as GNP less inventory change.

Chart 3
INFLATION AND MONEY GROWTH IN THE UNITED STATES

M1 Growth (%)   CPI Inflation (%)

Chart 4

M1 — VELOCITY IN THE UNITED STATES AND SWITZERLAND

in the velocity series, annual averages rather than quarterly data are shown in Chart 4.

At first sight, the evidence of Chart 4 is rather surprising. Over the period 1960-86, the variability of M1-velocity was far greater in Switzerland than in the United States. Only the most recent decline in U.S. velocity is comparable in size to the fluctuations characteristic for Switzerland. The evidence of Chart 4 cannot readily be reconciled with the U.S. and Swiss central banks' pronouncements on the policy implications of velocity movements. While the Fed has repeatedly stressed that velocity movements complicate the task of setting appropriate money stock targets, the SNB has been rather sanguine about these problems.

Needless to say, evidence of strong variability in velocity need not impair a central bank's ability of achieving price stability. As I pointed out earlier, monetarists do not postulate a close short-run relationship between money and prices but argue that tight control of money growth is effective in influencing the inflation trend. If the objective of monetary policy is to lower the inflation trend gradually to zero (or whatever level the public considers acceptable), strong variability of velocity, by itself, does not imply that central banks may fail to achieve their aims. A necessary condition for such a monetary strategy to be effective is that velocity—in an inflation-free environment—behave like a trend-stationary process.[5] Should this condition be met, central banks

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[5] Movements in U.S. M1-velocity since the early 1960s are best explained by a random walk with drift, that is, its behavior has not been trend stationary (Haraf, 1986). This need not imply that U.S. velocity would have displayed the same time-series properties if prices had remained stable in this period.

have a good chance of reducing the inflation trend to zero if they adopt a constant-money-growth (CMG) strategy designed to accommodate nothing more than the growth in money demand arising from the expected trend growth in output (or real final demand) and the expected trend change in velocity. Of course, a CMG-strategy will not prevent cyclical and other fluctuations in velocity and the price level about their stationary trends.

The condition of trend stationarity in an inflation-free environment is likely to be satisfied if velocity is (i) determined largely by domestic interest rates and (ii) a stable relationship exists between these two variables, because interest rates are likely to fluctuate about a stationary trend in such an environment.[6] In Charts 5 and 6, I examine the relationship between velocity movements and short-term interest rates in the United States and Switzerland. The interest-rate variables employed are the U.S. Treasury bill rate and the three-month Euro-Swiss-franc deposit rate respectively.[7] For both countries, the evidence points to a positive correlation between velocity and short-term interest rates.

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[6] This analysis is not altered if inflation expectations are allowed to influence directly velocity. In an inflation-free environment, inflation expectations, by definition, will not affect velocity.

[7] Interest rates quoted on the Euromarket for Swiss francs are regarded as the best indicator of borrowing costs in the Swiss money market. Published domestic deposit rates are posted rates applicable to small investors. They tend to be roughly 50 basis points below the corresponding Euromarket rates. Large depositors are able to obtain Euromarket conditions even if they place their funds with domestic banks.
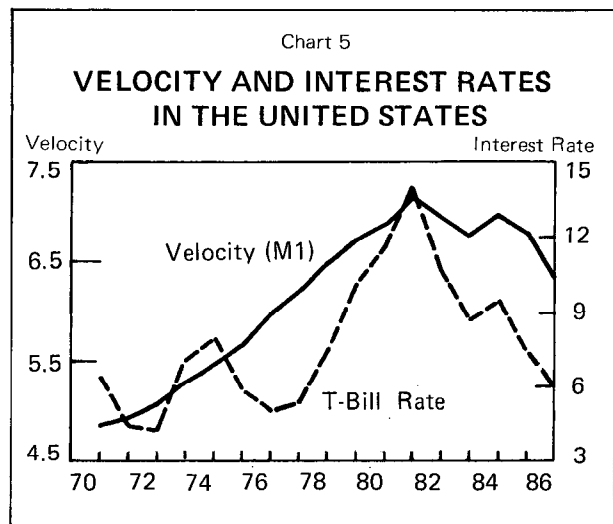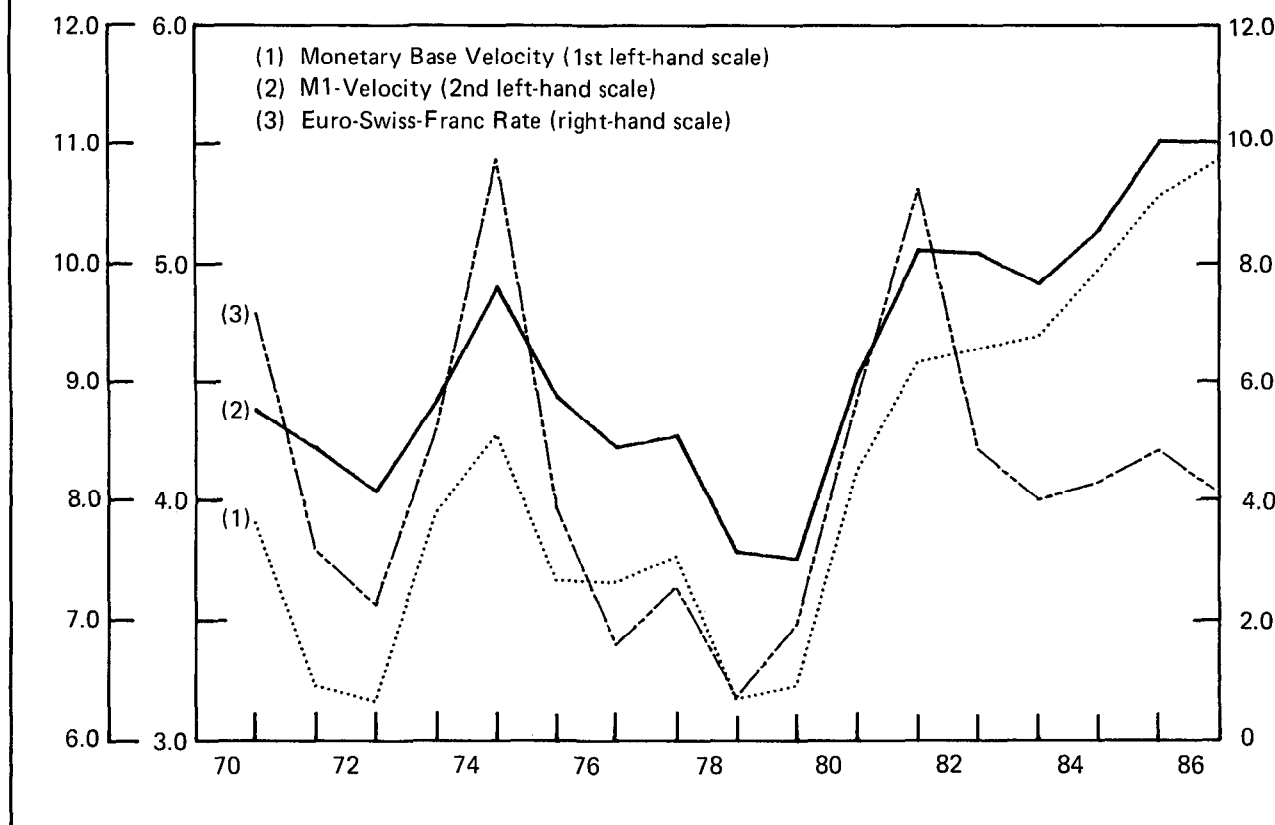

Chart 5

VELOCITY AND INTEREST RATES IN THE UNITED STATES

Chart 6

VELOCITY AND INTEREST RATES IN SWITZERLAND

(1) Monetary Base Velocity (1st left-hand scale)
(2) M1-Velocity (2nd left-hand scale)
(3) Euro-Swiss-Franc Rate (right-hand scale)

However, there are also notable differences between Charts 5 and 6. In the United States, interest rate movements seem to account, at least in part, for the upward trend of velocity in the 1970s and the subsequent decline in the 1980s. But there was no stable relationship between U.S. velocity and short-run movements in interest rates. The temporary increase in U.S. short-term interest rates in 1974 and 1975 did not affect velocity, while a similar rise in 1984 did. Indirect evidence on instabilities in the link between U.S. velocity and interest rates may also be gathered from recent studies of U.S. money demand, which suggest that the sensitivity of M1-demand—and hence M1-velocity—to changes in interest rates seems to have increased early in the 1980s (Wenninger, 1986; Mehra, 1986; Rasche, 1987a).

Recent instabilities in the behavior of U.S. velocity have commonly been attributed to financial deregulation in the United States. Financial deregulation in turn was a response to the mounting inflation rates of the 1970s, as well as to the policy measures re-

quired to combat inflation. Rising inflation expectations and the policy shift of 1979 seem to account in large measure for the sharp increase in nominal U.S. interest rates recorded in the late 1970s and early 1980s.[8] High U.S. interest rates gave rise to calls for deregulation of U.S. markets for bank deposits. Since banks were prohibited from paying interest on checkable deposits, holders of transactions balances incurred large losses in the form of foregone interest. With the authorization of such innovations as NOW and Super-NOW accounts, financial institutions were enabled to offer interest on checkable deposits. These innovations led to shifts in velocity that could not be forecasted reliably on the basis of past experience.

In contrast to the patterns observed for the United States, velocity movements in Switzerland were closely related to movements in interest rates, at least

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[8] The mounting U.S. budget deficits probably also explain part of the rise in U.S. interest rates.

until the beginning of the 1980s. As indicated by Chart 5, velocities of both M1 and the monetary base (also expressed in terms of final demand) tended to vary in sympathy with the Euro-Swiss-franc deposit rate. However, evidence of instabilities in the behavior of velocity began to surface in 1982 and 1983, when a marked decline in interest rates was not accompanied by a parallel fall in either velocity measure.

The reasons for the failure of Swiss velocity to react to a decrease in interest rates are not entirely clear. Some observers of Swiss monetary policy attribute these instabilities to financial innovation, in particular to the spread of cash-saving payments techniques. This explanation is not fully convincing for two reasons. First, there is no evidence of a burst of financial innovation in Switzerland in 1982 and 1983 that would account for the upward shift in velocity at that time. Second, the shift was due largely to a smaller than expected rise in commercial banks' deposits with the SNB and in the circulation of large-denomination banknotes. While financial innovation may account for the downward shift in deposit holdings with the SNB, I doubt that it was responsible for the instabilities in the behavior of large-denomination banknotes. It is unlikely that innovations in the payments system only affected the demand for large-denomination banknotes since these denominations do not seem to be used primarily for transactions purposes.[9] A more plausible explanation lies in the gradual removal of Swiss restrictions on capital imports from abroad in 1979 and 1980. There is circumstantial evidence to suggest that these—very severe—restrictions were partly circumvented by foreigners accumulating large-denomination Swiss banknotes. Thus, Swiss monetary policy has not been plagued unduly by unpredictable shifts in velocity caused by financial innovation.[10]

The proliferation in the United States of new types of transactions accounts and new cash management techniques has led many observers to conclude that Swiss banks, for some mysterious reason, are less innovative than their U.S. equivalents. As far as the provision of payments services is concerned, I believe there is nothing mysterious about the behavior of Swiss banks. In Switzerland, the trend of innovation

in the payments system points in very much the same direction as in the United States. Switzerland has just launched a new electronic payments system for settling interbank cash balances. This innovation—called the Swiss Interbank Clearing System (SIC)—will enable banks to manage more efficiently their own cash holdings. Moreover, SIC will allow banks to offer new types of payments and cash management services to their customers. Thus, what distinguishes Switzerland from the United States is not the *trend*—but the *pace*—of innovation in the payments system. The leisurely pace at which the Swiss payments system is being transformed is explained by our record of low inflation and low interest rates, rather than by an ingrained conservative disposition of Swiss bankers. The slow pace of financial innovation has facilitated considerably the conduct of Swiss monetary policy. Only the future will tell whether the Swiss financial environment will remain conducive to the pursuit of a monetarist policy strategy.

In conclusion, instabilities in velocity behavior have raised more serious problems in the United States than in Switzerland. Therefore, a CMG-strategy for achieving and maintaining price stability is likely to be more successful in Switzerland than in the United States. However, even in Switzerland, velocity behavior has not been very stable in recent years.[11] It is possible that the upward shift in velocity in 1982 and 1983 accounts for the relatively sluggish response in Swiss prices to the monetary contraction of 1979.[12] Nevertheless, for reasons to be discussed in Section 6, the SNB—thus far—has not responded to this velocity shift by adjusting its money stock target.

4. Objectives of Monetary Policy

Monetarists have consistently argued that price stability should be the principal objective of monetary policy. They admit that a policy of eradicating inflation through a contraction in the growth of the money stock may be associated with a temporary drop in output and employment. The sharp recession triggered by the Fed's policy shift in 1979 clearly testifies

[9] In Switzerland, the large denominations comprise Swiss francs 500 and 1000 bills (roughly US$ 330 and 660, respectively, at the current exchange rate). They account for over 50 percent of the aggregate note issue.

[10] A recent econometric study of Swiss money demand is consistent with these results as it points to a downward shift in real demand for M1 early in the 1980s (Heri, 1986, p. 103).

[11] It should also be noted that Swiss data on the money stock M1 have not been revised in a major way since 1975, while the corresponding U.S. data were adjusted to take account of new types of transactions accounts. There is some debate as to whether the revised aggregate is more stably related to GNP than an M1A-type measure (see Hafer, 1984; Rasche, 1987b).

[12] Another reason for the sluggish response of prices was the appreciation of the U.S. dollar in 1984 and early in 1985. It caused a sharp but temporary increase in Swiss prices of internationally traded goods.

to the sacrifices society may have to bear in order to quell inflation. However, monetarists are skeptical about the ability of central banks to "fine tune" the economy, that is, to smooth cyclical fluctuations in output and employment. In their view, monetary policy is effective in influencing inflation trends, but not well suited to deal with society's other economic ills.

The Swiss National Bank tends to share the monetarists' skepticism about central banks' fine-tuning abilities. It has always regarded price stability as the overriding objective of Swiss monetary policy. This does not imply that it completely ignores output and employment growth. Real developments have influenced Swiss monetary policy in two respects. First, the SNB in recent years has followed a gradualist approach to combatting inflation in an effort to minimize the real costs of its policies. Second, as I showed earlier, the SNB, in the fall of 1978, was forced to shift temporarily to an expansionary monetary policy in order to forestall an incipient slump in output and employment resulting from an excessive upvaluation of the Swiss franc. The events of 1978 show that in such a small country as Switzerland excessive exchange rate fluctuations seriously limit the central bank's room for maneuver and may compel it to push aside temporarily the objective of price stability.

Although the SNB pays attention to the state of the real sector of the economy, it has never attempted to boost employment through an expansionary monetary policy. In this regard, our approach to monetary policy differs sharply from that of the Fed. The American central bank is much more ambitious than the SNB. Aside from price stability, it has traditionally pursued a wide variety of other objectives. In charting its policy course, it takes account of unemployment, business cycles, the international debt situation, the exchange rate, conditions in financial markets, and other problems. The recent surge in the growth of the U.S. money stock M1 reflects in part the multiplicity of the Fed's objectives. Since inflation is not currently a major problem in the United States, the Fed feels that it has some leeway for breathing new life into a sluggish U.S. economy. In order to stimulate U.S. economic growth, it appears that the Fed has relaxed considerably its monetary reins. Thus, high U.S. money growth probably constitutes a response to deregulation and financial innovation, as well as a shift to an expansionary policy course. The Fed is not overly concerned about possible inflationary consequences

of its policies. Fed officials are confident that they will be able to pick the right moment for tightening monetary policy in order to forestall a resurgence of inflation.

I do not feel competent to comment upon the Fed's fine-tuning abilities. As far as the SNB is concerned, we would harbor grave doubts about our own capability of simultaneously stimulating economic growth and keeping prices stable. In all likelihood, the strong variability of Swiss velocity would thwart any attempt by the SNB to achieve short-run price and output goals. The SNB would run the risk of violating its objective of price stability without succeeding in its efforts to smooth cyclical fluctuations in output and employment. I realize, of course, that in a country such as Switzerland—which has not experienced high unemployment since World War II—the political environment is conducive to the conduct of a monetary policy directed primarily at price stability.

Skepticism about central banks' abilities to fine-tune the economy is widespread not only in Switzerland but also in Germany and other European countries. It explains why these countries have been reluctant to endorse enthusiastically recent American calls for stimulating their economies. At the present moment it is too early to tell whether the Fed will succeed in its efforts to stimulate economic growth without jeopardizing price stability. What I find worrisome about the current situation is that the weakness of the dollar has prompted many central banks outside the United States to follow in the footsteps of the Fed and to relax their monetary policies. If the worldwide acceleration of money growth were to continue for some time, I would not be surprised to see a resurgence of inflation. From the Swiss standpoint, a superior response to the current dollar weakness would be a tightening of U.S. monetary policy combined with a relaxation of other countries' policy stance. Whether monetarist skepticism about the wisdom of fine-tuning will be refuted by future developments clearly remains to be seen.

5. Monetary-Base Control

Switzerland is virtually the sole industrialized country that has adopted the monetarist proposition of targeting the monetary base. The chief advantage of this approach is that the monetary base is under direct central-bank control. Therefore, the question as to whether the central bank is able to control its monetary target variable does not arise in the Swiss

context.[13] Our monetary-base target is not only an intermediate target, but also an operational one.

The idea of controlling directly the monetary base has not gone down well with central bankers outside Switzerland. There is a widespread belief among central bank officials that monetary-base control is not feasible for a variety of reasons. A first objection to monetary-base control is that it is likely to lead to unacceptably high short-run fluctuations in interest rates. In most industrialized countries commercial banks only maintain minimal amounts of excess cash reserves, that is, holdings in excess of legal requirements.[14] If excess reserves were negligible, monetary-base control would be liable to have disruptive effects on financial markets. Suppose, for example, that the banking system is shocked by an unexpected drain of cash reserves into currency in the hands of the nonbank public. In the absence of excess cash holdings, banks would be short of required reserves, compelling them to borrow funds on the money market. Unless the central bank were prepared to make up for the reserve deficiency, interest rates would rise, possibly to very high levels.

In stressing the disruptive effects of monetary-base control, critics of that approach tend to overlook the fact that the extent to which banks hold excess reserves itself depends upon the control procedures employed by the central bank. Swiss experience suggests that commercial banks are induced to hold substantial excess reserves if the central bank controls tightly the monetary base. Moreover, in Switzerland, banks' demand for excess reserves is highly sensitive to changes in domestic short-term interest rates.[15] Interest-sensitive bank reserves

largely account for the close inverse relationship between the Swiss monetary-base velocity and the Euro-Swiss-franc rate displayed in Chart 6.[16]

Interest-sensitive bank reserves act as a shock absorber designed to smooth short-run fluctuations in interest rates. To return to the example mentioned above, an unexpected cash drain, in the Swiss context, may indeed raise domestic interest rates. However, the increase in interest rates will seldom be large because it is tempered by a fall in banks' excess reserves.[17] Moreover, since these shocks tend to be transitory in the sense that they are typically reversed within a few days, they affect mostly the overnight lending rate, rather than longer-term rates of interest. On the whole, I must admit that the short-run variability of interest rates has been more pronounced in Switzerland than in countries where money market rates tend to serve as operational variables for central banks. Nevertheless, the variability of interest rates engendered by our system of monetary-base control has not been large enough to inconvenience the Swiss economy very much.[18]

Excess reserves play an important role in the transmission of monetary disturbances to the real sector of the economy. For example, if the SNB decides to augment the nominal supply of base money, the immediate effect of such a measure, ceteris paribus, is to lower nominal domestic interest rates. The principal instrument of Swiss monetary

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[13] In the United States, this question was discussed extensively early in the 1980s, as a result of an increase in the volatility of M1 growth, following the implementation of the new operating procedures in 1979. For example, see the papers in the special issue of the *Journal of Money, Credit and Banking* 14, pt. 2 (November 1982).

