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The Quarterly Review is published by the Research and Statistics Function of the Federal Reserve Bank of New York. Among the members of the staff who contributed to this issue are JAMES FACKLER and ANDREW SILVER (on credit aggregates as policy targets, page 2); MARCELLE ARAK (on control of a credit aggregate, page 10); JOHN WENNINGER (on reserves against debits, page 16); ROBIN C. DEMAGISTRIS and CARL J. PALASH (on the impact of IRAs on saving, page 24); HOWARD ESAKI (on the economic effects of enforcing due-on-sale clauses, page 33); MARK A. WILLIS and DANIEL CHALL (on New York City's property tax problems, page 37); SUSAN A. HICKOK and ROSANNA ARGUELLES (on China's rapid trade growth and impact on the world economy, page 41).

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Money and Credit: Exploring Alternatives

Rapid and sweeping changes during the past few years in financial instruments available to the public have raised questions about basing monetary policy on a narrow monetary aggregate (M-1). Already, past relationships between narrow money and the economy at large have started breaking down. In the future, the relationships are likely to change even more. Because of recent regulatory changes, an expanding portion of narrow money pays interest, and over time a large portion may pay interest virtually at money market rates. Thus, narrow money has increasingly become a hybrid, including some balances that are used primarily to make transactions and other balances used primarily as savings instruments. Of course, other hybrid investment instruments are also available (notably money market funds and the money market deposit account). They are instruments with some transactions features, though they are outside the definition of narrow money.

If narrow money as presently defined and measured threatens to become an increasingly unhelpful aggregate for policy purposes, the question naturally arises

whether monetary policy should focus on something else over the longer term. This issue of the *Quarterly Review* begins with three articles that seek to analyze some aspects of that question. James Fackler and Andrew Silver have taken a new look at the evidence on the links between measures of credit and the economy. Marcelle Arak has asked what means could be applied to attain targets for credit aggregates. And John Wenninger has explored the case for putting reserve requirements on debits to transactions accounts, as well as on the accounts themselves—an idea which first surfaced over a half a century ago, but which may have relevance for future monetary policy.

To a considerable extent, these articles step back from the discussion of current monetary policy. Rather, they are an attempt to inform policy debates that may emerge somewhere down the road. Obviously, they do not begin to exhaust the possibilities for further work on these topics. But they do raise some new themes and bring some fresh insights into subjects that will require increasing attention.

Credit Aggregates as Policy Targets

In recent years, financial innovations have raised questions about the usefulness of narrowly defined money as a policy target. The establishment of nationwide NOW (negotiable order of withdrawal) accounts, the rapid growth of money market mutual funds, and, more recently, the creation of Federally insured money market deposit and super-NOW accounts have repeatedly altered the form in which the public holds transactions and savings balances. Because of the changing composition of the monetary aggregates, the relationship between GNP and those aggregates—especially narrowly defined money—have become less certain. As a result, the usefulness of monetary measures in general, and M-1 in particular, has declined in recent years. Furthermore, the difficulty with money likely will continue during the transition period of adjustment to the new accounts.

In such an environment, it may be worthwhile for policymakers to look at other financial measures in addition to the monetary aggregates. Credit aggregates are one kind of potential alternative. This article summarizes existing evidence on the relationship between GNP and credit. In addition, it investigates how the reaction of policymakers might have been different in the past if the Federal Reserve had targeted credit along with money. Such an analysis can provide some clues to the effectiveness of monetary policy in the future if a credit aggregate is added as a target.

Our main finding is that there is no evidence from the past suggesting that weighting credit more heavily in the policymaking process would have resulted, on balance, in a path of GNP more desirable than the one actually experienced. However, this result should be

viewed cautiously with regard to its implications for the future. Because the economy can change as a result of financial innovations, past relationships may not be reliable indicators of current or future behavior. Moreover, correlations also can change just because the Federal Reserve places more emphasis on a variable than it did in the past. Furthermore, conceptual considerations suggest that, in times of substantial shocks to the components of broad monetary aggregates, targeting credit or broad money instead of narrow money may result in smaller fluctuations in GNP.