[14] In Germany and Canada, for example, excess reserves are negligible, while in the Netherlands banks hold very little cash. In contrast to Germany and Canada, legal reserve requirements do not exist in the Netherlands. In the United States, excess reserves are also small, but higher than in Germany and Canada.

[15] In Switzerland, commercial banks must comply with primary and secondary liquidity requirements. Primary liquidity comprises base money (deposits with the SNB and currency), as well as deposits with the postal giro system and certain types of foreign assets. Since the primary liquidity requirement is not specified exclusively in terms of base money, it is difficult to determine the extent to which base-money holdings of Swiss banks constitute excess reserves. However, total base-money holdings of Swiss banks are inversely related to short-term domestic interest rates. (Rich and Béguelin, 1985, Table 4). Rich and Béguelin also provide a theoretical analysis of the relationship between commercial banks' reserve behavior and the central bank's monetary control procedures.

[16] Demand for large-denomination Swiss banknotes is also sensitive to changes in domestic interest rates.

[17] Poole (1982) also argues that accommodative behavior of commercial banks will smooth interest rate fluctuations if the central bank controls the monetary base or total bank reserves. In his analysis the shock-absorber effect does not derive from interest-sensitive excess reserves. Instead, he develops a buffer-stock model of the money market in which money-demand and money-supply disturbances are positively correlated.

[18] Interest rates tend to be more volatile in Switzerland than in Germany, especially at the short end of the maturity spectrum. Although the German Bundesbank employs the monetary base (adjusted for changes in reserve requirements) as an intermediate target variable, it does not control that aggregate directly but through changes in domestic money market rates. The Swiss overnight lending rate is particularly volatile as compared with its German equivalent. Our system of monetary-base control probably is not a major cause of the volatility in that rate. A more important reason is the way in which the primary liquidity requirement (see note 15) is enforced. Banks must only prove at the end of the month that they hold the minimum required liquidity. Therefore, bank demand for base money rises temporarily at month end. Since the SNB does not fully accommodate that increase in demand, the overnight lending rate also tends to surge at month end (sometimes to 100 percent and more). Inasmuch as the realized month-end increase in the overnight lending rate is consistent with banks' anticipations, it does not affect interest rates on assets with a term to maturity of one month or longer. Currently, efforts are under way to change this curious requirement.

policy consists of foreign exchange swaps with commercial banks. To increase the monetary base, the SNB purchases spot foreign exchange (usually U.S. dollars) from commercial banks and simultaneously covers the transaction in the forward exchange market. Since the SNB does not incur any exchange risk, it effectively acquires Swiss-franc denominated claims on foreign countries. As a result, the rates of return on such claims decline. Owing to a close substitutability of domestic assets for Swiss-franc denominated claims on foreign countries, domestic interest rates also fall.[19] This decrease in interest rates is required to induce banks to absorb the additional base money in the form of higher excess reserves. In the long run, the increase in nominal base-money supply leads to a proportionate rise in the price level and nominal base-money demand, while interest rates and excess reserves return to their initial levels.

A concern frequently expressed by opponents of monetary-base control is that excess reserves may be a very unstable element in the transmission process (e.g., Bryant, 1982, p. 620). This concern is supported by Swiss experience only to the extent that central banks are willing to achieve short-run price and output goals. As I pointed out in Sections 2 to 4, the strong interest sensitivity of Swiss banks' demand for excess reserves and base money has not impaired the effectiveness of domestic monetary policy as an instrument for stabilizing price level trends, but renders our system of monetary control unsuitable for attaining short-run price and output objectives. However, I seriously doubt whether alternative systems of monetary control would strengthen our ability to smooth short-run fluctuations in prices and output.

Another objection to monetary-base control derives from the inability of most central banks to keep a tight rein on their loans to commercial banks. Clearly, central banks cannot adequately control the monetary base unless they are empowered to restrict borrowing by commercial banks. In Switzerland, commercial-bank borrowing from the central bank is determined in large measure by the SNB, even though a few loopholes in our system of monetary-base control continue to exist. (See Kohli and Rich, 1986, p. 916). Despite these loopholes, the SNB is able to manage the monetary base with a high

degree of precision. Virtually all the deviations between actual and targeted base-money growth shown in the table mirror decisions by the SNB to deviate from its targets, rather than imperfections in its control procedures.

6. Rules Versus Discretion

Monetarists tend to dislike monetary discretion. They feel that the record of discretionary monetary policy has been dismal and, therefore, favor monetary rules such as money stock targets that limit the central banks' freedom of action.

Although there is much truth in the monetarist critique of discretionary monetary policy, I fail to see how central banks could do entirely without discretion. Central bankers are not perfect, but I doubt that the performance of monetary policy would improve if they were replaced by apes following a set of mechanical rules. Nevertheless, I do not wish to advocate unlimited discretion for central banks. In my opinion, it is necessary that central-bank behavior be governed by a set of rules, but these rules should not be so inflexible as to prevent policymakers from reacting to unexpected major shocks to the economy.

Monetary-policy rules are liable to improve the performance of central banks in two respects. First, a rule such as a money stock target makes the central bank accountable to the public. A preannounced money stock target invites public scrutiny of monetary policy, which in turn may aid central banks in devising optimum policy strategies. Moreover, should the central bank deviate from the preannounced target, it must explain its actions to the public. Accountability is socially desirable because it reduces the chance that economic agents misinterpret the intentions of central banks and, thus, take decisions on the basis of erroneous forecasts of future monetary policy. Accountability also enhances the reputation of central banks as it reduces the incentive for shrouding monetary policy in mystery and confusion. In an effort to strengthen accountability to the public, the SNB has always insisted on fixing targets for a single monetary aggregate.[20]

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[19] In the absence of default risk, domestic short-term interest rates equal the corresponding dollar rates plus the forward discount on the spot rate of the dollar. An increase in the monetary base by way of a purchase of covered dollar claims raises the forward discount on the dollar and, hence, lowers domestic short-term interest rates.

[20] The annual growth target for the monetary base is publicly announced. However, the SNB does not disclose to the public a set of monthly target values of the monetary base (which are derived from the annual target and take account of seasonal movements in base-money demand). In my opinion, it is not clear whether the benefits of not disclosing the monthly target values outweigh the costs. See Goodfriend (1986) for an excellent discussion of the benefits and costs of central-bank secrecy.

Second, a well-designed rule forces central banks not to lose sight of price stability as the principal objective of monetary policy. Policymakers are always under pressure to achieve a multitude of goals. In particular, they are prone to adopt a short-run outlook by attempting to manage output and employment.[21] If the rule is accepted by the public, it may help central banks to withstand such pressure. In order to stress the importance of price stability as a policy objective, the SNB not only fixes yearly monetary targets, but also indicates what rate of growth in the monetary base it would like to achieve in the medium and long run. Considering our forecasts of potential output growth and the trend change in velocity, we believe that the monetary base should increase by no more than 2 percent per year if the inflation trend is to remain within a range of zero to one percent. As may be seen from the table, the annual target consistently exceeded 2 percent until 1985. The SNB did not want to lower base-money growth quickly to 2 percent because of its preference for a gradualist approach to combatting inflation. As long as inflation remained relatively high, the SNB was willing to accommodate to some extent the growth in base-money demand arising from changes in the price level and output during the targeting period.[22] However, at the beginning of 1986, the SNB reduced its annual target to a level deemed appropriate in the medium and long run.

Despite its preference for a policy approach based on rules, the SNB has not rigidly adhered to its preannounced money stock targets. As a result of the difficulties that may arise from excessively large fluctuations in the real exchange rate of the Swiss franc, the SNB cannot help qualifying its commitment to money stock targeting. The SNB is prepared to deviate from—or even to give up temporarily—its money stock targets if unexpected developments on the foreign exchange market or other unexpected major shocks should call for such a course of action.

The major deviations between targeted and actual money growth shown in the table are largely explained by exchange-rate considerations.[23]

In contrast to undesirable exchange-rate movements, the recent upward shift in the monetary-base velocity has not, thus far, prompted any revisions in the SNB's money stock target. The SNB's relaxed attitude toward that velocity shift is explained by three reasons. First, it is not clear at this moment whether the velocity shift is permanent or transitory. Furthermore, even if the shift should turn out to be permanent, we do not know whether it represents an increase in the level or growth trend of velocity. The policy implications of changes in the level and growth trend of velocity are fundamentally different. In the first instance, the SNB need not alter its medium-run money stock target of 2 percent. It should still be able to achieve its objective of price stability even if money growth is kept at 2 percent. But the velocity shift is bound to lengthen the period required to reach that objective. A rise in the growth trend of velocity, by contrast, calls for a permanent reduction of the SNB's medium-run target. Second, the shock-absorber role of excess reserves implies that banks will temper the effect of a velocity shift on domestic interest rates and the real sector of the economy. Therefore, the SNB need not react quickly to a velocity shift but can afford to wait until it is certain about the nature of that shift. Third, even if the SNB were to conclude that the shift represents an increase in the growth trend of velocity, it probably would not be prepared to lower its medium-run target at the present moment. The current tendency of central banks in the major industrialized countries to relax their monetary policies has narrowed considerably our own room for maneuver. A tightening of Swiss monetary policy at the present moment would be inappropriate since it would likely result in a further real appreciation of the Swiss franc. This would impair the competitive position of Swiss industry at a time when there is mounting evidence of a cyclical slowdown in domestic economic growth.

Swiss experience with monetary targeting suggests that a policy of committing the central bank to a simplistic constant-money-growth rule may not be optimal. This does not imply that central banks

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[21] Kydland and Prescott (1977), Barro and Gordon (1983), Barro (1986) and others have argued that discretionary monetary policy may be inconsistent with price stability. If central banks determine their monetary strategy on a period-by-period basis, policy may become "time inconsistent" since policymakers do not take account of possible discretionary decisions to be taken in the future. They have a tendency to create monetary surprises by exploiting prevailing expectations in order to temporarily boost output. However, as economic agents adjust their expectations, this strategy results in additional inflation, while the output effects vanish.

[22] The effective growth in M1 and the monetary base suggests that the actual outcome was less gradualist than might be believed on the basis of the annual targets (see table).

[23] The SNB cannot simultaneously achieve money-stock and exchange-rate targets since sterilized intervention on the foreign exchange market affects the exchange rate only temporarily, if at all. See Weber (1986) for a good discussion of the effects of sterilized intervention. A succinct summary of the SNB's attitude toward official intervention on the foreign exchange market is provided by Schiltknecht (1983, pp. 76-77).

should be guided entirely by discretion. The problem is not to choose between rules and discretion but between a simple CMG-strategy and a more complex set of rules. In my opinion, the ideal central banker is not a person adhering mechanically to a preannounced set of money stock targets, but someone equipped with a good dose of what I would call creative inertia. The ideal central banker will abide by a preannounced set of rules in principle. These rules should be designed to ensure that the central bank will have a good chance of achieving price stability in the longer run. Moreover, the rules should be specified as a contingency plan, that is, the ideal central banker should state in advance the conditions under which he (or she) would contemplate a breach or modification of these rules. In the Swiss context, an important contingency would be the level of the real exchange of the domestic currency. The precommitment to a set of rules implies that the ideal central banker would not react immediately to every unexpected shock affecting the monetary or real sector of the economy. Instead, he would attempt carefully to identify shocks that call for a central-bank response. In my opinion, creative inertia would be a more desirable mode of behavior than the hectic—and frequently vacuous—activism, as well as the penchant for quick fixes that seem to be characteristic of bureaucracies all over the world.

7. Summary and Conclusions

In this paper, an attempt was made to assess recent Swiss and United States monetary policy in light of five important monetarist propositions. The analysis led to the conclusion that the experience of these two countries does not unequivocally support or contradict monetarism. On the basis of that experience, some monetarist propositions may be regarded as dead, but others continue to be well and alive. In particular, Swiss and United States experience is consistent with the monetarist notion as to a fairly close relationship between trend changes in money and prices. Thus, there is little doubt about the monetarist claim that tight control of the growth in the money stock offers the key to a successful assault on inflation. However, monetarists have underestimated the difficulties arising from instabilities in the link between money and prices.

These instabilities also show up in unexpected shifts in the velocity of money. Instabilities in the behavior of velocity have been a more serious problem in the United States than in Switzerland. This is attributable to deregulation of U.S. markets for bank deposits, as well as to the rapid pace of financial innovation in the U.S. payments system, as compared with the rather slow changes in Swiss payments techniques. The difference in the pace of financial innovation in the two countries is largely explained by the U.S. record of relatively high inflation and nominal interest rates. Thus, while in the United States velocity shifts have complicated the Fed's task of setting appropriate money stock targets, the Swiss National Bank has not been plagued unduly by such problems. Of course, monetarists might argue that in a more fundamental sense U.S. experience does not contradict their beliefs; it rather confirms an important monetarist truth that central banks should not allow inflation to surface in the first place.

Another difference between United States and Swiss monetary policies lies in the ultimate objectives pursued by the Fed and the SNB. The SNB endorses in large measure the monetarist proposition that price stability should form the principal objective of monetary policy, while the Fed has endeavored to pursue a multiplicity of goals. However, in practice, the SNB has not been able to disregard entirely other objectives. External constraints arising from undesirable movements in the real exchange rate, in particular, have occasionally compelled it to pay attention to the state of output and employment. Moreover, the SNB is virtually alone among central banks in operating a system of monetary base control, a policy approach propagated by some monetarists. The SNB also shares the monetarists' preference for a policy approach based on rules rather than discretion. However, the SNB does not regard rigid adherence to a constant-money-growth rule as the best possible approach to monetary policy. Instead, the rules should be cast in terms of a contingency plan. Central banks should state in advance the conditions requiring departures from their money stock targets. In the Swiss case, the principal contingency is excessively large fluctuations in the real exchange rate of the Swiss Franc.

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THE EFFECT OF EXCHANGE RATE VARIATION ON U.S. TEXTILE AND APPAREL IMPORTS

Christine Chmura *

In the past 12 years, textile and apparel imports have risen nearly six fold, from $4.3 billion in 1974 to $24.7 billion in 1986. During this time, foreign textile producers increased their U.S. market share from 5 percent to 12 percent while foreign apparel producers increased theirs from 8 percent to 24 percent.

The increase of textiles and apparel imports has often been attributed to the appreciation of the U.S. dollar and the resulting fall in the relative price of foreign goods that occurred from 1981 through 1985. The purpose of this study is to test this hypothesis. More specifically, this study seeks to determine if exchange rate variations significantly influenced the level of U.S. textile and apparel imports during the period from 1977 to 1986.

This study begins with a description of the textile and apparel industries. The specific characteristics of these industries are then related to their competitiveness. Subsequently, two earlier studies of the impact of foreign competition on U.S. textile and apparel industries are reviewed. Finally, we present and explain the results of empirical tests of the effect of exchange rate variation on textile and apparel imports.

INDUSTRY PROFILES

The textile and apparel industries are in some ways similar but in other ways quite different. These similarities and differences figure importantly in determining the susceptibility of these industries to import competition.

Standard Industrial Classification

The textile, or "textile mill products," industry is composed of nine groups of firms that weave fiber into fabric and process fabric into intermediate products. The textile groups include mills weaving cotton, wool, and synthetic fibers. About one-third

of textile production is used by the apparel, or "apparel and other textile products," industry. The apparel industry is also composed of nine industry groups among which are manufacturers of clothing, curtains and draperies, and automotive and apparel trimmings.

Characteristics

The U.S. textile and apparel industries are highly competitive. Each is composed of a large number of small manufacturers. In 1984, the U.S. apparel industry comprised about 23,000 establishments employing a total of 1.2 million production workers, and the U.S. textile industry consisted of about 6,000 establishments employing 724,000 production workers. Sixty percent of the textile firms and 75 percent of the apparel establishments employ fewer than 50 employees.[1] Moreover, textile and apparel firms are located all over the world. Textile manufacturing is often one of the first major industries formed in a developing country. Consequently, nearly every country has a textile industry, and apparel industries are also common to most countries.[2]

The textile industry exists in a more competitive environment than the apparel industry because textile products are more standardized than apparel products. Buyers of textiles can easily switch from a firm that sells a standard good at a higher price to one that sells virtually the same good at a lower price. Because they are more differentiated, the products of competing apparel firms are viewed as more distinct and are likely to be less sensitive than textile goods to changes in prices.

Textile and apparel production are labor intensive, giving a competitive edge to producers in low-wage

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foreign countries. Apparel production is considerably more labor intensive than textile production. The relative labor intensities of the textile and apparel industries as well as their low capital barriers to entry are apparent in the value of capital equipment per worker. In the U.S. textile industry, the net value of capital equipment per worker in 1980 was $9,020, slightly below the average for all manufacturing. In apparel, however, the net value of capital equipment per worker was $1,909, one-fifth of the U.S. average.[3]

Effects of Economic Conditions

The demand for textiles and apparel is sensitive to the business cycle. Sales of textiles and apparel rise during economic expansions and decline during economic contractions. This procyclical behavior characterizes the major users of textiles: the home furnishing industry, the automobile and marine industries, and the apparel industry. Because of the sensitivity of textile and apparel sales to the business cycle, competition in these industries is intense during a general economic downturn.

The demand for textiles and apparel is also influenced by long-term economic conditions. As income has steadily risen in the United States, apparel and textile consumption has also risen. For example, in 1974 U.S. apparel consumption in real terms was $178 per capita while real disposable personal income was $703. By 1985, real apparel consumption had risen 52 percent to $270 per capita while real disposable personal income had risen 25 percent to $878.[4]

TWO RECENT STUDIES

This section reviews two recent reports on the effect of the dollar's value in foreign exchange markets on U.S. textile and apparel industries. The first report, by the Economic Consulting Services (ECS), studies the impact of the exchange rate on U.S. imports of textiles and apparel. The second report, by the Congressional Budget Office (CBO), considers the effect of the exchange rate on production levels of U.S. manufacturing industries, including textiles and apparel.

The ECS Report

A report prepared by ECS examines the effect of the U.S. dollar appreciation during the years 1981 through 1984 on the increase in U.S. imports of textiles and apparel.[5] The study focuses on the 25 countries supplying the largest quantities of U.S. imports of textiles and apparel. The ECS study uses a nominal exchange rate rather than a real exchange rate.[6]

The ECS study begins by identifying a "control" group of countries. The logic is that in countries where the currencies have maintained a stable rate of exchange with the dollar or have appreciated against the dollar, the growth in textile and apparel imports cannot be attributed to the appreciating U.S. dollar. Six "exchange rate neutral" countries comprise this control group.[7] These six countries were responsible for 11 percent of textiles and 27 percent of apparel imported from the 25 top suppliers.

The U.S. imports of textiles from the exchange rate neutral countries rose 84 percent during 1981 through 1984, while imports of apparel from these countries rose 48 percent. The remaining countries, whose currencies depreciated against the U.S. dollar between 1981 and 1984, showed a 98 percent increase in textile imports and a 49 percent increase in apparel imports. These figures seemed to indicate little difference between the two cases. Therefore, ECS concluded that U.S. dollar appreciation had only a small impact on the increase in U.S. imports of textiles and had a negligible impact on the increase in U.S. imports of apparel. In country by country comparisons, however, the ECS study found that the U.S. dollar appreciation had a greater effect on imports from countries with wage rates comparable to those in the United States.

CBO Study

In a report prepared by Elliot Schwartz for the CBO, quarterly data from 1973.3 through 1985.1

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[3] *Statistical Abstract of the United States 1985*, pp. 413, 525, and U.S. Department of Commerce, unpublished data in Daniel P. Kaplan, *Has Trade Protection Revitalized Domestic Industries?* (Washington, D.C.: Congressional Budget Office, 1986), p. 17.

[4] Numbers are deflated by the consumer price index (CPI) for all items and for the "apparel and upkeep" expenditure class where 1967 = 100.

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[5] Economic Consulting Services Incorporated, *The Impact of the Appreciation of the Dollar on U.S. Imports of Textiles and Apparel*, (Washington, D.C., 1985). This study was prepared for the American Textile Manufacturers Institute.

[6] For an explanation of the importance of using a real exchange rate to determine international competitiveness, see Dallas S. Batten and Michael T. Belongia, "The Recent Decline in Agricultural Exports: Is the Exchange Rate the Culprit?" The Federal Reserve Bank of St. Louis, *Review* 66 (October 1984), pp.5-14.

[7] They are the Dominican Republic, Haiti, Malaysia, Singapore, Taiwan, and Egypt.

are used to study the effects of imports on production.[8] Schwartz's regression equations contain explanatory variables for the nominal exchange rate, income effects, and price effects.

His results suggest that nominal exchange rate changes have no effect on U.S. textile and apparel production. None of the explanatory variables are significant in his textile regression equation. The only significant variable in his apparel regression is the income effect, included to capture short-term changes in the business cycle.

REEXAMINATION OF THE EVIDENCE

This section describes the method used here to estimate the impact of exchange rate variation and other factors on the level of U.S. imports of textiles and apparel.

Scope of the Study

The period chosen for the empirical tests extends from the first quarter of 1977 through the first quarter of 1986. This period is chosen for three reasons. First, the Multifiber Arrangement was in effect during the entire period, therefore there were few changes in foreign trade arrangements.[9] Second, the period includes pronounced variations in the exchange rate. The foreign exchange value of the dollar declined between the second quarter of 1976 and the first quarter of 1979, appreciated between the fourth quarter of 1979 and the first quarter of 1985, then declined through the first quarter of 1986. Third, the volume of textile imports increased 256 percent and the volume of apparel imports increased 380 percent over this period. (See Chart 1.)
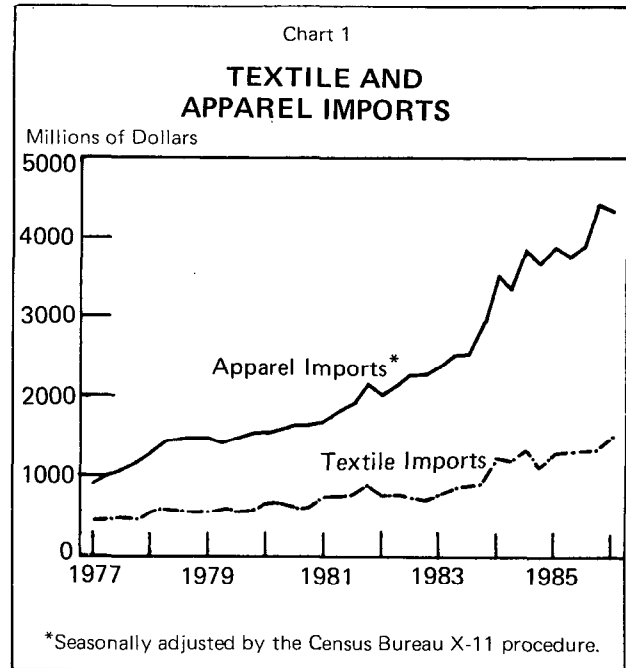
Real Exchange Rate Changes

The importance of using real, rather than nominal, exchange rates in studies of import competition is well documented.[10] The nominal exchange rate is

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[8] Elliot Schwartz, "The Dollar in Foreign Exchange and U.S. Industrial Production," Staff Working Paper, The Congress of the United States, Congressional Budget Office, December 1985.

[9] The Multifiber Arrangement (MFA) established a set of rules for developed countries to regulate imports of textiles and apparel made of cotton, wool, and man-made fiber. Although such barriers to trade interfere with estimations of the effect of exchange rate changes on imports, the constancy of these barriers is less damaging than frequent changes in the barriers.

[10] Belongia, op. cit.

Chart 1

TEXTILE AND APPAREL IMPORTS

Millions of Dollars

*Seasonally adjusted by the Census Bureau X-11 procedure.

simply the amount of one foreign currency that can be obtained for a unit of another currency. The real exchange rate, however, is the nominal exchange rate adjusted for the difference in price levels in the two countries. It shows the real quantity of imports the country gets per unit of export given up. (See Appendix A.)

Table I provides comparisons of the percentage changes in individual countries' real exchange rates with their associated percentage changes in textile and apparel imports to the United States. Inspection of these percentage changes, does not, however, suggest any strong correlation between real exchange rates and textile and apparel imports. Indeed, the correlation coefficient between percentage changes in the real exchange rates and textile imports is only 50 percent, and for apparel only 56 percent, for these 24 countries over the period examined.[11]

As Michael Belongia has argued, however, it is misleading to consider only individual countries because changes in relative prices cause many forms of substitution among users. Thus, a number of bilateral exchange rate movements will not capture the substitution possibilities as well as a single measure of changes in the dollar's value relative to

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[11] The correlation coefficients are distorted by the large percentage changes in textile and apparel imports from Sri Lanka and Indonesia. When these two countries are deleted from the comparison, the correlation coefficient between percentage changes in the real exchange rates and textile imports is only 7 percent, and for apparel only 37 percent.

REAL EXCHANGE RATES AND IMPORTS BY COUNTRY

| | Real Exchange Rate* | | | Million SYE** | | | | | |
| | | | | Textile Imports | | | Apparel Imports | | |
Country	1977	1985	Percent change 1977-85	1977	1985	Percent change 1977-85	1977	1985	Percent change 1977-85
Brazil	773.43	1615.12	108.8	38.3	157.3	310.7	6.4	41.9	554.7
Canada	245.60	298.78	21.7	68.9	239.3	247.3	6.9	14.6	111.6
Dominican Republic	239.62	475.07	98.3	2.1	12.2	481.1	25.5	107.2	320.4
Egypt	267.77	295.46	10.3	8.7	42.5	388.5	0.2	0.8	300.0
France	246.17	368.54	49.7	99.9	100.4	0.5	12.9	22.8	76.7
Germany	198.31	327.14	65.0	191.7	326.7	70.4	3.9	10.3	164.1
Haiti	235.56	208.85	−11.3	0.8	4.2	425.0	43.0	80.6	87.4
Hong Kong	246.87	347.75	40.9	214.3	222.9	4.0	601.0	824.9	37.3
India	217.88	289.40	32.8	115.1	153.9	33.7	50.5	116.2	130.1
Indonesia	280.62	542.64	93.4	0.2	130.8	65300.0	2.7	136.3	4948.1
Italy	283.47	366.59	29.3	153.5	455.1	196.5	37.7	73.3	94.4
Japan	198.75	234.66	18.1	773.8	593.0	−23.4	169.3	130.2	−23.1
Korea	316.58	410.92	29.8	84.8	472.1	456.7	439.6	671.0	52.6
Malaysia	207.04	254.75	23.0	11.6	60.3	419.8	9.1	91.9	909.9
Mexico	326.77	347.76	6.4	76.3	135.2	77.2	78.7	109.6	39.3
Pakistan	233.58	365.27	56.4	57.2	219.4	283.6	10.2	70.1	587.3
Peru	890.06	1460.00	64.0	19.7	68.2	246.2	0.1	1.6	1500.0
Philippines	269.90	318.04	17.8	14.0	13.4	−4.3	128.0	257.4	101.1
Singapore	212.92	245.59	15.3	18.9	7.7	−59.3	42.3	152.8	261.2
Sri Lanka	297.84	584.52	96.3	0.01	11.9	118900.0	4.1	110.6	2597.6
Spain	320.70	447.70	39.6	10.1	106.4	953.5	4.2	4.9	16.7
Taiwan	168.72	182.33	8.1	91.2	644.6	606.8	547.5	957.9	75.0
Thailand	257.79	337.57	30.9	23.5	145.2	517.9	22.0	130.6	493.6
United Kingdom	258.40	304.28	17.8	122.3	176.1	44.0	8.1	27.1	234.6

* Units of foreign exchange per U.S. dollar, adjusted for inflation.

** Standard yard equivalents.

Note: Import numbers are for cotton, wool, and man-made fibers textiles and apparel.
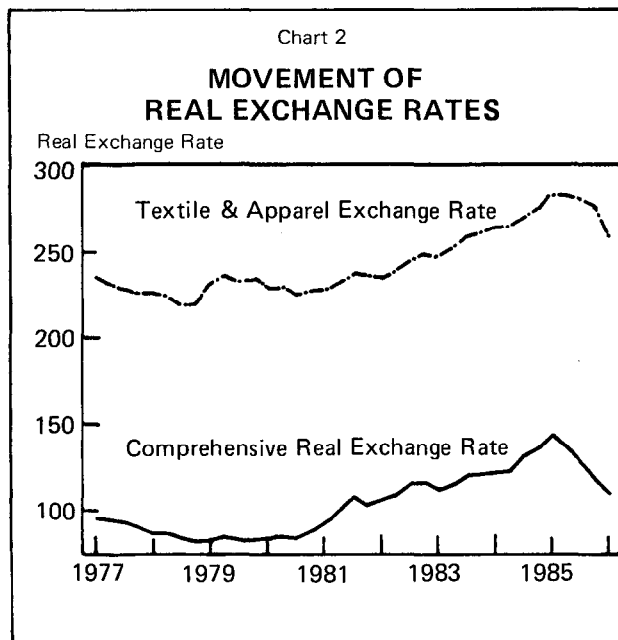
Sources: See Appendix A.

multiple currencies.[12] For that reason, aggregate imports and a trade-weighted exchange rate are used in the regression equations in this paper.

Comprehensive real trade-weighted exchange rates covering all exported and imported goods are available.[13] Because of their breadth of coverage, however, such indexes are not appropriate for studies of imports of specific types of goods. For that reason, this study uses a specially constructed index composed of trade-weighted data from countries that accounted for an average 84 percent of U.S. textile and apparel imports during the period 1977 through 1986. Chart 2 shows how the behavior of this special index for textiles and apparel differs from the behavior of the Federal Reserve's comprehensive index designed to cover all goods. (See Appendix A for a description of the textile and apparel index.)

[12] Michael T. Belongia, "Estimating Exchange Rate Effects on Exports: A Cautionary Note," The Federal Reserve Bank of St. Louis, *Review* 68 (January 1986), p. 5.

[13] One such index is published monthly by the Board of Governors of the Federal Reserve System. The countries used in this index were collectively responsible for only 22 percent of U.S. imports of textiles and apparel in 1984.

Chart 2

MOVEMENT OF
REAL EXCHANGE RATES

Real Exchange Rate

income and real exchange rates.[15] All variables are in the form of their natural logarithms.[16] Therefore, their coefficients can be interpreted as elasticities. In other words, the coefficient value of a particular explanatory variable represents the percent change in the imports of the textile or apparel industry with respect to a 1 percent change in the explanatory variable, holding other variables constant.

The explanatory variable representing the exchange rate is the real trade-weighted exchange value of the U.S. dollar. It is expected to be related positively to the quantity of textile and apparel imports. As the dollar appreciates in value, imports should rise, all else equal.

The explanatory variable for shifts in income (real GNP) should be positively related to imports. The higher the level of U.S. real economic activity, the higher the demand for textile and apparel goods (including imports), all else equal.

The Results

As shown in Table II, all of the coefficients of the explanatory variables for both the textile and apparel regression equations are statistically significant. Results for both textiles and apparel indicate that changes in the exchange value of the dollar affect the quantity of imports. For both textiles and apparel, a 1 percent increase in the exchange rate is associated with about a 1.4 percent increase in imports.[17]

These findings suggest that the exchange value of the dollar has the same effect on imports of apparel as on imports of textiles. At first blush, this result may seem surprising because imports of the more standardized textile goods might be expected to be more sensitive to price changes via the exchange rate than the more differentiated apparel goods. On the other hand, the high labor intensity of the apparel industry might lead one to expect a greater influence of the exchange rate on this industry's import competition. It might be easier to combat the import-

The Model

The model used below to test the exchange rate's affect on import demand focuses on the principal factors likely to affect the U.S. demand for imports of textiles and apparel. In addition to the real exchange rate, the model includes an explanatory variable for shifts in U.S. income. The primary purpose of the model is, of course, to determine if real exchange rate changes affect textile and apparel imports. A second purpose is to see if imports of textiles are affected differently from imports of apparel by changes in real exchange rates.

The model used in this paper posits a linear relationship between the dependent variable, imports (real dollar volume), and two independent ones, namely the real trade-weighted exchange value of the dollar, and the level of income (real GNP). In equation form:

imports = b_1 + b_2(real exchange rate) +
$\qquad$ b_3(real GNP) + error term

where the import variable is in terms of textiles or apparel.[14]

The independent variables are lagged by one quarter to capture the effect of time delays occurring before import levels respond to changes in

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[14] Import data were obtained from the American Textile Manufacturers Institute, Inc., *Textile Hi-Lights*, various issues, and unpublished data. See appendix for real exchange rate data. GNP data (1982 = 100) were obtained from the Department of Commerce.

[15] Alternatively, when the delay is specified as a second-degree polynomial distributed lag, the effect of the exchange rate changes are shown to persist for a period of four quarters for both textile and apparel imports. In the textile equation, the effect of real GNP is shown to persist for four quarters; lagged effects were not found for the real GNP variable in the apparel equation.

[16] The dependent variable, imports, increases at different percentage rates over the time period studied. For that reason, the natural logarithms are a better measure than the natural numbers.

[17] Statistically significant results were obtained using the Board of Governors real exchange rate in the regression. However, the coefficients for the real exchange rate varibles were much lower (0.004 for textiles and 0.78 for apparel).

Table II

REGRESSION RESULTS FOR THE PERIOD
1977.1 TO 1986.1

Variable	Textiles*	Apparel*
Intercept	−29.41	−35.09
	(−11.20)†	(−11.35)†
Log of Real Exchange Rate	1.33	1.40
	(3.54)†	(3.39)†
Log of Real GNP	2.91	3.69
	(5.94)†	(7.23)†
R-Square	.87	.84

* A two-step full transform method was used to correct for first order autocorrelation.

† T-statistic significant at the 1 percent level.

promoting effects of increases in the value of the dollar in a capital intensive industry where equipment can be modernized to lower cost than in a labor intensive industry. In a labor intensive industry in which there is little available capital to substitute for labor, it is probably harder to cut costs because it is difficult to decrease wages.[18]

In both regression equations, the income variable (real GNP) has a positive effect on imports. This result was expected as textile and apparel consumption have historically risen with increases in income. In addition, the income variable has a greater effect on textile and apparel imports than does the exchange rate. In other words, if the economy were to continue to grow at its trend rate of 2 percent and real exchange rates did not vary, then the dollar volume of imports of textiles would double by the year 2011 and the dollar volume of imports of apparel would double by 2006. However, an increase in the volume of imports does not necessarily mean production in the United States will decline by the same amount. In fact, although the market share of foreign imports

[18] Indeed, the evidence on capital investment in the textile and apparel industries in the last few years lends credence to this argument. As a result of the dollar appreciation in the 1980s, domestically produced textiles and apparel became more expensive than their foreign-produced counterparts. Because of increased capital expenditures and modernization in the textile industry, productivity in that industry rose 14 percent from 1981 through 1985. In the apparel industry, however, productivity rose only 6 percent during the same period. The industries' consequent loss in competitiveness with foreign producers is apparent in the share of the U.S. market gained by foreign producers: foreign market share in the textile industry increased from 5 percent in 1977 to 12 percent in 1986 while in the apparel industry foreign market share increased from 10 percent to 24 percent over the same period.

has increased in the past ten years, production in the U.S. textile and apparel industries has held steady in real terms.

Variations of the Model

An alternative model providing more information about trade flows than that presented above would account for supply as well as demand factors affecting imports. Appendix B contains a model of this type. Specifically, one variable affecting the supply of U.S. imports is the foreign price of particular imports relative to the foreign general price level. Unfortunately, however, there is no price index of U.S. textile and apparel imports. The domestic wholesale price index (WPI) for textile and apparel goods is used as a proxy for the price of U.S. imports of those goods. As with the model already presented above, the alternative version shown as Model 2 in Appendix B supports the conclusion that real exchange rate variations affect the volume of imports of textiles and apparel.

Still another way to measure the effect of exchange rate variations on imports is to use a commodity-specific real exchange rate. Such a measure was employed in the third version of the model, designated Model 3 in Appendix B. The results of this version again support the conclusion that exchange rate variations affect the volume of imports of textiles and apparel.

SUMMARY AND CONCLUDING COMMENTS

Although two recent studies indicate that exchange rate variations do not influence overall textile and apparel imports or production, the empirical tests conducted here suggest to the contrary that exchange rate variations do indeed have a significant effect on textile and apparel imports. Changes in income are found to have a greater impact than changes in the exchange rate on textile and apparel imports.

The results reported here are good news for the U.S. textile and apparel industries. If, as our study indicates, the exchange value of the dollar does affect imports, then the recent exchange rate depreciation should cause a decline in the quantity of imports. In addition, as our study indicates that textile and apparel imports are related to income and thus demand increases, part of the reason why imports are rising may be that the U.S. demand is expanding. If so, then the potential exists for domestic production to expand with a rise in demand. Consequently, although the market share of foreign imports has increased, production in the U.S. textile and apparel industry has held steady in real terms.

APPENDIX A

Calculating a Real Exchange Rate for Textile and Apparel Imports

The multilateral real exchange rate for this study consists of 24 foreign countries that supplied the United States with an average of 84 percent of its textile and apparel imports from 1977 through 1986.[1]

The index is constructed on a quarterly basis for the period 1977.1 through 1986.1 by using the following formula:

$$I_t = \left[\prod_{i=1}^{24} \left(\frac{E_t^i}{E_B^i} \cdot \frac{CPI_t^{us}}{CPI_t^i} \right)^{W_t^i} \right] 100$$

where

I_t = the textile and apparel index in quarter t,

E_t^i = the number of units of currency i per U.S. dollar in quarter t,

E_B^i = the number of units of currency i per U.S. dollar in the base period (first quarter 1977),

CPI_t^i = the consumer price index of country i in quarter t,

CPI_t^{us} = the consumer price index of the U.S. in quarter t,

$W_t^i = \dfrac{M_t^i}{\sum\limits_{i=1}^{24} M_t^i}$ trade weight,

M_t^i = U.S. imports from country i in year t.