Conceptual issues

Until recently, conceptual models investigating what variables monetary policy should target considered only the choice between targeting interest rates and the money stock. More recently, a number of analysts have pointed out that one should also consider aggregates from the liability side (*i.e.*, credit aggregates) of the balance sheet of the nonbank public. However, the few models developed in the past several years that do incorporate credit unfortunately have not been able to provide any general conclusions on whether money, credit, or the interest rate is best suited for policy targets.¹ The general problem is that in some situations economic theory suggests that

¹See, for example, Franco Modigliani and Lucas Papademos, "The Structure of Financial Markets and the Monetary Mechanism" (Columbia University Discussion Paper No. 90, February 1981), and Andrew Silver, "Choosing Among Narrow and Broad Monetary and Credit Aggregates: An Evaluation of 'The Structure of Financial Markets and the Monetary Mechanism', by Modigliani and Papademos" (Federal Reserve Bank of New York Research Paper No. 8110, June 1981).

money would be superior to credit as a policy target; in other situations, however, credit would be preferred. Thus, to choose optimal policies, it is necessary to understand which of the various theoretical situations best approximates the economy and then to tailor policy accordingly. For example, assume that the only uncertainties about the economy were the random shifts that could occur between two components of a broad monetary aggregate (say, between M-1 and money market mutual funds). Then, controlling one of those components (e.g., M-1) would be inferior to controlling a credit aggregate or a broad money aggregate, both of which would be stable under this assumption. On the other hand, suppose the demand for money were stable and interest inelastic but the level of credit demand was uncertain (due, e.g., to shifts in investment spending between firms that typically depend extensively on credit and those that do not). In this case, controlling M-1 would be better than controlling credit.²

The obvious problem for the policymaker in interpreting these results is that the actual structure of the economy cannot be categorized easily as belonging to either of these special cases or, for that matter, to any special case. In a world in which random shocks occur to the components of money and credit demand, as well as to other sectors, the policymaker needs to know the expected magnitudes of all those random occurrences. In addition, it is necessary to know how all economic agents respond to changes in the economy to understand how the shocks are transmitted from market to market. Unfortunately, existing empirical models are not complete enough to provide the necessary estimates.

Despite lack of such precise knowledge, if it is true that shocks to the monetary measures resulting from financial innovations are increasing relative to those affecting the credit aggregates, then this relative increase in uncertainty about the monetary aggregates probably moves us closer to a situation in which a credit target may be superior to a money target. In such a situation, attention to a credit aggregate in addition to the usual concern with the money aggregates may guide us to policies that are better (or at least no worse) than policies that focus exclusively on money.

Empirical evidence

It is apparent from the previous discussion that the case for a credit target, either instead of or in addition to a money target, is not strong enough to be made exclusively on conceptual grounds. Even if we

fully understood qualitatively how disturbances in any particular market were transmitted to other markets in the economy, it would still be necessary to estimate empirically the magnitudes of various transmission mechanisms. In view of the complexities inherent in the economy, such a detailed estimation of the structure of the economy is extremely difficult.

An alternative to trying to identify and to estimate the relevant links among the various markets for money, credit, and output is to focus an empirical analysis on a very small subset of economic variables. This approach has been used recently in numerous studies in an attempt to sort out the impacts of money and credit on output.

The results from these "reduced-form" studies are very sensitive to the time period under consideration, the particular sets of variables in the analysis, and the form in which the data are analyzed.³ Consequently, these studies often show conflicting results. In some, credit measures do better in explaining movements in nominal GNP, or prices, or real output than do monetary measures, while in others, money does better. Furthermore, interest rates were shown to affect the relationships among the variables in ways that raise the question of whether either money or credit is linked directly to the ultimate goals of monetary policy—price stability and output growth. The basic conclusion from these empirical findings, therefore, is a rather weak one: because of the lack of a consistent and durable set of empirical results, the relative usefulness of money and credit as policy targets cannot be determined on the basis of such evidence. We will now review some of these results, and the underlying methodologies, that have led us to this conclusion.

Much of the discussion on the use of credit aggregates has concentrated upon three different financial measures: bank credit, formerly an associated policy target; the debt proxy, an aggregate recommended by Henry Kaufman;⁴ and nonfinancial domestic credit, a variable proposed by Benjamin Friedman.⁵ Bank credit is the narrowest measure of the three and consists of loans and investments of commercial banks; the debt proxy represents financial claims held by the

³ For example, different results are obtained if one uses end-of-quarter data or averages of adjacent end-of-quarter data. See E.K. Offenbacher, R.D. Porter, and E.F. McKelvey, "Empirical Comparisons of Credit and Monetary Aggregates Using Vector Autoregression Methods", mimeographed (Board of Governors of the Federal Reserve System, July 1982).

⁴ Henry Kaufman, Testimony before the House of Representatives Committee on the Budget, February 6, 1978.

⁵ Benjamin Friedman, "Time to Reexamine the Monetary Targets Framework", *New England Economic Review* (Federal Reserve Bank of Boston, March/April, 1982).

² Silver, "Choosing Among Narrow and Broad Monetary and Credit Aggregates".

nonfinancial domestic sectors; and nonfinancial domestic credit represents credit market funds raised by all domestic nonfinancial sectors, including local, state, and Federal government units.⁶ Detailed definitions of these aggregates are provided in the box on page 6.

The point of departure for a variety of studies investigating the credit-GNP relationship⁷ is the striking constancy of the ratio of income to each of several broad credit aggregates, *i.e.*, constant income velocities (chart). Indeed, at face value, this constancy suggests that GNP can be accurately controlled if sufficiently close control over credit is maintained. Nonetheless, a velocity which is trending but predictable would be just as helpful to the policymaker as a velocity which is constant. What is important from a policy viewpoint are the sizes and predictability of the fluctuations around the trend of velocity. However, when one adjusts the velocities for their trends and respective means, there is not much difference in the variability of the financial aggregates under discussion (Table 1).⁸

Since the income velocity of a financial aggregate is the ratio of nominal GNP in a particular period to the value of the financial aggregate in that same period, a further shortcoming of an analysis of velocities is that time lags are ignored. To allow for time lags in a simple way, researchers have run equations in which GNP is regressed on both current and lagged values of the financial variables of interest.

These types of relationships between GNP and M-1, as well as those between GNP and the credit aggregates similar to those described above, have been investigated previously by Richard G. Davis.⁹ Each pair of variables was analyzed by regressing GNP growth on a weighted average of current and four lagged growth rates of the respective financial aggregates and by regressing GNP growth on a weighted average of only the lagged growth rates of the various financial variables. The latter type of regression, which excludes values of the financial aggregates contemporaneous to the dependent variable, is used to reduce the ambigu-

Table 1

**Coefficients of Variation of Velocities:
Money and Credit Aggregates***

1960-I through 1982-I

Velocities	Raw data	Detrended data
M-1	0.205	1.20
Bank credit	0.058	1.32
Debt proxy	0.015	1.17
Nonfinancial credit	0.013	1.22

* The coefficient of variation is defined as the standard deviation divided by the mean.

ities with regard to the "causality" in the relationships between the variables; thus, attention is focused upon whether current GNP movements are determined strictly by *prior* movements in the explanatory variable.

In his analysis, Davis studied the 1961-I through 1977-IV period as well as the 1961-I through 1969-II and 1969-III through 1977-IV subperiods. He found that, when contemporaneous values of the financial aggregates were included, the debt proxy provided the most explanatory power for GNP (a multiple correlation coefficient of 0.35) over the full sample period. M-1 provided slightly less explanatory power, followed by total credit¹⁰ and bank credit (which explained only 4 percent of the GNP variation). In each of the two subperiods, the debt proxy also explained a substantial portion of GNP movements; however, total credit provided the most explanatory power in the 1970s (39 percent).

Benjamin Friedman reports similar results from investigating the relationships between GNP and various credit and monetary aggregates in similar types of equations; broad credit aggregates do about as well as M-1 in explaining GNP.¹¹ Friedman found, however, that the explanatory power of all the aggregates, including the broad credit aggregates, declined sharply in the 1970s.¹²

⁶ Nonfinancial domestic credit measures the liabilities of particular sectors, while the debt proxy and bank credit measure the assets of various agents. Nonetheless, for the purposes of this article, we will refer to all three of the aggregates as "credit" aggregates.