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[1] These countries are: Taiwan, Korea, Hong Kong, Japan, Italy, Pakistan, Mexico, Canada, Germany, Philippines, Indonesia, India, Thailand, United Kingdom, Brazil, Malaysia, Singapore, Dominican Republic, Sri Lanka, France, Haiti, Spain, Egypt, and Peru. Although the People's Republic of China provides the second largest quantity of textile and apparel imports to the United States, it is not included in the exchange rate computation because CPI data is not available on a quarterly basis.

APPENDIX B

Variations of the Model for the Period 1977.1 to 1986.1

Model 2

Variable	Textiles*	Apparel*
Intercept	−24.75	−16.10
	(−3.71)†	(−2.42)†
Log of Real Exchange Rate	1.14	0.83
	(2.49)†	(2.05)‡
Log of Real GNP	2.58	2.19
	(3.91)†	(3.32)†
Log of Real Price Index	−0.18	−0.75
	(−0.76)	(−3.14)†
R-Square	.87	.88

$$\text{Real Price Index} = \left[\prod_{i=1}^{24} \left(\frac{WPI_t^{us}}{CPI_t^i} \right)^{W_t^i} \right] 100$$

Model 3

Variable	Textiles*	Apparel*
Intercept	−25.89	−19.63
	(−5.24)†	(−3.85)†
Log of Commodity-Specific Real Exchange Rate	1.13	0.99
	(3.79)†	(3.29)†
Log of Real GNP	2.63	2.05
	(4.36)†	(3.38)†
Time Trend	0.01	0.02
	(2.88)†	(5.46)†
R-Square	.91	.93

Commodity-Specific Real Exchange Rate =

$$\left[\prod_{i=1}^{24} \left(\frac{E_t^i}{E_B^i} \cdot \frac{WPI_t^{us}}{CPI_t^i} \right)^{W_t^i} \right] 100$$

$W_t^i = \dfrac{M_t^i}{\sum\limits_{i=1}^{24} M_t^i}$ trade weight,

M_t^i = U.S. imports from country i in year t.

Time trend = the trend that may be attributed to variables that are not in the regression equation, such as a relative price variable.

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* A two-step full transform method was used to correct for first order autocorrelation.

† T-statistic significant at the 1 percent level.

‡ T-statistic significant at the 5 percent level.

COST DISPERSION AND THE
MEASUREMENT OF ECONOMIES IN BANKING

David B. Humphrey

Introduction and Summary

The concept of scale economies in banking is important because it implies that larger banks may have an inherent cost advantage over smaller ones.[1] Such a competitive advantage could be increased if large banks found it easier to become even larger. This situation could occur if bank mergers were more freely permitted or nationwide banking became a reality. To properly gauge the effects of public policy in this area, it is necessary both to have accurate estimates of cost economies in banking and to determine their potential contribution to differences in relative costs already observed among banks.

Past studies generally have concluded that large banks possess scale economies. It is demonstrated below that these historical estimates of scale economies are small when compared with other influences already operating on bank costs. That is, even if scale economies exist and are statistically significant, they are much less important in conferring competitive advantages than commonly thought. Put differently, the observed variation in cost among banks can be split into (a) scale or cost economies across different-sized banks and (b) cost differences between similarly-sized banks. The first type of variation has been extensively studied while the second is new. Using recent data on all commercial banks, it is shown that estimated cost economies (when they occur) pale in comparison with existing differences in average cost levels.

This effect is easiest to see after all banks have been divided up into four equal groups or quartiles based on the level of their current average costs. The difference in average costs between the 25 percent of all banks with the lowest average costs and the

25 percent of banks with the highest costs is two to four times greater than the observed variation in average costs across bank size classes. These findings suggest that the existence of bank scale economies (or diseconomies) should have little competitive impact relative to those competitive effects which already exist as a result of large differences in cost levels. Thus structural or competitive changes due to cost effects associated with nationwide banking should be relatively small.

While scale economies are seen to be less important in determining cost advantages between large and smaller banks than has heretofore been thought, their accurate measurement is still of interest. In an effort to improve this accuracy, two influences on cost economy estimation are explored. These relate to assumptions that all banks in a sample lie on the same average cost curve (1) over time and (2) across different-sized banks at one point in time.

Over time, as interest rates fluctuate, the cost curve can experience large changes in its slope. Such changes lead to quite different scale or cost economy measurements at different points in time. Thus results based on cross sections of banks for one year may not generalize well to other years. In addition, results based on a cross section of all banks even at one point in time may not generalize well to all bank size classes. This is because different-sized banks can experience significantly different cost economies. Hence looking at all banks together for even a single year, which is the method used in almost all studies, is only weakly justified and should be tested before such results are relied upon. These conclusions are illustrated by computing cost elasticities (showing the percentage change in cost per given percentage change in assets) by separate bank size classes and by separate average cost quartiles of banks for three years (1984, 1982, and 1980). It is shown that accurate cost economy estimates are likely to be obtained if banks are disaggregated by size class or, more importantly, if analyses are performed over time so that interest rate changes do not unduly bias the scale economy estimates obtained.

[1] *Scale economies exist when average cost falls as bank output rises. One way this can occur is when fixed costs are spread over a greater volume of output (with product mix constant).*

Average Costs and Bank Size in 1984

There were 13,959 banks in the United States in 1984. Publicly available balance sheet and cost data on these institutions were collected from the Consolidated Report of Condition and the Report of Income and Dividends. Banks in unit banking states (*unit state banks*) are treated separately from those in limited and statewide branching states (branching state banks).[2] Past analyses of bank costs have utilized sophisticated models and econometric techniques. In contrast, the analysis undertaken here will rely on the raw data with a minimum of manipulation or application of statistical procedures to illustrate the major points. Technical issues are treated in footnotes. With this approach, it is possible to divide the data up in ways not previously attempted and suggest areas where more sophisticated procedures may be usefully applied in the future.

A Scatter Diagram of Average Costs and Bank Size To date, almost all published studies report the average or mean relationship between bank costs and size. This is because all banks in a sample are pooled together in a single regression equation. In this process some descriptive information about the sample, such as its dispersion about the mean, is largely lost. Dispersion in a sample can be inferred by looking at a scatter diagram. The scatter diagrams shown in Figures 1a and 1b relate average bank cost to the size of a bank. Average cost (AC) includes all reported operating costs and interest expenses while bank size is measured by the dollar value of total assets (TA). Figure 1a shows the scatter for 7,661 branching state banks and Figure 1b shows 6,298 unit state banks. Many of the data points shown overlap each other. Since the bank sizes (TA) vary from $1 million ($10^6$) to over $100 billion ($10^{11}$), the logarithm of total assets was used on the horizontal axis.

If the curve that best fits the scatter of points in these figures happens to be U-shaped, then AC falls as a bank gets larger, reaches some minimum point where costs are constant for further size increases, and then rises for even larger banks. Alternatively, the curve may only fall, or be flat for the entire range, or only rise as banks become larger. A major assumption at this point, regardless of what the curve looks like, is that the observed cost relationship across

different-sized banks at one point in time can be used to infer the average result which would apply to any given bank which itself becomes larger, either by core deposit or purchased money growth over time or by bank merger.[3] As seen from the two scatter diagrams, there is considerable dispersion in average costs for the smaller banks. This dispersion is somewhat reduced for larger banks. It is clear that banks of similar size have greatly differing average costs per dollar of total assets.

Costs by Average Cost Quartile The dispersion in average costs can be more easily seen when all banks are ranked by the level of their average cost and placed into average cost quartiles. The dashed lines in Figures 2a and 2b show this result. The highest dashed line (AC_{Q4}) in Figure 2 shows the average cost of that 25 percent of all banks in each of 13 size classes (listed in Table I) with the highest (fourth quartile) individual average costs; the lowest dashed line (AC_{Q1}) shows the same thing for that 25 percent of all banks with the lowest (first quartile) average costs. The solid line (AC_M) reflects the mean average cost for all banks in each size class over all four quartiles together.[4]

Displaying bank cost data by average cost quartiles shows there is more cost variation between the lowest and highest cost quartiles in any given size class than there is between the lowest and highest average cost values in any given quartile across all size classes. An example is the percentage variation between points A and B in Figure 2a. There the variation between AC_{Q1} and AC_{Q4} within size class 7 ($200-$300 million in TA) always exceeds the maximum variation along a quartile, such as the percentage variation between points B and C on AC_{Q4} or between points D and E on AC_{Q1}.

The data used to plot Figure 2 are shown in Tables Ia and Ib. Computations from Table I indicate that the maximum variation in branching state banks' average cost along each of the four average cost quartiles is 6, 6, 9, and 12 percent, respectively, for the first to fourth quartiles (with a maximum variation of 8 percent along AC_M, the average cost curve for all banks together). In contrast, the maximum variation between the lowest and highest quartiles occurs

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[2] Separate treatment is desirable because statistical analyses have earlier indicated that these two classes of banks are significantly different from one another in terms of how costs vary with size. It should be noted that banks in unit banking states do at times have a limited number of branches while unit banks—those with no branches—exist in branching states.

[3] For larger banks, mergers seem to be preferred over waiting for core deposits to grow as the size of the existing market expands. For example, Rhoades [1985] has shown that mergers have accounted for 72 percent of the current size of the twenty largest U.S. banking organizations.

[4] That AC_M is closer to AC_{Q3} than AC_{Q2} indicates that the distribution of individual average costs within each size class is skewed somewhat toward the higher AC values, reflecting more dispersion for the higher cost banks.

Figure 1a

SCATTER DIAGRAM: AVERAGE COST OF BRANCH STATE BANKS

Average Cost ($)
(Operating and interest costs per dollar of assets)

(1984; 7,611 Banks)

InTA
(M = Millions; B = Billions)
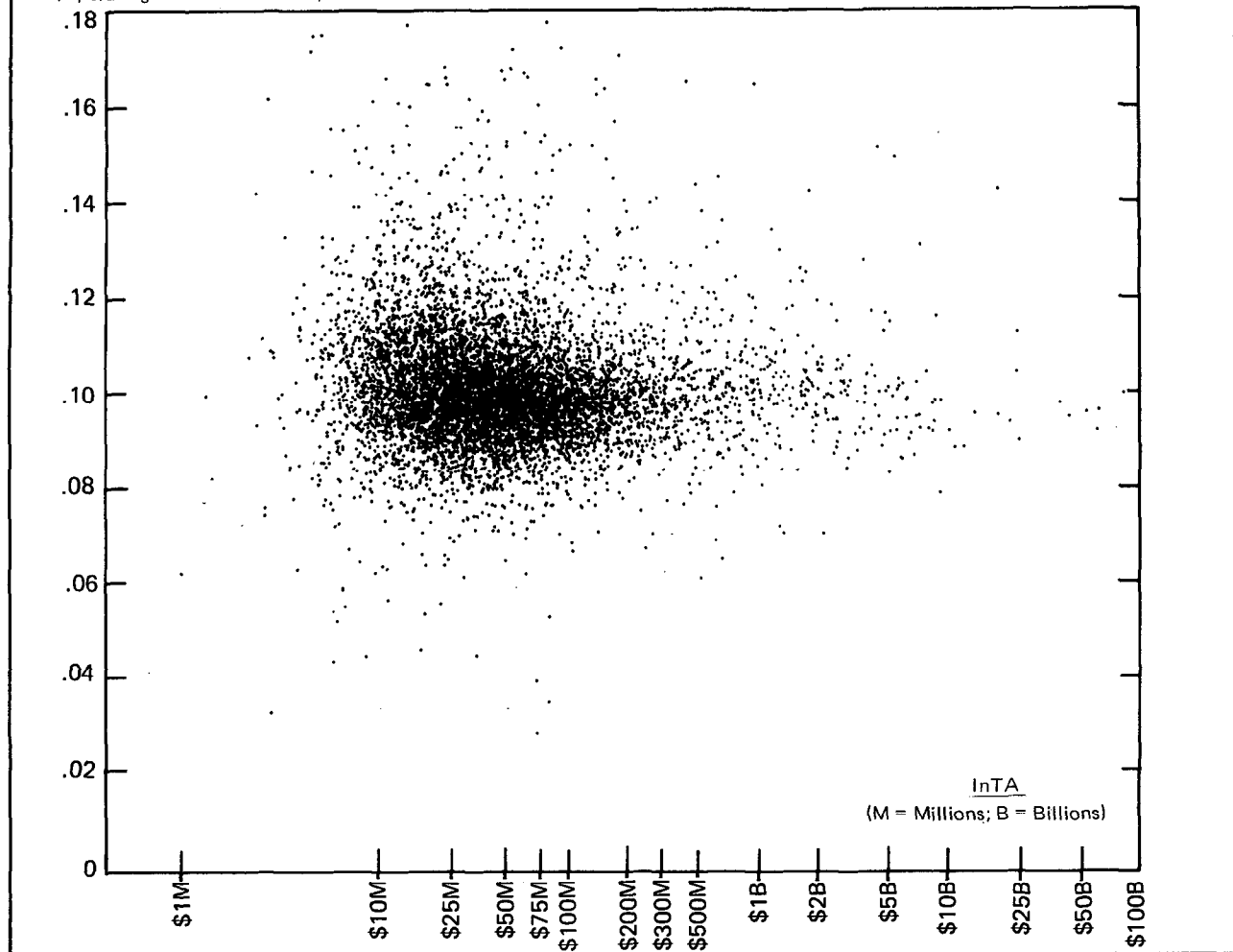
at size class 1 and is 49 percent, with a minimum of 26 percent at size class 7. The variation between all banks in these two quartiles across all size classes was 34 percent. In summary terms, the variation between average cost quartiles for branching state banks (34 percent) averages more than four times the variation along a quartile (8 percent).

The same results apply, with only slightly less force, to unit state banks. Here the maximum difference in average cost along each of the first to fourth quartiles are, respectively, 14, 11, 14, and 27 percent (with a 17 percent maximum variation along AC_M). The maximum difference between the lowest and highest average cost quartiles is, however, 52 percent for size class 1, with a minimum variation of 17 percent for size class 12. Across all size classes

between these two quartiles, it was 31 percent. In summary terms again, the variation between average cost quartiles (31 percent) for unit state banks averages a little less than twice the variation along a quartile (17 percent). Thus the distribution of individual bank average costs *about* the mean level of average cost for all banks is more important than the distribution of average cost values *along* the mean or any quartile cost curve.

Relative Efficiency: Comparing Mean Average Costs With Those of the Lowest Cost Quartile Figure 3 shows the mean average cost AC_M for both branching (top solid line) and unit state banks (top dashed line) and permits a comparison with the average costs for branching and unit state banks in the lowest average

Figure 1b

SCATTER DIAGRAM: AVERAGE COST OF UNIT STATE BANKS
(1984; 6,298 Banks)

Average Cost ($)
(Operating and interest cost per dollar of assets)

InTA
(M = Millions; B = Billions)

Y-axis: 0, .02, .04, .06, .08, .10, .12, .14, .16, .18

X-axis: $1M, $10M, $25M, $50M, $75M, $100M, $200M, $300M, $500M, $1B, $2B, $5B, $10B, $25B, $50B, $100B
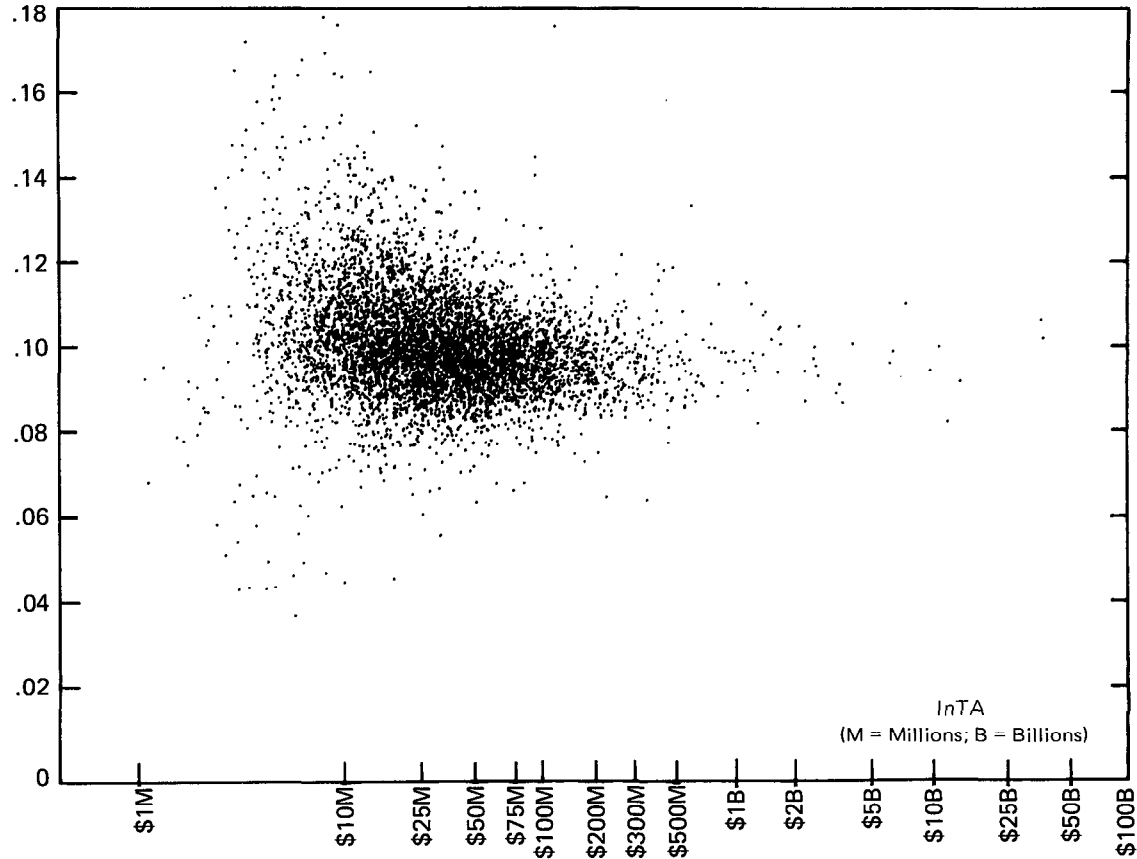
Figure 2a

COST BY AVERAGE COST QUARTILE
(Branch State Banks:1984)

Average Cost ($)

AC_{Q4}
AC_{Q3}
AC_{M}
AC_{Q2}
AC_{Q1}

C, B, E, A, D

Y-axis: .08, .09, .10, .11, .12, .13

Asset-Size Classes: 1 2 3 4 5 6 7 8 9 10 11 12 13
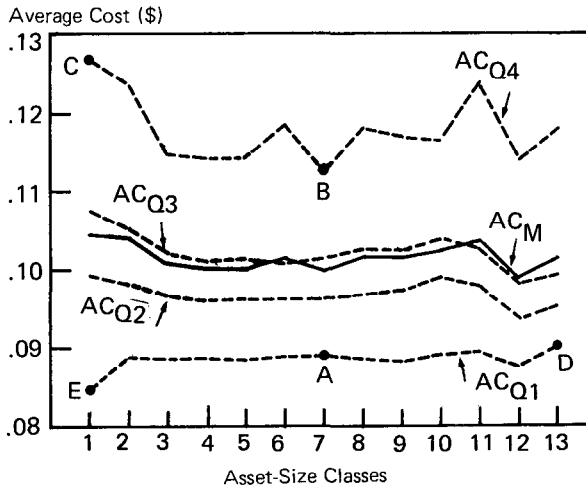
Figure 2b