⁷ Specifically, Richard G. Davis, "Broad Credit Measures as Targets for Monetary Policy", this *Quarterly Review* (Summer 1979); Frank E. Morris, "Do the Monetary Aggregates Have a Future as Targets of Federal Reserve Policy?" *New England Economic Review* (Federal Reserve Bank of Boston, March/April 1982); and Benjamin Friedman, "Time to Reexamine the Monetary Targets Framework".

⁸ A useful graphical comparison of variability in the M-1 and debt proxy velocities, for example, is in Davis, "Broad Credit Measures as Targets for Monetary Policy", page 17.

⁹ Davis, "Broad Credit Measures as Targets for Monetary Policy".

¹⁰ Davis's measure of total credit is similar to what we have called nonfinancial domestic credit, but his measure excludes Federal Government borrowing.

¹¹ Benjamin Friedman, "The Roles of Money and Credit in Macroeconomic Analysis", mimeographed, September 1981.

¹² In contrast, Davis found that the explanatory power of total credit rose in the 1970s as compared with the 1960s and that the explanatory power of the debt proxy was about the same in the two periods. Possible explanations for this discrepancy include the form of the lag distribution, presence of other explanatory variables, and different estimation periods and definitions of variables.

Further, it has been found that excluding the contemporaneous values of credit aggregates from the regressions results in a sharp drop in the ability of these measures to explain income.¹³ Analogous results were found by Davis for total credit as well as for M-1 and the debt proxy. When only lagged values of these financial aggregates were used, the aggregates' explanatory power for GNP declined dramatically in the 1970s.

This type of equation has been criticized by econometricians. In particular, in these equations the temporal relations between GNP and the financial aggregates are constrained to run from money or credit to GNP. Of course, such a constraint may not be valid; it may be that GNP changes, in fact, precede credit changes or that the two are jointly determined. If the data are inappropriately constrained, then unreliable estimates of the financial aggregate-GNP relationship may emerge.¹⁴

In part due to the potential problems associated with inappropriately constraining the temporal relations among variables, a new statistical technique—vector

autoregression—recently was developed to help avoid imposing such incorrect constraints. This technique is in many ways a natural extension of the simpler methodology referred to above. The technique allows each variable to depend potentially upon prior values of all the variables under analysis.¹⁵ For example, GNP would be regressed on prior values of itself as well as prior values of the financial variable(s) of interest. Davis also ran equations of this type.¹⁶ He found that, when lagged values of either M-1 or the debt proxy were added to lagged values of GNP, the explanatory power for current GNP improved significantly. Neither bank credit nor total credit, however, provided similar contributions in explanatory power.

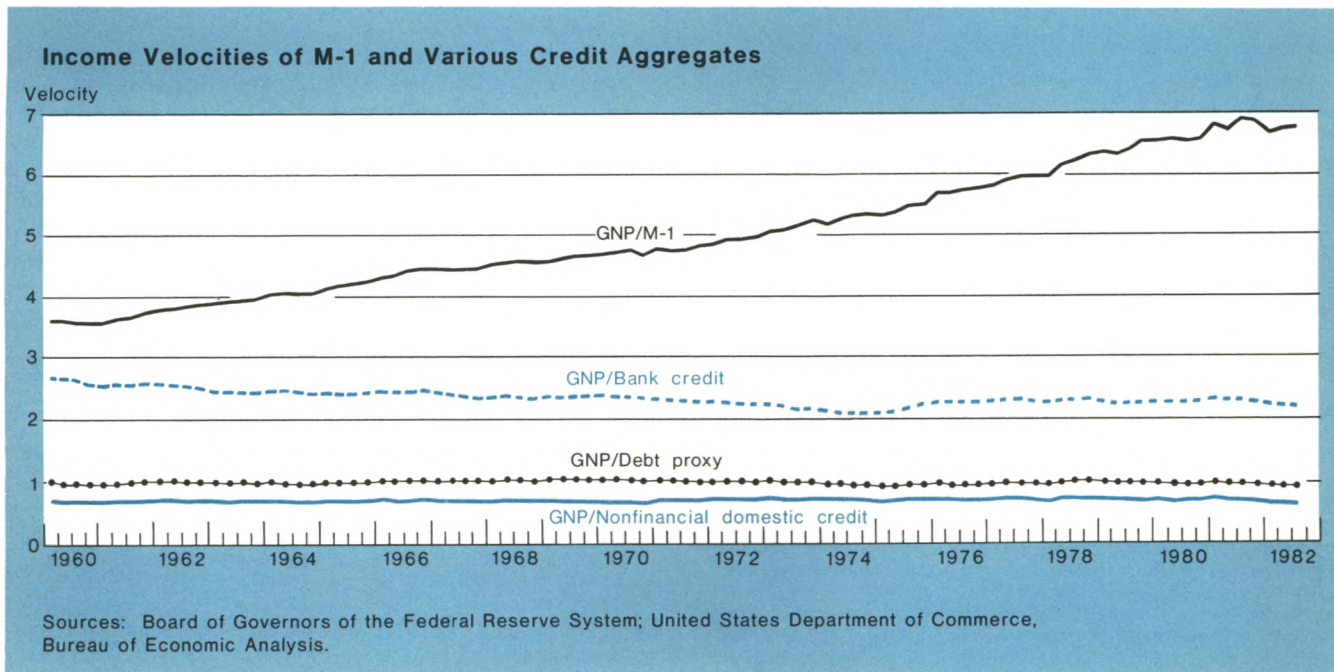
Other analyses using the general vector autoregression technique often distinguish explicitly between the real and price components of nominal GNP. This distinction between the real and price components allows for analysis of issues such as whether financial aggregates directly influence real output or prices, or both. For example, if it is found that some financial aggregate is linked directly to prices, but not to output, then that aggregate might be a candidate as an intermediate