COST BY AVERAGE COST QUARTILE
(Unit State Banks:1984)

Average Cost ($)

AC_{Q4}
AC_{M}
AC_{Q3}
AC_{Q2}
AC_{Q1}

Y-axis: .08, .09, .10, .11, .12, .13

Asset-Size Classes: 1 2 3 4 5 6 7 8 9 10 11 12 13

Table Ia
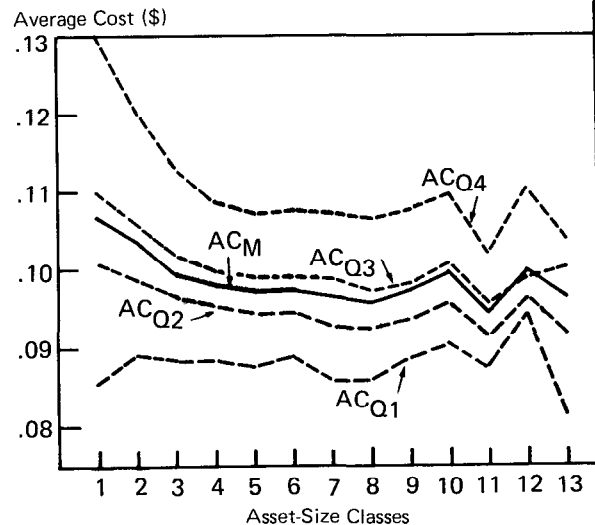**AVERAGE COSTS BY SIZE CLASS AND COST QUARTILE**
(Branch State Banks: 1984)

Size Class:	Average Cost Quartile:				All Banks	Sample Size	Percent Sample Size
	1	2	3	4			
1. $1M-$10M	$.085	$.099	$.108	$.126	$.105	542	7.1
2. $10M-$25M	.089	.098	.105	.124	.104	2,007	26.2
3. $25M-$50M	.088	.097	.102	.115	.100	2,054	26.8
4. $50M-$75M	.089	.096	.101	.114	.100	1,009	13.2
5. $75M-$100M	.089	.097	.101	.114 ·	.100	524	6.8
6. $100M-$200M	.089	.097	.101	.118	.101	738	9.6
7. $200M-$300M	.089	.097	.101	.113	.100	230	3.0
8. $300M-$500M	.089	.097	.103	.118	.102	178	2.3
9. $500M-$1B	.088	.098	.103	.117	.102	159	2.1
10. $1B-$2B	.089	.099	.104	.117	.102	95	1.2
11. $2B-$5B	.089	.098	.103	.124	.104	76	1.0
12. $5B-$10B	.088	.094	.098	.114	.099	30	.4
13. > $10B	.090	.096	.099	.117	.102	18	.2
All Banks	.088	.097	.103	.118	.102	7,660	100.0

(M = millions; B = billions)

cost quartile AC_{Q1} (bottom solid and dashed lines, respectively). Two things stand out. First, average costs between branching and unit state banks are closer together in the lowest average cost quartile (bottom two lines) than they are at the mean (top two lines). Second, the lowest quartile average cost curves represent roughly parallel displacements from the mean average cost curves.

These two results imply that the difference between mean average costs and those for the lowest average cost quartile are due to differing efficiency levels among banks and not due to different technologies used in production of bank outputs or services. For example, use of different technologies to produce bank output, such as building many branches to service customers versus no or few branches (as when branching and unit state banks are contrasted), or relying on core deposits versus purchased money to fund assets (as when small and
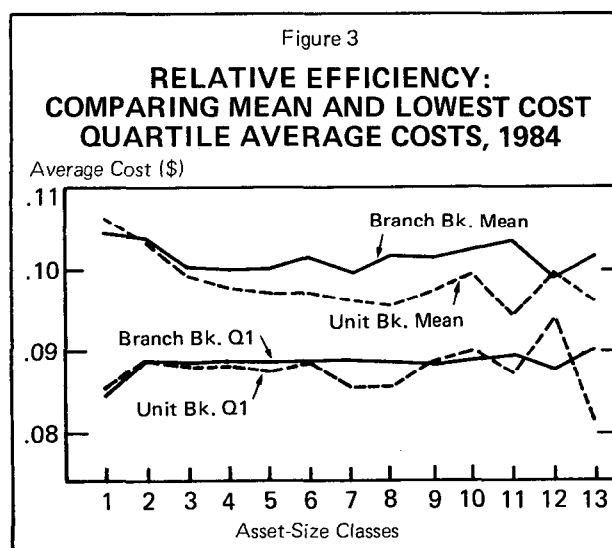
large banks are compared), generates little difference in the average costs faced by banks either at the mean or at the lowest cost quartile. The roughly parallel shift between AC_M and AC_{Q1} suggests, in addition, that measured scale economies at the mean of all banks should not be markedly different from those computed for the lowest average cost quartile of banks, since the slopes of the plotted curves appear to be similar. This proposition is illustrated next by estimating asset cost elasticities.

Asset Cost Elasticities

Asset cost elasticities (ASCE) show how much costs change as a bank becomes larger. The ASCE is the ratio of the percentage change in bank operating and interest costs to the percentage change in bank asset size. When the ASCE is less than one, cost economies exist as average costs fall for larger-sized

AVERAGE COSTS BY SIZE CLASS AND COST QUARTILE
(Unit State Banks: 1984)

Size Class:	Average Cost Quartile:				All Banks	Sample Size	Percent Sample Size
	1	2	3	4			
1. $1M-$10M	$.085	$.101	$.110	$.130	$.106	828	13.1
2. $10M-$25M	.089	.099	.106	.120	.103	1,979	31.4
3. $25M-$50M	.088	.096	.101	.112	.100	1,626	25.8
4. $50M-$75M	.088	.095	.100	.108	.098	757	12.0
5. $75M-$100M	.088	.095	.099	.107	.097	349	5.5
6. $100M-$200M	.088	.095	.099	.107	.097	501	8.0
7. $200M-$300M	.086	.093	.099	.107	.096	107	1.7
8. $300M-$500M	.086	.093	.097	.106	.096	78	1.2
9. $500M-$1B	.088	.094	.098	.108	.097	35	.6
10. $1B-$2B	.090	.096	.101	.109	.100	18	.3
11. $2B-$5B	.087	.091	.096	.102	.095	11	.2
12. $5B-$10B	.094	.096	.099	.110	.100	4	.1
13. > $10B	.082	.092	.100	.104	.097	5	.1
All Banks	.088	.097	.103	.116	.101	6,298	100.0

Figure 3
**RELATIVE EFFICIENCY:
COMPARING MEAN AND LOWEST COST
QUARTILE AVERAGE COSTS, 1984**

banks. When the ASCE equals one, average cost neither falls nor rises as a bank gets larger and constant cost prevails. Finally, when ASCE exceeds one, average costs rise and diseconomies exist for larger banks.

It is possible to estimate separate asset cost elasticities for each of the size class and average cost quartile cells in Table I. This will indicate if and by how much cost elasticities may differ across 13 separate size classes or among the 4 different cost quartiles. That is, do larger banks have greater cost economies than smaller ones? Does this hold at the mean as well as for each quartile? Do banks currently in the lowest cost quartile experience cost economies which add to their existing advantage of already having lower costs?

To answer these questions, it is sufficient for our purposes to estimate a simple quadratic equation of the logarithm of total costs (ln TC) regressed on the logarithm of bank asset size or total assets (ln TA):

(1) ln TC = a + b (ln TA) + c ½(ln TA)².

The asset cost elasticity (ASCE) is derived from $\partial(\ln TC)/\partial(\ln TA)$ in (1) and can vary by bank size:

(2) ASCE = b + c (ln TA).

A major difference between our ASCE and other treatments of bank scale economies is that unlike prior studies we do not "hold other things constant." This difference is a result of asking different questions. The standard approach is to hold constant such things as input prices (the prices of labor, capital, and materials used to produce bank outputs), the number of branches a bank has, and (more recently) the product mix of outputs produced. These things are held constant since, in terms of standard economic theory, scale economies are supposed to measure how costs change at one "plant" as only the scale of output is varied. To estimate this effect empirically, the influence of scale on cost should not be commingled with the effect of other things that change along with scale and affect costs. An alternative question is just as valid and concerns how costs vary at the firm level not only with the scale of output, but also with the myriad of other things that change as a bank gets larger, such as executive compensation, increased reliance on branches to deliver deposit and loan services, and different product mix.[5]

This alternative approach also bears more directly on the political and economic question of the effect of bank mergers or interstate banking on bank costs. Bankers especially wish to determine if and how effectively they can compete with the money center bank who has just moved in down the street or has recently merged with a competitor. These bankers or their Congressmen are not as concerned about what the costs of the money center bank would be at the plant or branch office level (or even the firm level) if everything but scale is held constant. It is precisely because other things vary as a bank gets larger that the political interest is in the bottom line effect on costs as all things along with scale are changed. Thus our ASCE measure addresses a different question from that addressed by other treatments of scale economies.

Asset Cost Elasticities by 13 Size Classes and 4 Cost Quartiles In any data analysis, it is important to choose a classification scheme that does not unduly obscure important differences in the data. For this

reason, 13 bank size classes were used in place of the four size class quartiles adopted in Lawrence and Shay [1986a]. If all banks were broken down into only four size class quartiles, the first three quartiles would consist of 75 percent of all banks but only cover those with assets of up to $80 million ($58 million) for branching (unit) state banks. The last quartile would cover the remaining 25 percent of all banks with over 80 percent of all bank assets. This would poorly distinguish between large and smaller banks since branching (unit) state banks in this quartile would range from $80 million to $116 billion ($58 million to $36 billion) in assets.

The ASCEs shown in Tables IIa and IIb are based on separate regressions using equation (1) for each cell in Table I. When all banks are pooled together or when all banks are divided up by size class, ordinary least squares (OLSQ) estimation is appropriate. The same is true when all banks are placed into average cost quartiles on the basis of their *observed* level of average cost and when these quartiles are further subdivided by size class. If, however, the purpose is to obtain the curve of best-fit for those banks which reflect different long-run cost regimes, OLSQ can yield biased estimates and different estimation methods, such as TOBIT, would be preferred.[6] With this qualification in mind, the OLSQ regression results are presented.

When all banks are pooled together, significant (but quantitatively small) cost economies are experienced at the mean. The ASCEs are .99** (.97**) for branching (unit) state banks.[7] In contrast, slightly

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[5] In effect, our ASCE is equivalent to the total derivative of costs with respect to all explanatory variables that affect bank expenses (and are correlated with bank size), rather than the partial derivative used to derive scale economies alone.

[6] The OLSQ estimates can be biased in this case since some banks observed to be in, say, the lowest cost quartile will in fact, due to random variations in cost, actually belong to another long-run quartile cost regime and therefore be misclassified. Similarly, some banks which should be in the lowest long-run quartile cost regime will be observed in a different quartile for the same reason. Regardless of whether one is interested in defining quartiles as long-run cost regimes or merely as where bank costs are observed to be at one point in time, heteroscedasticity is likely to be a problem and bias the estimated standard errors.

[7] The *t* tests were always two tailed and evaluated at the 95 percent (*) and 99 percent (**) confidence intervals. Since at least 4 alternative hypotheses have been estimated, the actual overall confidence intervals are 80 percent (*) and 96 percent (**). This adjustment is accomplished by taking 4 times .05 or .01 and subtracting this value from 1.00 [see Christensen, 1973]. The 4 alternative hypotheses concern: (1) pooling all banks together; (2) dividing up all banks into 13 size classes; (3) dividing up all banks into 4 average cost quartiles; and (4), dividing up each cost quartile into 13 size classes. Since the data have been divided up or pooled so many different ways, the probability of finding some statistically significant parameters and ASCEs by chance alone will have increased. This problem is addressed by looking at the *overall* confidence level, rather than the confidence level that presumes only one version of the model—one type of pooling—has been run.

Table IIa
ASSET COST ELASTICITIES (ASCEs)
(Branch State Banks: 1984)

Size Class:	Average Cost Quartile:				
	1	2	3	4	All Banks
1. $1M-$10M	1.13*	1.01	1.00	.93	1.00
2. $10M-$25M	1.00	1.00	1.00	1.00	.97*
3. $25M-$50M	1.01	1.00	.99	1.01	.97*
4. $50M-$75M	.91	1.00	1.01	1.13*	.97
5. $75M-$100M	1.22	1.03*	1.00	1.04	1.04
6. $100M-$200M	1.00	1.00	1.00	1.08	1.07*
7. $200M-$300M	.99	1.03	1.01	1.06	1.03
8. $300M-$500M	.85	1.00	1.01	1.21	1.10
9. $500M-$1B	1.00	1.01	.99	.93	1.00
10. $1B-$2B	1.03	.99	.96**	1.16	1.05
11. $2B-$5B	1.10	1.00	.98	1.21	1.06
12. $5B-$10B	1.09	.98	.97	.83	.89
13. > $10B	1.02**	.98	1.03*	.74*	1.03
All Banks	1.01**	.99**	.98**	.98**	.99**

different results are obtained when the data are divided up into average cost quartiles (last row of Table II). Minor cost diseconomies are evidenced at the lowest cost quartile of banks (1.01**) with increasing cost economies experienced for banks in successively higher quartiles (going from .99** to .98** or from .98** to .94**). Greater variation in ASCEs occurs by size class (last column of Table II). Here point estimates range from .85 to 1.30, although most are not significantly different from 1.00 or constant costs. While some of the variations in ASCEs appear to be quite large, it has to be remembered that these apply only to the size class indicated. The overall impact on the level of average cost experienced is thus the weighted effect of all size class ASCEs up

to the size class being examined, not just the ASCE observed at a particular size class in the table.[8]

A similar diversity in ASCE results apply to the separate estimates by average cost quartile size class where a minimum of pooling is used (rows 1 to 13

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[8] For illustrative purposes only, all cells in Table II were reestimated where the regression (1) is linear rather than quadratic (since the restriction c = 0 in (1) is imposed). In this case, the ASCE is a constant within the sampled banks used in each regression. For the most part, there were no changes in the ASCEs computed, showing that straight line segments evaluated at the mean of each cell would give the same results as a curve evaluated at the same point. Only in those few cases where sample size within a cell was very small to begin with, as occurred for the very largest banks, was there any change. But this difference would be expected when sample size is extremely small.

Table IIb
ASSET COST ELASTICITIES (ASECs)
(Unit State Banks: 1984)

Size Class:	Average Cost Quartile:				
	1	2	3	4	All Banks
1. $1M-$10M	1.16**	1.01	.99	.97	1.00
2. $10M-$25M	1.02	1.00	1.00	.96**	.94**
3. $25M-$50M	1.00	1.00	1.00	.97	.98
4. $50M-$75M	1.05	1.00	.99	.97	1.03
5. $75M-$100M	1.02	1.03	1.01	1.08	.94
6. $100M-$200M	1.00	1.01	1.00	.98	.97
7. $200M-$300M	1.13	.93	1.00	1.11	1.16
8. $300M-$500M	.93	1.05	.98	1.25*	1.05
9. $500M-$1B	1.14	.90	1.00	.94	1.04
10. $1B-$2B	.68	.70*	1.14	.76*	1.09
11. $2B-$5B	a	a	a	a	.85
12. $5B-$10B	a	a	a	a	1.30
13. > $10B	a	a	a	a	1.04
All Banks	1.01**	.98**	.97**	.94**	.97**

a Sample size was too small to have positive degrees of freedom and so a regression for this cell was not estimated.

and columns 1 to 4). While the range of variation is larger, only 29 of the 104 ASCEs in Table II are outside the range of .95 to 1.05 and fewer still (12) are significantly different from constant costs.

So, using 1984 data, are there cost economies in banking? Yes, but looking at the results for each average cost quartile (last row) or size class (last column), seemingly only for higher cost and/or smaller banks. Do they confer competitive advantages for larger banks over smaller ones? Not really, for at least two reasons. First, as noted above, the individual cell estimates generally show cost elasticities insignificantly different from constant costs, which would not favor large over smaller banks. Second, even if cost economies were pervasive, the ASCEs would have to be on the order of .49 to .66 to lower costs equivalent to the difference in costs already observed between banks in the highest and lowest cost

quartiles.[9] Thus cost economies at large banks would have to be far larger than those measured here or elsewhere (usually between .90 and 1.00 [Benston, 1972]) to dominate existing differences in cost levels and so have a major effect on competition over that which already exists today for similarly sized banks.

Lastly, are cost economies important for public policy purposes? Yes, but not as important as previously believed. The variation in average costs between different-sized banks—the standard measure of cost economies—is much smaller than the existing

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[9] The average cost of a $500 million asset branching (unit) state bank at the highest average cost quartile is $.118 ($.106) from Table I. If size were doubled to $1 billion and average cost fell to the level experienced at the lowest cost quartile ($.088 for both sets of banks), the implied ASCE would be .49 (.66) for branching (unit) state banks. Similar values are obtained if, instead, size were doubled from $1 to $2 billion or from $2 to $4 billion.

dispersion of average costs across banks in the same class. Because such dispersion has seemingly not yet resulted in disruptive structural changes in banking, it is unlikely that the existence of significant cost economies or diseconomies at the levels typically estimated will do so either under nationwide banking.

Do All Banks Lie on the Same Average Cost Curve?

Almost all cost studies have assumed that: (1) results based on a cross section of banks for one year can be generalized to other years; and (2) all banks in a cross section can be pooled together when cost economies are being estimated. In effect, previous studies have assumed that all banks lie on the same average cost curve both over time and across different-sized banks at the same point in time. Although these two assumptions can importantly influence the accuracy and acceptability of cost economy estimates, they have been largely overlooked in published analyses. The simple answer to the question posed, Do all banks lie on the same average cost curve?, is "No"; not over time and only sometimes across size classes at one point in time.

Average Costs Over Time: 1980, 1982, and 1984 Purchased funds are heavily used at larger banks while core deposits comprise the main component of bank liabilities at smaller banks. Purchased funds were 12 percent of core deposits plus purchased money at branching state banks with around $50 to $75 million in assets.[10] By the time these banks reach $300 to $500 million in assets, the purchased funds proportion rises to 19 percent. And when assets rise to $2 to $5 billion and then to over $10 billion, the proportion rises further to 36 and 60 percent, respectively. At unit state banks for the same four size classes, the purchased funds proportions are 16, 31, 61, and 78 percent, respectively.