¹³ James Fackler and Ken Guentner, "Money, Credit and Income", mimeographed (Federal Reserve Bank of New York, January 20, 1982).

¹⁴ For an exposition of the biases inherent in ignoring feedback from the economy to policy variables in the context of a structural model, see S.M. Goldfeld and A.S. Blinder, "Some Implications of Endogenous Stabilization Policy", *Brookings Papers on Economic Activity* (3, 1973).

¹⁵ Vector autoregression is so named because it investigates the relationship between a set of current variables (*i.e.*, a vector) and prior values of that set of variables (*i.e.*, an autoregression).

¹⁶ However, Davis did not provide a full vector autoregression analysis since analogous equations explaining the financial aggregates were not simultaneously estimated.



Definitions of Selected Credit Aggregates

Bank credit Commercial bank holdings of Federal and state and local government obligations and total bank loans. These include mortgages, consumer credit, agricultural loans, open market paper, commercial loans, loans to other financial institutions, and loans to foreign banks.

Debt proxy Holdings by private domestic nonfinancial investors of currency, checkable deposits, large and small time deposits, money fund shares, repurchase agreements, Federal Government securities, state and local government obligations, open market paper, corporate and foreign bonds, and other loans.

Nonfinancial domestic credit Credit market funds raised by nonfinancial sectors, including funds raised by Federal, state, and local governments, corporate bonds, mortgages, consumer credit, and open market paper.

target in a policy aimed at controlling inflation.

An analysis of the temporal relations among real GNP, prices, and money has shown that lagged values of money (M-1) help explain prices, but not output.¹⁷ When a broad credit aggregate (nonfinancial domestic credit) is substituted for M-1, so that the set of variables under consideration includes output, prices, and credit, then credit, like money, explains prices but not output.¹⁸ When sets of lagged values of both M-1 and credit are included in an equation explaining

prices, however, neither set is individually significant. This suggests that M-1 and credit contain similar information for future prices, and therefore both are not necessary to explain prices. On the other hand, when M-1 and credit are included in an equation explaining output, both financial measures are significant.¹⁹ Therefore, information on money and credit possibly can be combined usefully in determining future output.

However, when the rate of interest is substituted for credit in a four-variable analysis (*i.e.*, output, prices, money, interest rate), money is no longer directly important for explaining output.²⁰ Money, however, does retain importance for explaining prices. Furthermore, in a five-variable analysis (*i.e.*, money, credit, the rate of interest, output, and prices), the interest rate helps explain movements in output and prices. But, while money and credit explain some of the variations in the interest rate, neither financial aggregate directly influences prices, a result similar to the four-variable case referred to above. In addition, neither money nor credit appears to contribute directly to the determination of output; this is a markedly different result from the one obtained when the interest rate is excluded.²¹ The interest rate, therefore, appears to be an important but heretofore relatively ignored variable in studies of the relationships among money, credit, prices, and output. The complete set of relationships needs to be explored and explained further before the target question can be resolved.

Would credit aggregates have helped policy in the past?

Although the Federal Reserve monitored a variety of economic and financial indicators in deciding upon monetary policy in the past, M-1 was usually the primary aggregate used in the period since 1970. In this section, we look at whether giving more weight to credit would have resulted in a "better" monetary policy. That is, would more attention to credit have resulted in reactions by policymakers that would have

¹⁷ In addition, both lagged output and lagged prices influence the current stock of money, so that significant feedback from the economy to money exists. One implication of this result is that single equation models may inappropriately constrain the income-money relationship to one in which changes in money temporally precede changes in income.

¹⁸ Whether money or credit is used as the explanatory variable in the output and price equations makes very little difference in the explanatory power, as measured by the coefficient of multiple determination (R^2) and the standard error. (See Benjamin Friedman, "The Roles of Money and Credit".) In the systems of three-variable equations referred to above, neither money nor credit is significant at the 10 percent level in explaining output. In the price equations, money is significant at the 1 percent level, but credit is significant only at the 5 percent level.

¹⁹ These results, along with those in the preceding paragraph, are presented in Friedman, "The Roles of Money and Credit". The R^2 s and the standard errors of the equation in the system including both M-1 and credit are essentially the same as those in the systems that include only one of the financial variables. The exception is that the standard error of the output equation is slightly lower in the system that includes both financial variables.

²⁰ For instance, Friedman, "The Roles of Money and Credit", and Christopher Sims, "Comparison of Interwar and Postwar Business Cycles: Monetarism Reconsidered", *American Economic Review* (May 1980).

²¹ See James Fackler, "An Empirical Model of the Markets for Money, Credit, and Output", mimeographed (Federal Reserve Bank of New York, revised December 1982).

led, on balance, to a better performance, in terms of output and inflation, since 1970?²² The answer, we find, is that it probably would have not.

To see if a joint M-1 and credit target would have resulted in a better policy than one based on money alone, it is first necessary to determine when those two policies would have been different. That determination depends on how policymakers were to incorporate credit into the decision-making process. One possible way would be to make decisions based on M-1 alone as long as the signals emanating from M-1 and credit were not very different. That is, one could assume that there is some "normal" or "average" relationship between M-1 growth and a particular credit aggregate growth and that some variation around this relationship is to be expected and not to be viewed as "unusual" in any policy-oriented sense. When the signals were very different, though, policymakers would weight those conflicting signals and adjust policy accordingly.

For example, if credit growth greatly exceeded money growth, the credit aggregate would indicate that a "looser" policy was actually being employed than if policymakers looked just at money growth. Hence, to achieve a given desired goal, policy would be tightened, either by raising interest rates or by reducing nonborrowed reserves, relative to the situation in which money was used as the sole indicator. This relative tightening would occur whatever the policymakers' reaction would have been to money growth alone. If money growth was deemed unsatisfactorily low, policymakers, looking only at M-1, might react by loosening policy; looking at credit (growing rapidly) in addition to money (growing slowly), they might still loosen but loosen less. On the other hand, if money was growing faster than desired or anticipated, policymakers might tighten policy. Adding credit as a target in this situation would lead policymakers to tighten even more. Analogously, when credit growth was "abnormally" low relative to money growth, the indication would be that policy was tighter in fact than that signaled by money alone; hence, taking credit growth under consideration would lead to a relatively looser policy.

Table 2 shows the periods in which such a joint policy of M-1 and each of the credit aggregates, respectively, would have been different from one based solely on M-1. The specific criteria used to judge when the relationships between the growth rates were "abnormal" were differences between the four-quarter growth rates of M-1 and the credit aggregates of more

than two standard deviations.²³ For those periods in which "abnormal" differences in growth rates existed, and hence a joint target-based policy would have been different from an M-1 based policy, we have indicated the direction of the difference in resulting policies. That is, if policy would have been more expansionary using a joint target, the term "looser" has been entered in the appropriate column; if policy would have been more contractionary, the term "tighter" has been used. We have not indicated the exact magnitudes of the resulting policy shifts because to do so would require precise knowledge of, or assumptions regarding, how policymakers would have weighted conflicting signals given by M-1 and credit. However, as long as credit is given some weight, we can determine the direction of policy change. Furthermore, we have looked only at short-run changes in policy. Any hypothetical policy that differs from the historical record would have affected the entire subsequent evolution of the economy, at least partly due to the reaction of subsequent policy. However, the study of such potential long-run responses is beyond the scope of this article.