Since core deposits only grow slowly over time, they can not quickly substitute for purchased funds if purchased money costs should rise significantly over a period of a few years. While purchased funds can more easily replace core deposits should purchased funds interest rates fall, interest rates typically vary more rapidly than banks can implement fully offset-

ting adjustments to their average core deposit/purchased funds liability mix. Consequently, interest rate changes over time can systematically alter the slope of bank average cost curves and thereby change the estimated cost elasticities. Because larger banks rely more on purchased funds, a given rise (fall) in the general level of interest rates will raise (lower) average costs for larger banks more than it will raise (lower) average costs for smaller banks, tilting the curve upward (downward) for large banks.
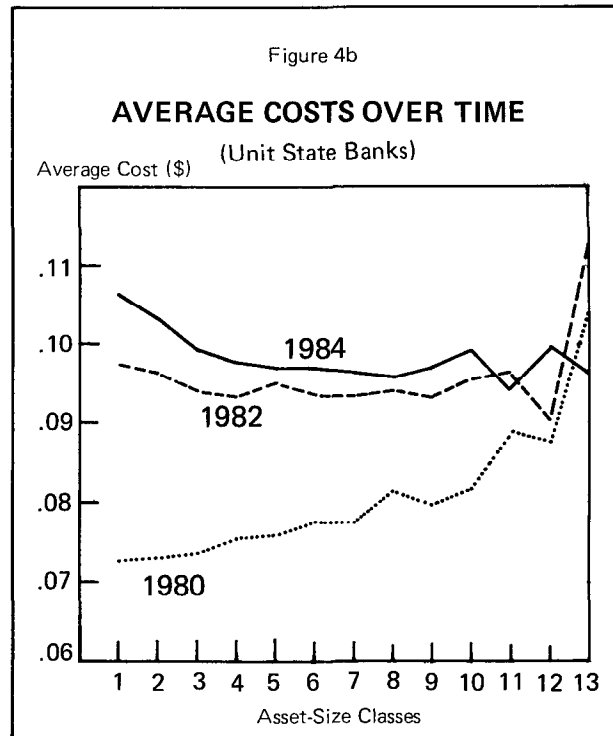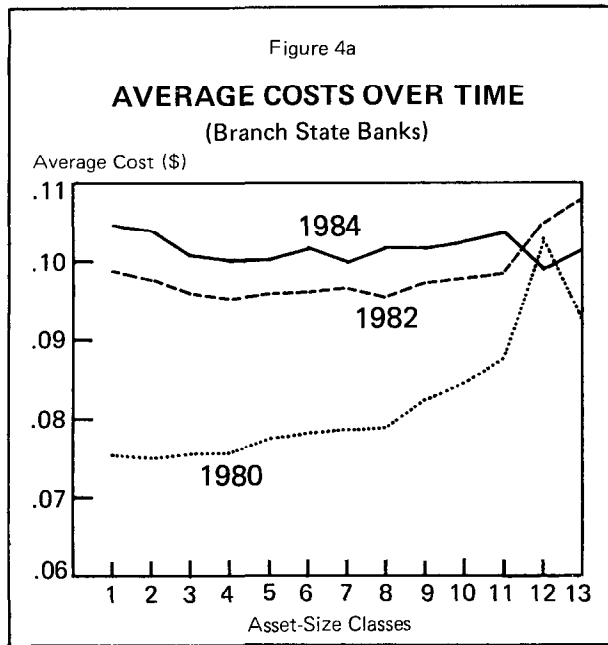
Interest rates were at a very high level in 1980. The three-month CD rate was 17.4 percent (December, 1980). Four years later, the CD rate had fallen by more than fifty percent, to 8.9 percent (December, 1984). The high interest rates in 1980 are associated with bank average cost curves in Figures 4a and 4b (dotted lines) which almost continuously rise, showing only increasing costs as banks become larger. As interest rates fell, the associated average cost curves for 1982 (dashed lines) and 1984 (solid lines) become semi-U-shaped and flatter. The curves become flatter over 1980 to 1984 for three reasons:

(1) Reduction in interest rates on purchased funds, which primarily lowered the average costs of large banks;

(2) Phase-out of Regulation Q ceilings on small savings and time accounts, which had a larger cost increasing effect on the average costs of smaller banks; and

(3) Lagged effect of inflation on labor and physical capital costs—operating costs—which will have a greater proportional impact on smaller banks, since operating costs are a larger proportion of total cost at these banks.

Thus the time period used for analysis can be important, especially when large changes in interest rates occur, as they did in the late 1970s and early 1980s.[11]

Average Costs at One Point in Time It is also important to determine if all banks can be said to

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[10] Purchased funds (PF) are here defined to be purchased federal funds, CDs of $100 thousand or above, and foreign deposits (which are almost always over $100 thousand). Core deposits (DEP) are demand deposits and small denomination (i.e., less than $100 thousand) time and savings deposits. The percentages are thus PF/(PF + DEP).

[11] When time-series analyses are performed usually only a time dummy variable is specified to capture all time-related changes in bank costs [Hunter and Timme 1986]. But since labor and physical capital prices are usually in nominal terms, shifts in the average cost curve due to these operating cost changes will already be largely captured in the price variables. Consequently, a time dummy variable will really reflect the interest rate cycle, interest rate deregulation, along with productivity and technology changes. Perhaps a more accurate specification, one which would capture better the possibility of a changing cost curve, would be to specify the average interest rate paid by a bank as an input price and let it interact with some measure of bank output as well. This is done in Lawrence and Shay [1986a] and Kim [1986].

Figure 4a

AVERAGE COSTS OVER TIME

(Branch State Banks)

Average Cost ($)

1984

1982

1980

Asset-Size Classes

Figure 4b

AVERAGE COSTS OVER TIME

(Unit State Banks)

Average Cost ($)

1984

1982

1980

Asset-Size Classes

lie on the same average cost curve at the same point in time, since this has been the premise of almost all bank cost studies performed to date. One way to address this question is to compare actual average costs across size classes for 1984 or 1980 (solid lines in Figures 5 and 6) with the average costs predicted from regressions fitted to the underlying bank data (dashed lines). The fit seems to be best for those banks in the smaller-size classes. Large banks often have a relatively poorer fit. Since 97.2 percent (99.3 percent) of the branching (unit) state banks are smaller than $1 billion (see Table I, last column), the relatively poorer fit for large banks is likely due to the low weight given them in minimizing the sum of their squared errors compared with the much larger weight given to the much more numerous smaller banks.[12]

Tests of Aggregation or Pooling Across Size Classes The usual way to test statistically whether or not all banks lie on the same average cost curve is to divide up the data by size class, run separate regressions for each group, and compare the sum of squared errors of these separate size class regressions with the sum of squared errors obtained when all banks are pooled together in a single regression.[13] In terms of the model used here, this is equivalent to testing

to see if the intercept and two slope coefficients are equal to each other across 13 size classes. This null hypothesis was marginally rejected using an F test for both branching and unit state banks for the three years covered (1984, 1982, and 1980).[14] With the exceptionally large samples used here—six to eight thousand banks—rejecting a null hypothesis is not unusual. Thus some would prefer a Bayesian type of approach which permits the "F value" to rise as sample size increases. Applying a Bayesian likelihood ratio rather than a Classical F test leads to the opposite conclusion—pooling across size classes at the mean would not be rejected.[15] While

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parameters of each size-class quartile estimate were equal across the four identified. This hypothesis of the same technology across size-class quartiles was rejected for each of the four years tested over 1979-1982. Later, when their FCA data were separated into branching and unit state bank categories, this same hypothesis was occasionally accepted [Lawrence and Shay 1986b].

[14] The computed F statistics were 1.84, 3.66, 1.77 (3.38, 6.24, 1.85) for branching (unit) state banks for the three years listed in the text. The critical F value at the 99 percent confidence interval was 1.69 for the 36 parameter restrictions of 39 estimated parameters using sample sizes varying from 6,000 to 8,000. Because the hypothesis tested is actually one of four which were run at the same time, the correct overall confidence interval is 96 percent (or $1.00-(4)(.01)$).

[15] The Bayesian likelihood ratio ranges between 8.87 with a sample size of 6,000 to 9.13 for a sample of 8,000. The formula was $[(N-k)/p]/[N^{p/N}-1.0]$ from Leamer [1978, p. 114], where N is sample size, k is the total number of all parameters estimated (here 39), and p is the total number of restrictions (36) placed on the k parameters estimated.

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[12] This fitting problem will not be apparent in the reported R^2s. In the regressions reflected in Figures 5 and 6, plus those for 1982 (not shown), the R^2s ranged from a low of .981 to a high of .997.

[13] Lawrence and Shay [1986a] divided up their Functional Cost Analysis (FCA) data into four size-class quartiles, estimated each one separately, and then tested the hypothesis that the

one approach marginally rejects and the other "accepts" pooling across size classes at the mean of all banks, the fact remains that predicted average costs are seen to diverge from actual average costs at the largest banks when all banks are pooled together (Figures 5 and 6).

Lastly, one can test the proposition that all banks in the lowest (highest) average cost quartile lie on the average cost curve for that quartile alone. This is the same question just answered for the cost curve of all banks together only this time applied to the quartile cost curves. Using F tests, the proposition was marginally rejected for the highest cost quartile of banks but sometimes accepted for banks in the lowest cost quartile. In sum, the statistical tests do not always support the proposition that all banks lie on the same average cost curve for a given cross section at one point in time. Unless such pooling is supported through a statistical test or a visual comparison of predicted and actual average costs, scale or cost economy estimation may best be applied to banks disaggregated by size class.

Comparing Asset Cost Elasticities from Separate and Pooled Regressions The importance of size class disaggregation for cost economy estimates is illustrated by comparing cost elasticities from disaggregated and pooled data. The years 1984 and 1980 are illustrated in Tables IIIa and IIIb, since these show the greatest difference in the slope in average cost in Figure 4. This is done once where separate regressions for each size class were run and again when all banks across the size classes were pooled and a single regression was estimated. ASCEs under the heading "Separate" are thus based on the separate parameter estimates for each size class (and repeat, for 1984, those shown in Table II) while ASCEs under the heading "Pooled" are based on a single set of parameters but evaluated using data at the mean of each of the separate size classes.

For both years, the pooled results for all banks together have ASCEs which are significantly different from constant costs and smoothly rise as banks get larger. Relying on the pooled approach, significant cost *diseconomies* would be observed for both large branching and unit state banks at the mean.[16] No such simple generalization is possible for the separate ASCE results since they are seen to fluctuate from economies to diseconomies and back again as banks

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[16] These diseconomies are lower in 1984 than they are in 1980, a result illustrated earlier in Figure 4 where mean average cost was plotted. The diseconomy results obtained for larger banks mirror those obtained using FCA data by Benston, Hanweck, and Humphrey [1982] and Gilligan, Smirlock, and Marshall [1984] when it was assumed that all banks did indeed lie on the same average cost curve and the data were pooled. This particular assumption was tested and accepted in Berger, Hanweck, and Humphrey [1987], which also used FCA data.

Figure 5
ACTUAL AND PREDICTED
AVERAGE COSTS: 1984
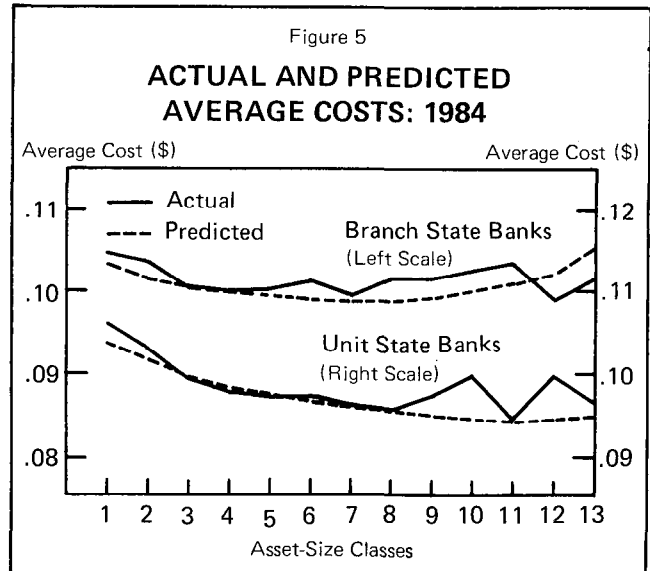
get larger.[17] Even ASCEs for the same size classes are often quite different when different years are examined. In the separate results, ASCEs are typically not significantly different from constant costs. Thus in neither the pooled nor the separate ap-

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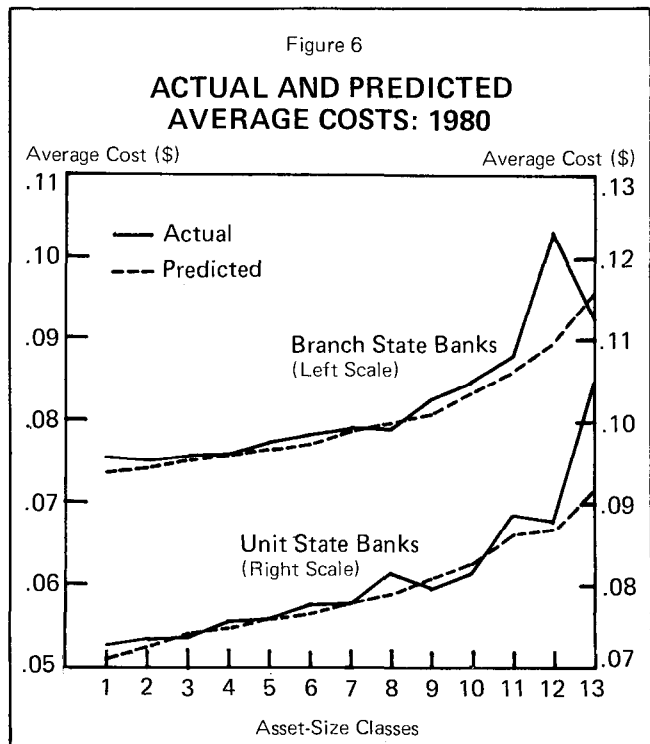[17] The same holds for 1982, which is not shown in the table.

Figure 6
ACTUAL AND PREDICTED
AVERAGE COSTS: 1980

Table IIIa
ASSET COST ELASTICITIES (ASCEs) FROM
SEPARATE AND POOLED REGRESSIONS
(Branch State Banks)

Size Class:	1984 All Banks		1980 All Banks	
	Separate	Pooled	Separate	Pooled
1. $1M-$10M	1.00	.98**	1.01	1.01**
2. $10M-$25M	.97*	.98**	1.00	1.01**
3. $25M-$50M	.97*	.99**	1.01	1.02**
4. $50M-$75M	.97	.99**	.99	1.02**
5. $75M-$100M	1.04	.99**	.92	1.02**
6. $100M-$200M	1.07*	1.00**	1.08**	1.02**
7. $200M-$300M	1.03	1.00	1.06	1.03**
8. $300M-$500M	1.10	1.00	1.06	1.03**
9. $500M-$1B	1.00	1.01*	1.08	1.03**
10. $1B-$2B	1.05	1.01**	1.12	1.04**
11. $2B-$5B	1.06	1.01**	1.03	1.04**
12. $5B-$10B	.86	1.02**	1.73ᵃ	1.05**
13. > $10B	1.03	1.03**	1.03	1.05**
All Banks	.99**	.99**	1.02**	1.02**

ᵃ Based on only 4 observations, one degree of freedom.

proaches are significant cost economies identified for larger banks in 1984 or 1980.

Conclusions

The variation in bank costs has two components. One, the variation in scale or cost economies across different-sized banks, has been extensively studied. The other, differences in cost between similarly-sized banks, is new. Data are presented for all banks in the United States over three years (1984, 1982, 1980) which show that variation in the latter far exceeds variation in the former.

Bank average cost, defined as total operating and interest expenses per dollar of assets, was computed for over 13,000 banks in the United States. These data were arrayed by 13 asset-size classes and 4 average cost quartiles for branching state and unit state banks separately. The mean variation in average cost between the highest and lowest average cost

quartiles of banks was 34 percent (31 percent) for branching (unit) state banks. As the mean variation in average cost across size classes was only 8 percent (17 percent), the variation between quartiles was four (two) times the variation across size classes.

Since these existing relative efficiency differences between similarly-sized banks far exceed those obtainable by altering bank size, scale economies are less important in conferring competitive advantages for large banks than is commonly realized. For example, if a $500 million asset bank doubled in size to $1 billion and its average cost fell from that at the highest average cost quartile to that at the lowest quartile, the implied cost elasticity would average .58. This far exceeds the value of bank cost or scale economies measured here or elsewhere, which have historically been on the order of .90 (scale economies) to 1.00 (constant costs). In sum, the competitive implications of scale economies for large banks is seen to be importantly qualified by the existence of off-

Table IIIb
ASSET COST ELASTICITIES (ASCEs) FROM
SEPARATE AND POOLED REGRESSIONS
(Unit State Banks)

Size Class:	1984 All Banks		1980 All Banks	
	Separate	Pooled	Separate	Pooled
1. $1M-$10M	1.00	.97**	1.05**	1.02**
2. $10M-$25M	.94**	.97**	.99	1.02**
3. $25M-$50M	.98	.97**	1.01	1.02**
4. $50M-$75M	1.03	.98**	1.09*	1.03**
5. $75M-$100M	.94	.98**	1.22**	1.03**
6. $100M-$200M	.97	.98**	1.02	1.03**
7. $200M-$300M	1.16	.99**	1.40**	1.03**
8. $300M-$500M	1.05	.99**	1.11	1.03**
9. $500M-$1B	1.04	.99*	1.14	1.03**
10. $1B-$2B	1.09	1.00	.99	1.03**
11. $2B-$5B	.85	1.00	a	1.04**
12. $5B-$10B	1.30	1.00	a	1.04**
13. > $10B	1.04	1.01	a	1.04**
All Banks	.97**	.97**	1.02**	1.02**

a Sample size was too small to have positive degrees of freedom and so a regression for this cell was not estimated.

setting differences in cost levels or relative efficiency for all sizes of banks due to other (nonscale) causes. The public policy implication is that there appears to be no strong reason to constrain bank mergers or inhibit nationwide banking for fear of conferring important cost advantages on large banks. While there may be other reasons (including a concern about economic concentration in banking) to constrain expansion, reliance on the cost or scale economy argument is not supported by the data developed here or in other recent studies.

In terms of cost or scale economy estimation, it is shown that the approach used in almost all previous statistical studies may benefit from two extensions. First, such estimates may be more accurate if they are obtained from data which has been disaggregated by size class rather than pooled together in a single regression. Of course, if it can be shown that such pooling does not bias the estimates obtained, then disaggregation is not needed. The problem is that such tests sometimes do and sometimes do not support pooling. Second, cost or scale economy results based on a single year's cross section may not generalize well to other years. Thus time series analyses, which combine annual cross sections over different years, will likely yield results which are more general than those for a single cross section. Fluctuations in market interest rates over time can alter the slope of the average cost curve and thereby affect the cost elasticity estimate. Hence the importance of time series analysis in obtaining general results useful for policy purposes.

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AN OVERVIEW OF AGRICULTURAL POLICY

. . . PAST, PRESENT, AND FUTURE

Raymond E. Owens

> . . . the majority of Americans have come to be completely divorced from the land and, as a result, the general public understanding of agriculture and its problems has declined. Even American farmers themselves, driven by the daily necessities of making both ends meet and bewildered by the growing complexity of their individual lives, have found it increasingly difficult to comprehend and deal with the collective problems of American agriculture. . . . Strangely, however, no adequate attempt seems to have been made to give the general public an impartial, over-all picture of the vast governmental operations in the field of agriculture and of their cause and effects.
>
> Evans Clark
> *Farm Policies of the United States, 1790-1950*

These words, written in 1953, are as applicable today as they were 34 years ago. As then, the problems facing agriculture today are complex and daunting. Government spending on agricultural programs has increased dramatically since 1985; yet many farmers remain in financial difficulty. Also it still remains difficult for the average American to understand present policy and its relationship to contemporary farm problems. As an aid to understanding, this article sketches the historical development of United States agricultural policy. Special emphasis is placed on policy developments since 1930 as these developments make up the foundation of the present agricultural policy. As a preliminary, however, the first few paragraphs below highlight the chief policy issues of the period 1800 to 1930.