While it is relatively easy to determine when policy would have been different, as well as the direction of those differences, it is much harder to conclude whether the alternative policies would have been an improvement over actual policy. Both economists and policymakers have widely divergent opinions on the efficacy of monetary policy on inflation and real economic activity, on the timing of any influence that does exist, and on the relative costs of inflation and sacrifices in real output. Therefore, in evaluating the joint target policies, our conclusions are limited to those cases in which we view the evidence as overwhelming. Even so, we recognize that those conclusions are by no means the only ones that could be reached. To help readers follow our analysis of the alternative economic policies and to aid in the formation of independent judgments, we have listed the quarterly growth rates (at annual rates) of real GNP and consumer prices in the last two columns, respectively, of Table 2.

Nonfinancial domestic credit

A joint target of nonfinancial domestic credit and M-1 would have created a policy different from a strict M-1 target in three periods. In the first period, 1973-III through 1973-IV, nonfinancial domestic credit was

²³ The mean and standard deviation for a given quarter were calculated from the data for the five years prior to that quarter. Thus it is assumed that, given the changing relationships in an evolving economy, policymakers would have looked only at the five most recent years of behavior in evaluating signals in a given quarter.

²² For expositional simplicity, we refer to actual policy in the post-1969 era as an M-1 based policy and to a hypothetical policy, with more weight on credit, as a joint M-1 and credit policy.

Table 2

Differences in Policy Signals between M-1 and Credit

Year-quarter	Policy change indicated by:			Real GNP Quarterly growth, at compound annual rate	Consumer price index	Year-quarter	Policy change indicated by:			Real GNP Quarterly growth, at compound annual rate	Consumer price index
	Nonfinancial domestic credit	Debt proxy	Bank credit				Nonfinancial domestic credit	Debt proxy	Bank credit		
1970-I ...			Looser	-1.54	6.70	1976-II ..				2.74	3.22
1970-II ..			Looser	0.59	5.73	1976-III ..				2.31	6.55
1970-III ..				3.86	4.45	1976-IV ..				3.74	6.28
1970-IV ..				-3.11	5.94	1977-I ...				8.87	7.39
1971-I ...				10.26	3.30	1977-II ..		Looser		6.72	7.26
1971-II ..				1.96	3.84	1977-III ..		Looser		6.77	5.58
1971-III ..				3.19	3.92	1977-IV ..		Looser		0.75	5.96
1971-IV ..				3.49	2.87	1978-I ...				3.38	7.38
1972-I ...				7.90	3.63	1978-II ..				*11.00	9.42
1972-II ..		Tighter	Tighter	7.57	2.50	1978-III ..				3.33	9.28
1972-III ..				5.05	3.36	1978-IV ..				5.52	10.01
1972-IV ..				7.48	4.20	1979-I ...				1.15	10.61
1973-I ...				10.96	6.34	1979-II ..				-0.92	12.71
1973-II ..			Tighter	0.48	8.42	1979-III ..				4.82	13.69
1973-III ..	Tighter	Tighter	Tighter	2.43	8.14	1979-IV ..				0.73	14.10
1973-IV ..	Tighter	Tighter		3.32	10.53	1980-I ...				1.51	16.48
1974-I ...		Tighter		-3.98	12.57	1980-II ..	Tighter	Tighter		-9.56	13.52
1974-II ..				0.45	10.86	1980-III ..				1.66	7.62
1974-III ..				-2.49	11.87	1980-IV ..	Looser			4.33	12.83
1974-IV ..				-5.19	13.37	1981-I ...	Looser			7.90	10.96
1975-I ...				-8.19	8.56	1981-II ..	Looser			-1.48	7.81
1975-II ..			Looser	4.94	4.48	1981-III ..				2.20	11.81
1975-III ..			Looser	9.23	8.55	1981-IV ..		Tighter		-5.27	7.80
1975-IV ..			Looser	3.64	8.11	1982-I ...				-5.11	3.16
1976-I ...				9.11	4.33	1982-II ..				2.11	4.59
						1982-III ..				0.00	7.60