HISTORY OF AGRICULTURAL POLICY

In the broadest sense, agricultural policy is any government policy that affects the decisions of the agricultural industry regarding investment, production, pricing, or distribution. Since the original economy of the United States was almost exclusively agrarian, much of the early economic and trade policy was effectively agricultural policy. Thus, in the early federal period, whenever the federal government responded to the problems and needs of the economy, it was creating agricultural policy.

Pre-Civil War

In the early 1800s economic policy and hence, agricultural policy, stressed expansion and development. The United States possessed large amounts of undeveloped land that people were eager to settle and farm. Early federal legislation was directed toward accommodating those wishing to farm the lands. With the rise of nonfarm economic interests in the early to mid-1800s, however, national economic policy became less accommodative to agricultural interests. Congress erected tariffs on imported finished goods to protect the emerging domestic manufacturing industry. These tariffs, however, hurt farmers, who sold on the open market and wished to buy finished goods as cheaply as possible.

Congress also attempted to develop a stable currency and payments mechanism in the United States in the early to mid-1800s. A dependable payments system was held to be a prerequisite for the development of commerce within the United States and with foreign nations, particularly those of Europe. The most notable of the attempts to improve the payments mechanism were Congressional efforts to establish a lasting central bank. Farmers who were normally indebted opposed such institutions because they perceived that they would pursue "hard money" policies.

Although agricultural interests were, to some extent, overshadowed by those of other economic sectors by the mid-1800s, interest in agricultural

policy always revived when agriculture experienced economic downturns. Those downturns usually followed periods of high prices for farm commodities. When prices fell at the end of the booms, farm incomes dropped and farmers usually sought help from the Congress. Such an episode in the late 1850s led to the establishment of the United States Department of Agriculture (USDA), which was charged with assisting farmers to produce more efficiently.

Post-Civil War

The Civil War arguably exerted a larger influence on agriculture than any other event in the nineteenth century. High prices and scarce manpower during the war years induced the development and adoption of technology that substantially boosted farm productivity. Further, westward expansion in the postwar period brought substantial increases in the amount of land being settled and farmed. Not surprisingly, agricultural production outpaced demand and prices dropped.

Farmers pressed for legislation that would, in their view, increase the prices they received. Control of warehouse and shipping rates and cooperative marketing arrangements were areas where legislation was sought. Farmers thought they would receive higher net prices if they could eliminate the middleman, but their efforts to gain control over marketing proved unsuccessful and prices showed little change. Farmers also sought legislation promoting inflation in order to lessen their debt burden. These efforts were also fruitless.

With the beginning of the twentieth century, farm incomes improved dramatically. The end of western settlement caused slower growth in farm output while the United States population and the demand for food continued to grow. Farmland prices rose with the improved farm income prospects, which led to a greater demand for credit to purchase farms. Congress responded with the establishment of the farm land bank system. The Federal Land Bank System, established in 1916, was a cooperative system of twelve regional banks whose purpose was to raise private capital to provide credit to agriculture.

World War I generated a strong demand for food. Seeking to secure adequate supplies of food for our European allies, the federal government intervened in agricultural markets by entering into marketing agreements with domestic agricultural producers and setting guaranteed prices for hogs and wheat. Farmers responded with increased production. This intervention—the first of many—proved in retrospect to be quite important. It was the first time the federal government entered the domestic agricultural market as a consumer on a large scale.

Post-World War I

War demand created relatively high agricultural prices that encouraged expansion of agricultural production in both the United States and Europe. As foreign production increased, however, demand for American products in Europe decreased, and world prices dropped sharply after peaking in early 1920. Although prices rose somewhat throughout the remainder of the decade, American farmers did not regain their wartime prosperity.

The end of the 1920s saw a sharp economic downturn. The stock market crash of 1929, tight money, and sharply lower farm prices adversely affected the agricultural sector. The stock market crash ended the urban prosperity of the 1920s and weakened domestic demand for agricultural products. Tight money caused many banks and insurance companies to seek new sources of liquidity. One way for them to increase their liquidity was to stop rolling over or refinancing farm mortgages. In the late 1920s and early 1930s many farm mortgages of the period were of a very short term, often three years or less, and were regularly rolled over at expiration. Due to low farm prices and a bleak outlook for the sector, many agricultural loans were not rolled over in the early 1930s.

The 1930s

As the 1930s began, farmers sought federal legislation to maintain the "fair" price levels of the 1920s and to provide adequate credit. Congress responded by considering a number of policies designed to support farm income. Congressional consideration concluded in the passage of the Agricultural Adjustment Act of 1933 (AAA) on May 12, 1933.

The AAA recognized that low agricultural prices were the result of domestic oversupply. Given this, higher farm prices could be achieved via three routes. First, production could be limited (see Box 1); second, consumption could be increased by subsidizing food for lower income groups; and third, consumption could be raised by raising aggregate incomes. AAA followed the first and third paths.

To limit production, AAA allowed the federal government to enter into voluntary agreements with farmers who would reduce their planted acreage of crops that were in surplus. Farmers who met acreage reduction requirements were offered benefit payments or supplementary income. Payments were in the form of rent on the acreage left out of produc-

tion. To pay for the output reduction programs, a processing tax was levied on the appropriate commodities.

To increase consumption, the government sought to raise employment levels and per capita incomes. Several programs were enacted to put people to work, often on government-sponsored projects. Although national income rose, it is not clear that this increase perceptibly boosted demand for agricultural products.

Congress also sought to make "adequate" credit available to the farm sector. Since Colonial days credit availability had been a concern of the farm sector. In the 1930s, farmers felt that long-term credit, which they used to purchase and improve farmland, was difficult to obtain. Further, farmers needed more flexibility in repayment terms because drought years hampered their ability to service debt.

On March 27, 1933, in response to these concerns, President Roosevelt, acting on authority granted by Congress, issued an order to reorganize the various farm credit agencies then in existence into one unified body called the Farm Credit Administration (FCA). This organization provided emergency refinancing of long-term farm debt. Later Congress passed the Emergency Farm Mortgage Act and the Farm Credit Act.

The Emergency Farm Mortgage Act provided authorization to raise $2 billion (backed by bonds that were to be guaranteed by the federal government) to refinance non-land bank loans. The act further specified that existing and new land bank loan rates be reduced to 4.5 percent from the prevailing rate of 5.4 percent and that repayment schedules be "stretched out" when the weak financial condition of farmers dictated this to be necessary. The Act, as its name implies, was intended to be temporary assistance to farmers in adjusting to the depressed economic conditions of the period.

A second piece of legislation, the Farm Credit Act of 1933, was passed on June 16, 1933. The act was intended to provide a long-term solution to problems associated with farm debt. Specifically, it combined existing credit agencies with new ones to form the Farm Credit Administration. The system consisted of four segments that were equipped to provide long-term, intermediate-term, and short-term credit to farmers. The system still operates today.

The AAA of 1933 was amended in 1938 to establish loans to farmers at harvest using their crops as collateral, acreage allotments, market quotas for some commodities, and maintenance of prices in some prescribed ratio to those existing in the pre-World War I period.

Between 1940 and 1945, World War II strengthened prices for agricultural products. As with previous war-related booms, however, the postwar years saw surpluses and a downturn in the farm sector.

Post-World War II

The postwar era was characterized by farm commodity surplus. High prices and access to production technology rapidly expanded farm output in the late 1940s. The surge in output exceeded growth in demand, pushing prices down. Many farmers went out of business.

In this period, agricultural policy was based on the same framework as in 1933. Modifications of the 1933 farm bill were passed in the late 1940s, 1950s, and early 1960s. Most relied on land retirement plans in attempts to reduce the surpluses. Rising foreign sales finally reduced the surpluses in the early 1960s, but the strong sales were short-lived and commodity stocks began to pile up again late in the decade.

RECENT AGRICULTURAL EXPERIENCE

The most recent agricultural "boom and bust" cycle began in the early 1970s. The boom was caused by the combination of small world stocks of grains, strong economic growth, and relatively abundant credit worldwide. The price of grain was bid up globally as nations sought to improve their dietary standards. The United States, which held a large portion of world grain stocks, liquidated those stocks on the world market. The strong demand and decreasing stock levels raised prices and caused agricultural producers, especially in the United States, to invest in more efficient production techniques. Increased capital investment in farming was often funded by long-term debt.

As agricultural prices moved up, federal support prices followed. A price support is a guaranteed minimum or floor price: at that price the federal government will buy whatever the market will not absorb. Because prices could fall only as far as the support price, farmers were willing to take on long-term debt to finance land and equipment that expanded production.

The expansion of demand enjoyed by farmers during the 1970s vanished by the early 1980s. The boom ended in a manner similar to that following World War I. With world prices high in the 1970s, many nations began producing more of their own food and feed. Adding to their decision to do so in the early 1980s were their lower income prospects

Box 1
DOMESTIC AGRICULTURAL POLICY

Agricultural policy has historically sought to increase farm income by increasing gross farm receipts. Gross farm receipts are determined by the quantity of farm products sold multiplied by their market prices. Agricultural policies attempt to boost receipts by limiting output or by guaranteeing farmers a higher price. What follows explains the policies in terms of supply and demand for a representative agricultural commodity.

Output Constraints

The purpose of acreage reduction programs and other output limitations is to reduce supplies and boost prices. Acres taken out of production are often idled, leaving them unavailable for the production of other crops. As shown in Figure 1a, a decline in output rotates the commodity supply curve to the left. A perfect output control mechanism would make the curve vertical at the desired output. This raises the equilibrium market price of the commodity from P_1 to P_2. Less effective output control mechanisms, however, will shift the supply curve to a position between S_1 and S_2 because attempts to limit output are in part thwarted by farmers using their remaining land more intensively.

Because the quantity of farm commodities demanded is relatively insensitive (inelastic) to changes in price, gross farm receipts (price times quantity) will be higher with the restrictions. In terms of Figure 1a,

rectangle a is greater than c + d, so farmers have a net gain. But the farmers' gain is at the expense of consumers who now pay more for less, so a represents a redistribution of income from consumers to farmers. That leaves two losses. First, triangle b represents the deadweight loss, that is, potential gains to consumers from transactions that do not take place due to the constraints. Second, triangle c represents the lost benefits to farmers from selling more at a lower price.

Guaranteed Price

The nonrecourse loan program acts as a "floor" to the market price. The government lends to the farmer an amount equal to the value of his crop at the guaranteed loan price. In return, the farmer puts up the crop as collateral. If the market price rises above the loan price, the farmer pays back the loan and keeps the rest. If market price is below the loan price, the farmer forfeits the crop and keeps the loan amount. In effect, then, under such a program part of the crop is "sold" to the government.

In Figure 1b, the government sets a guaranteed loan price at P_2. At that price, farmers produce OQ_3 units of which OQ_2 are sold on the market, leaving an excess quantity supplied of Q_2Q_3 to be absorbed by the government. The dotted area represents a transfer from consumers to farmers due to higher prices. The shaded area represents government expenditures on the program, which are in part offset by the value of the stocks they have accumulated. The government is now faced with the problem of eliminating the excess.
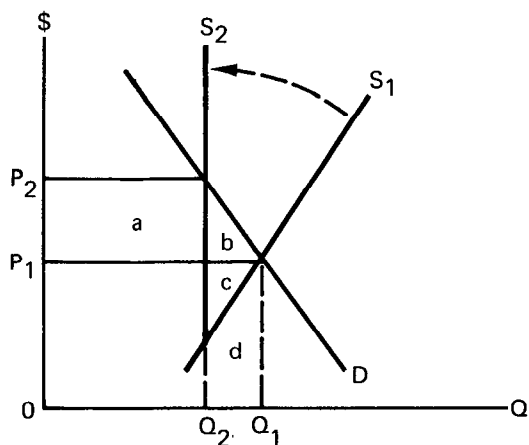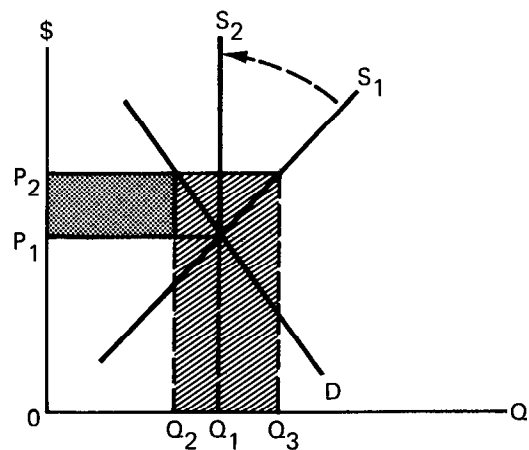
Figure 1a

Figure 1b

In practice, guaranteed prices are coupled with output reduction programs. If they are effective, they limit the subsidy amount and excess quantity supplied. To the extent that farmers work their remaining land more intensively, though, some subsidy and surplus production will remain.

Target Prices

Target prices increase farm receipts more directly. In Figure 1c, the government allows the market to clear but pays the farmer directly, by check, a premium equal to the difference between revenues at the target price (P_2) and revenues at the market price (which is expected to be P_1). From the farmers' point of view, this effectively shifts the demand curve up from D to the horizontal line at P_2 since the target price is known at the beginning of the season when crops are planted. From consumers' point of view, however, the market demand curve is still D. If no attempt is made to limit output, quantity supplied will increase to Q_2 but market price will fall to P_3. Since the target price is still P_2, the cost of the program to taxpayers is equal to the increase in gross farm receipts due to the target price, represented graphically by the shaded area. Output reduction programs could attempt to rotate the supply curve to S_2 and limit the subsidy to area $a + b$. Since output reductions are not likely to be completely effective, the amount transferred from taxpayers to farmers is likely to fall somewhere between the two areas.

Figure 1c
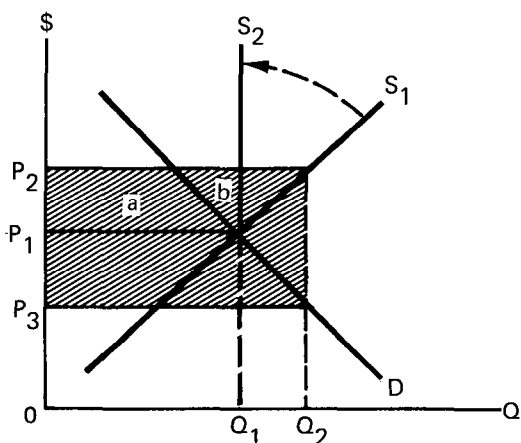
and their lessened access to credit. With lower export earnings and the need to service debt, many countries found themselves with less foreign exchange to purchase agricultural goods abroad. As a result, world demand for agricultural exports declined. The United States, which had benefited in the 1970s when world trade expanded, shouldered a large part of the decrease when world trade declined.

The poor prospect for agricultural prices in the 1980s was not recognized by those who formulated farm policy in 1981. The 1981 Farm Bill, structured in a manner similar to all agricultural legislation since the AAA of 1933, increased price supports for a variety of crops from 1981 to 1985. As a result, the gap between domestic price supports and world prices widened, providing additional incentives for American farmers to produce surpluses, and domestic stocks of grain to accumulate rapidly.

At the same time, a number of producers who had taken on long-term debt in the 1970s found that the price levels of the early 1980s provided them with insufficient income to service their debt. Such farmers, especially those who encountered drought or unforeseen problems, experienced financial stress and in some cases left agriculture through bankruptcy, foreclosure, or other means.

Striking parallels exist between the situation facing American agriculture in the 1930s and the 1980s. Today, as then, the farm sector is experiencing a period of depressed farm prices resulting from stock buildups. In both instances these stock buildups occurred after a slump in foreign demand. And finally, in both cases, the basic farm policy approach is similar. In fact, many farm analysts believe that current farm policy may have hampered adjustment by the agricultural sector to the latest episode of weak demand, and thus, may have contributed to the current problems facing agriculture.

THE 1985 FARM BILL

The architects of farm legislation in 1985 faced large and increasing government holdings of commodity stocks, widespread financial stress among farmers, and the overfarming of land and the resulting depletion of land resources. Of course, there were other influences. Tighter money and higher interest rates often made the rollover or expansion of loans more difficult. Also exports were affected adversely by the increased foreign exchange value of the dollar and trade barriers and restrictions imposed on United States agricultural products by foreign countries.

The drafters of the 1985 Farm Bill had two primary goals: the support of farm income and the reduction of domestic government-held grain stocks. Their secondary goal was to modify farm credit mechanisms which were facing financial problems. Initially these goals were to be met through programs that placed greater reliance on market signals to make agricultural policies effective for the long term.

The policy tools chosen by Congress, however, turned out to be little different from those employed almost continuously over the past fifty years. The Food Security Act of 1985 was hardly a revolutionary departure from previous farm policy, although it was billed as such during its formulation. Although the Bill eliminated the yearly increases in support prices in effect since 1977, it retained the traditional two-tiered price support system and otherwise merely extended production limits, trade incentives, and farm credit programs.

Commodity Programs

The commodity programs that are the backbone of the 1985 Farm Bill, attempt to limit commodity production by inducing farmers to voluntarily constrain their production in a manner prescribed by the government. Farmers who comply with the constraints are eligible to receive price supports or other financial incentives from the federal government. Such programs are usually administered through the United States Department of Agriculture (USDA).

Crops Crop price support programs are intended to supplement farm income and limit the acreage planted in many field crops. Crops covered under price support programs include wheat, corn, sorghum, barley, oats, rye, rice, soybeans, peanuts, cotton, sugar, and tobacco.

For most field crops, the programs attempt to limit production by reducing the program participant's "base acreage," which is determined from the number of acres he has historically devoted to the production of the crop. The USDA then requires the participant to limit acres planted of the crop to some portion of the base acreage. For peanuts, tobacco, and rice, however, production control limits a participant's total production.

Price supports are most often structured in two tiers. The first is a nonrecourse loan and the second a deficiency payment. The mechanics of these two supports can be best explained by example.

Chart 1 shows the market price, target price, and nonrecourse loan price for corn from 1981 to 1987. At harvest each year, farmers may sell their crop at the market price, if they desire. Farmers meeting

USDA's production limitation requirements have a second option, a nonrecourse loan, available. Those who take the loan must store their crop as collateral, placing the crop in a government-approved storage facility. Borrowers are required to repay the loans plus interest at the maturity date (usually nine months from the date the loan is made) or forfeit the collateral and keep the loan proceeds. No penalty is associated with the nonpayment of nonrecourse loans beyond collateral forfeiture.

The market effects of nonrecourse loans are straightforward. If market prices remain below loan prices, farmers will forfeit their collateral and keep the loan—effectively selling their crop to the government. If market prices rise far enough above loan prices to cover the loan principal plus accrued interest, however, farmers will pay off their nonrecourse loans and sell their crops on the open market. With large farmer participation, loan programs may apply to a significant portion of the available grain stocks. If so, the nonrecourse loan price which acts as a "trigger" price at which farmers are likely to redeem crops and resell on the market, can have a substantial influence on the market price.

Total price support compensation is not dictated so much by the loan price as by the target price, which is legislated. When market prices and basic loan prices fall below the target price, eligible farmers receive a deficiency payment equal to the difference between the target price and the market price or between the target price and basic loan price, whichever is less. Payment can be made in either cash or commodity certificates. Commodity certificates may be used to redeem agricultural commodities owned by the government or sold for cash.

Crop loan prices were sharply reduced in the 1985 Farm Bill. Further, the Secretary of Agriculture has an option to reduce loan prices further if market conditions dictate. The Secretary has exercised this option as indicated in Chart 1 by the dotted line labeled the announced loan price. Target prices, however, have remained relatively stable, being fixed from 1984 to 1987 and projected to decline gradually thereafter.

Livestock Fewer price support programs are available to livestock producers. The dairy industry is the most notable example, operating under a marketing order program. Under the program, the government purchases or "removes" excess dairy products (those not consumed in the open market) at a set price. The government price remains fixed so long as removals remain within a range determined by the dairy program. If the removals exceed the

Chart 1

CORN: Target Price, Loan Price, and Market Price

Dollars Per Bushel
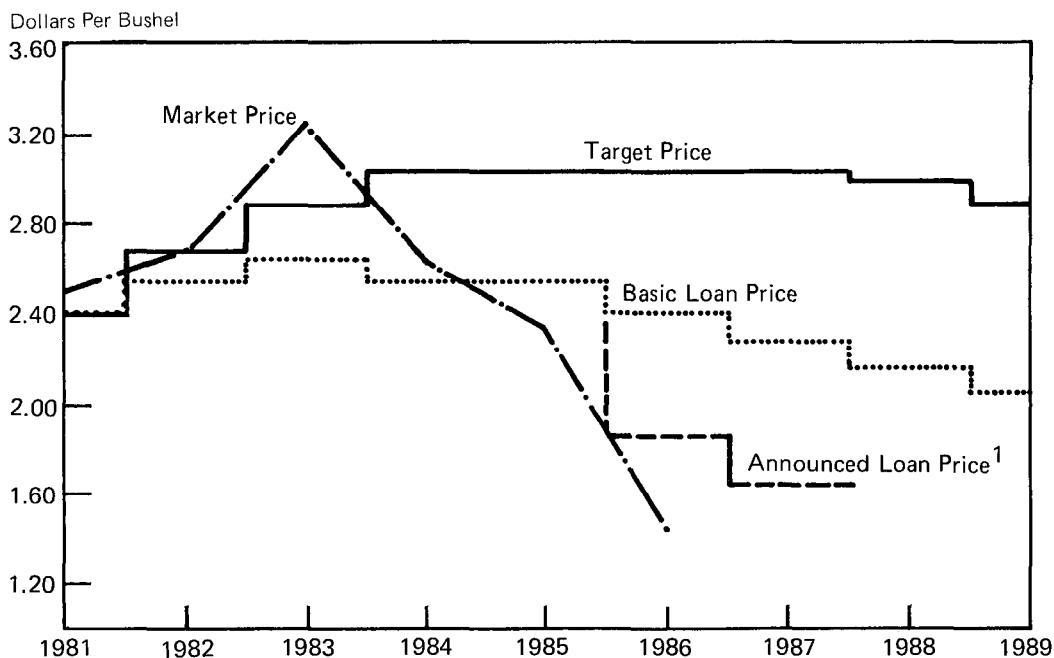
[1]Set by the Secretary of Agriculture within mandated limits.

Source: Department of Agriculture.

government limit, dairy price supports fall. If removals are below the limit, program provisions are in place to increase support price levels.

Beef producers have effective price support through restrictions on the quantity of imported meat that comes into the United States. Import limits are normally exercised through voluntary agreements among major suppliers. In addition, the federal government adds to domestic demand through beef purchases.

Perhaps the most important policies to livestock producers are the crop price supports. Since these programs often influence the price of grain, livestock producers' costs generally fall when loan prices are low and rise as loan prices rise.

Export Incentives

In addition to commodity programs, the 1985 Farm Bill establishes incentives for foreign nations to purchase American farm commodities (see Box 2). These programs are intended to reduce surplus stocks by encouraging additional foreign demand.

A primary incentive included in the export programs is providing credit assistance for foreign purchases of American farm products. Additionally, stocks of government-held grain and dairy products are to be made available to exporters and others to

counter "unfair" trade practices, to offset high domestic price supports and unfavorable movements in the exchange value of the dollar, and to expand markets. Promotional programs, designed to provide information to foreign nations, are also provided for under the bill.

Public Law 480 is another conduit for exports. This law allows a qualifying nation to receive United States food grain stocks and dairy products free or at favorable long-term financing if the recipient qualifies under the law.

Food Stamps

As a corollary to the export subsidies, the food stamp program is aimed at subsidizing domestic consumption of agricultural products. This program, along with programs such as the school lunch program, however, has a relatively small effect on total domestic demand for agricultural products.

Credit Programs

Agricultural credit policy is channeled through two programs: the Farmers Home Administration (FmHA), a government agency, and the Farm Credit System (FCS), a government-sponsored agency. The programs are similar in that they originated in the

Box 2
AGRICULTURAL TRADE POLICY

Figure 2a illustrates the mechanics of agricultural trade. The figure divides the world into two parts, the domestic market and the "rest of the world." In the absence of government intervention, at price "A" the quantity supplied exceeds the quantity demanded in the United States and the quantity supplied falls short of that demanded in the rest of the world. The world market equilibrium is reached when the quantity of exports from the United States (c – b) equals the quantity of imports by the rest of the world (e – d).

Domestic agricultural policy can negatively affect the position of United States farmers in world trade. In the early 1980s, for instance, restrictions on production and

domestic price supports pushed domestic prices up and lowered agricultural exports from the United States. Figure 2b demonstrates how the agricultural trade position is affected by domestic price support programs, represented by price B.

At B, the now larger domestic surplus (c – b) exceeds the quantity demanded by the rest of the world (e – d). The domestic surplus must be absorbed by the United States government if price B is to be maintained.

Current agricultural trade policy attempts to increase the usage of American farm products by encouraging foreign consumption. The 1985 Farm Bill provides a number of incentives to nations wishing to buy farm

Figure 2a

UNITED STATES   REST OF THE WORLD
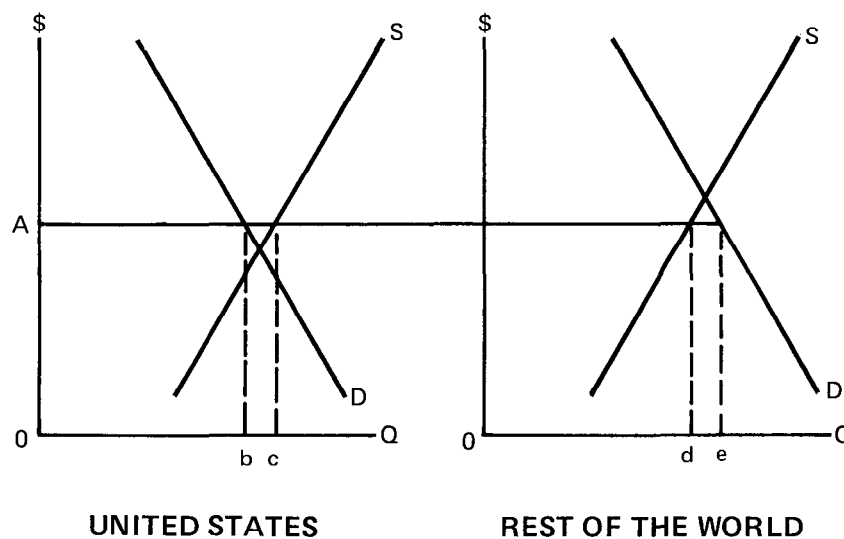
1930s and both are charged with making loanable funds available to the agricultural sector. Their specific areas of responsibility and methods used to achieve their objectives differ in many respects, however.

FmHA initially provided credit to small farmers to help them adjust to economic changes. Under this proposal, those receiving credit were normally poor credit risks. In recent years, FmHA credit has increasingly been made available to larger farmers. Still,

many borrowers remain poor credit risks, and FmHA loans usually carry more favorable terms than commercial alternatives.

FCS is a member-owned cooperative system consisting of twelve regional banks with numerous branches. The FCS seeks creditworthy farm borrowers for a variety of loan terms. The system has three lending arms. The Federal Land Banks make long-term loans usually collateralized by real estate. The Federal Intermediate Credit Banks and Produc

commodities. In general, these incentives lower the effective cost of these commodities on the world market.

Trade incentives can take many forms. Credit concessions, in-kind commodities, subsidized prices, and other types of export enhancement programs effectively lower the price of U.S. farm commodities to foreign buyers. The lower export price could expand the United States' share of the world market if other nations do not offset our actions. In Figure 2b, an export subsidy program might try to lower the export price to C overseas while the domestic price is maintained at B. If at price C the quantity demanded for import

(i – h) by the rest of the world exceeds the quantity available for export from current production in the United States at price B (c – b), the difference must come from a drawdown of U.S. surplus stocks. Ideally, such a drawdown should eventually place upward pressure on domestic U.S. commodity prices.

Two problems arise with this approach. First, the reduction of stocks is costly. Subsidies can push the export price below the cost of production, leaving the taxpayer to fund the difference. Second, if foreign nations match United States export prices due to subsidy or comparative advantage, the programs may not result in increased market share. The drawdown of stocks, then, might not occur as expected.

Figure 2b

UNITED STATES   REST OF THE WORLD
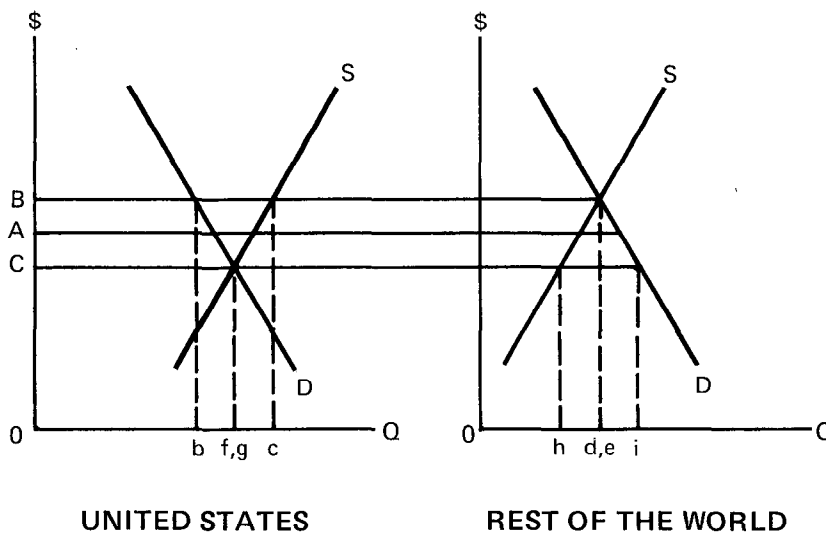
tion Credit Associations provide short- and intermediate-term credit. The Central Bank for Cooperatives provides loans to farmer cooperatives. FCS raises funds through the issuance of bonds and lends the proceeds to the agricultural sector.

The economic difficulties of agriculture over the past few years have contributed to weak earnings for the FCS. In 1985 Congress put in place a federal line of credit that may be used to cover temporary liquidity problems of the FCS should the need arise.

THE COST OF FARM POLICY

Farm policy affects domestic farmers, consumers, foreign policymakers, and others. When policy changes, these groups benefit and lose to different extents. As a result, it is difficult to fully measure the net welfare effects of farm policy.

A relatively simple method by which part of the cost of farm policy may be measured is to examine the annual budget USDA devotes to direct

agricultural programs for price supports and product promotions. In the early 1980s, the direct budget costs (those borne directly by the taxpayer) totaled $3 billion to $5 billion per year. In 1987, the cost is projected to reach about $30 billion, or about $700 for every nonfarm family in the United States.

The cost of farm policy is thus of great concern to Congress, taxpaying households, and farmers. The high cost impedes Congressional efforts to reduce the federal budget deficits. Households, who bear the cost of farm policy, are questioning this wealth transfer with a more critical eye. Farmers themselves are divided over the effectiveness of the farm policies. Certain farmers have come to believe that the policies allow inefficient producers to remain in agriculture and they argue that too many farmers contribute to the problem of mounting agricultural surpluses. Many farmers also express concern that their incomes depend increasingly on federal dollars. With 25 percent of farm net cash income coming from direct government payments in 1986, recipients fear that shifts in agricultural policy could result in sharp reductions in farm income.

THE EFFECTIVENESS OF FARM POLICY

As noted earlier, the primary goals of agricultural policy are to reduce the accumulation of surplus stocks of farm commodities and to support farm income. The success of policy in accomplishing these objectives is open to question.

Commodity Stocks

As shown by Chart 2, carryover stocks have been rising in recent years despite acreage reduction programs. The increases have occurred because agricultural production levels have been maintained while exports have fallen sharply.

Domestic grain production has remained at relatively high levels because set-aside acreage has often been offset by increased yields. For example, thirteen million acres of corn were set aside in 1986, but total production was 8.2 billion bushels, the second highest harvest ever. Weak corn exports compounded the problem of large production, leaving ending stocks at 5.7 billion bushels, far above the previous record of 4 billion bushels set in 1985. Other major crops show a similar, though often not as dramatic, pattern.

Despite the policy's current emphasis on exports, both the volume and value of commodities sold abroad have fallen in recent years. Reasons advanced for the declines include increased production abroad, unfair trade policies, and high domestic

Chart 2

CARRYOVER STOCKS OF COARSE GRAINS AND WHEAT
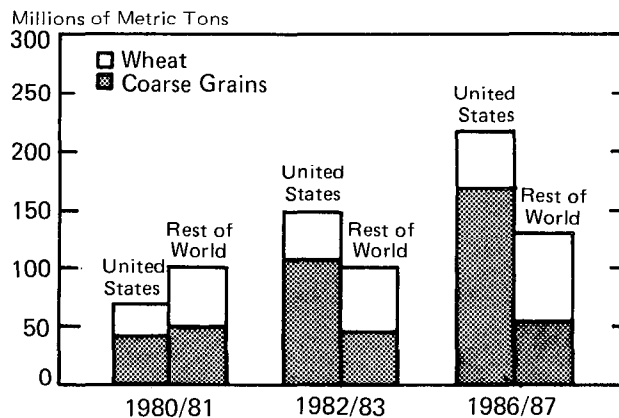
Note: Data are for crop years; 1986/87 data are preliminary estimates.

Source: Department of Agriculture.

prices. Export sales of wheat and corn concluded early this year coupled with the likelihood of reduced plantings may be sufficient to slow further stock accumulations in 1987. However, these developments do not appear sufficient enough to reduce current stock surpluses. Because surplus grain stocks have not yet been lessened, policy has to be judged deficient in this area.

Income Supports

A second major goal of the 1985 Farm Bill is the support of farm income. As can be observed from the table, farm cash receipts from marketings declined sharply in 1986 and are expected to decrease further this year. The decrease comes entirely out of crop cash receipts as livestock cash receipts are actually increasing over the period.

This pattern is influenced by the price support mechanisms. Crop cash receipts are based on sales at the prevailing market price or government loan price. Since market prices and loan prices fell sharply, it is not surprising that crop cash receipts also fell.

Farm income has been supported, however, despite the decline in cash receipts. As noted earlier, farmers' total price support compensation includes deficiency payments and the loan price. It was also pointed out that deficiency payments grow when loan

FARM INCOME AND CASH FLOW STATEMENT

Item	1983	1984	1985	1986P	1987F
			Billion dollars		
1. Farm receipts	140.9	146.4	148.5	139	131-133
Crops (incl net CCC loans)	67.0	69.2	72.7	63	54-56
Livestock	69.5	72.9	69.4	71	71-73
Farm related	4.4	4.3	6.4	5	4-6
2. Direct Government payments	9.3	8.4	7.7	12	15-17
Cash payments	4.1	4.0	7.6	8	7-9
Value of PIK commodities	5.2	4.5	0.1	4	7-9
3. Total gross farm income	152.4	174.4	166.6	158	154-156
4. Gross cash income	150.2	154.9	156.2	151	146-148
5. Nonmoney income	13.2	13.3	11.5	10	8-10
6. Value of inventory change	-10.9	6.3	-1.1	-3	-4-0
7. Cash expenses	113.0	115.6	112.1	102	96-98
8. Total expenses	139.5	141.7	136.1	125	119-121
9. Net cash income	37.1	39.3	44.0	49	48-52
10. Net farm income	13.0	32.7	30.5	33	33-37
Deflated (1982$)	12.5	30.3	27.3	29	27-30
11. Off-farm income	37.0	37.9	40.8	43	43-45
12. Loan changes: Real estate	2.5	-0.8	-5.6	-8	(-8)-(-4)
13. Nonreal estate	1.0	-0.8	-9.2	-10	(-9)-(-5)
14. Rental income plus monetary chng.	5.7	7.8	8.0	17	5-7
15. Capital expenditures	13.0	12.5	10.1	8	6-8
16. Net cash flow	33.3	33.0	27.1	30	34-38

P-preliminary.   F-forecast.

Source: U.S. Department of Agriculture

prices drop and target prices remain relatively unchanged. The effect of bigger deficiency payments can be seen in line 2 of the table, direct government payments. Between 1985 and 1987 (projected), direct government payments almost doubled, from $7.7 billion to $15 billion.

The effect of higher direct government payments and lower costs of production has meant higher income levels to farmers (lines 9 and 10). It appears, therefore, that income is being maintained by higher government payments and not by a greater reliance on market forces as early architects of the 1985 Farm Bill had hoped.

WHERE DO WE GO FROM HERE?

Aware of the high costs of current farm policy and concerned about the impacts of policy on agricultural problems, Congress is expected to focus a great deal of attention on farm policy later this year. Policy areas to be considered will likely include those denoted by the terms *decoupling, targeting, trade negotiation,* and *resource conservation.*

Decoupling refers to the elimination of the linkage between farm income programs and commodity production. Present programs require the removal of cropland but provide income based directly or

indirectly on the total quantity of production. Farmers are thus encouraged to strive for higher yields on fewer acres and, in the process, may counteract the program's intended goal of reducing production.

Under decoupling, the government would make direct cash payments to farmers to support their incomes, but the payments would be disassociated from production. Therefore the market would determine supply and demand of commodities. Surplus stocks should not occur under such a system.

Targeting refers to an identification mechanism that would replace production as a means of determining the distribution of government payments to farmers. Under targeting, criteria would be developed to determine the eligibility for and amount of payments to particular farmers. This procedure would allow the government to encourage or discourage specific activities within agriculture.

Trade negotiation would attempt to dismantle, through international cooperation, protection in the global marketplace. Nations that reduce agricultural trade subsidies often lose their markets to other nations that continue subsidies. Only through international cooperation can these subsidies be eliminated and world prices be adjusted to reflect true market prices.

Resource conservation programs would encourage the removal of erodible and dry farmland which has been brought into agricultural production due to high commodity price supports. Farmers would be paid "rent" by the government to remove eligible land over a long-term basis, usually ten years. USDA is aware that the concurrent offers of price supports and retirement of land may place managers of government programs in a position where they bid against themselves. Congress must consider a solution to this problem in its debates on resource conservation programs.

CONCLUSION

The present structure of agricultural policy grew out of programs implemented during the 1930s. These programs may be inappropriate now. If so, current policy may be ineffective in solving problems facing the agricultural sector. Policy costs have soared, yet primary goals remain only partially met. With this in mind, Congress will likely consider modifications that may divert domestic agricultural policy from the traditional path it has followed.

Congressional modifications of the type discussed in this article will likely add to the expense of farm programs in the short run. If, however, they achieve the desired results, namely a reduction in surplus stocks and maintenance of farm income, they may prove to be a bargain in the long run.

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