growing much faster than M-1, so that, had credit been considered along with M-1, policy would have been tighter than it actually was. The arguments for the appropriateness of a tighter policy center around the rapidly accelerating inflation rate of the period and the high level of capacity utilization in various industries. On the other hand, some of the inflation was caused by rising food prices due to bad weather in the 1972-73 winter and, in the fourth quarter of 1973, by rising fuel prices due to the OPEC oil embargo. In addition, the lower rate of economic growth experienced in the final three quarters of 1973 (compared with the 1972-I through 1973-I period), if allowed to persist, may have eventually led to less inflationary pressures. Therefore, it is not clear what kind of policy change would have been desirable in the second half of 1973.

In the second quarter of 1980, nonfinancial domestic credit again would have led policymakers to tighten policy. Such an action, coming on top of the credit control program adopted in March 1980, may have intensified and extended the sharp drop in real GNP that occurred in the second quarter (9.6 percent at an annual rate). The benefit, of course, may have been an even sharper drop in the inflation rate than actually occurred from the first to third quarters of 1980.

The final instance in which nonfinancial domestic credit would have affected policy was in the 1980-IV to 1981-II period. Had the credit measure been followed during that period, policy would have been looser than the one actually employed. Although this may have moderated the subsequent fall in economic activity, a looser policy may also have resulted in less of an improvement in the inflation picture than was experi-

enced. Thus, it is not clear that a looser policy would have been desired.

Debt proxy

The joint target system based on the debt proxy measure of credit would have called for actions different from those based on M-1 alone in five different periods in the post-1969 era. In 1972-II the debt proxy measure signaled that policy was looser than indicated by money growth; hence, had policy been based at least partially on the debt proxy, policy would have been tighter. This, in fact, may have been a more appropriate policy to pursue, given the fact that the economy was in the midst of an extremely rapid expansion and at the beginning of a period of accelerating inflation.

A policy based on the debt proxy in the 1973-III through 1974-I period would have been similar to, and had the same problems as, one based on non-financial domestic credit. Furthermore, since the period of tighter policy called for by the debt proxy extended into the beginning of 1974, following that signal would have led to a tighter policy at the start of what was already developing into a very severe recession.

From 1977-II through 1977-IV a debt proxy-based policy would have been more expansionary than an M-1 based policy. At the time, the economy was expanding at a rapid rate, and a period of sharply accelerating inflation was about to begin. A looser policy, therefore, was probably not desirable.

In the second quarter of 1980 the debt proxy again would have led to the same change in policy as indicated by nonfinancial domestic credit, and thus would have had benefits and pitfalls similar to those described above. In addition, the debt proxy would have led policymakers to tighten policy in the fourth quarter of 1981, another period of very weak economic activity and slackening inflation.

Bank credit

A joint bank credit and M-1 target would have led to a looser policy than an M-1 target in the first two quarters of 1970. Although the economy was in a minor recession at that time, the relatively high rate of inflation may have made a more expansionary policy undesirable.

The next two periods in which bank credit and M-1 would have given divergent signals were in 1972-II and 1973-II through 1973-III. In both periods, bank credit would have led to a tighter policy. As in the case

of the debt proxy, a tighter policy probably would have been appropriate in 1972-II. However, the same may not be true for the latter period, as noted above for nonfinancial domestic credit.

The final period in which bank credit and M-1 would have given different signals was from 1975-II to 1975-IV, when bank credit would have led to a looser policy. Given that this period marked the start of a vigorous economic recovery, coincident with a falling rate of inflation, it is not clear that any alternative policy would have been superior to the one actually pursued.

Summary

One possible argument on the part of proponents of credit aggregates is that, even if the credit aggregates on average do not "outperform" the monetary aggregates, they may in fact give important signals at critical points in the business cycle. However, the evidence described in this section does not support this argument. None of the credit aggregates described above would have consistently improved an M-1 based policy in the post-1969 period. Even in two of the three periods in which more than one credit measure would have led to the same modification in policy, those modifications may have led policy in the wrong direction. Furthermore, none of the aggregates indicated that a tighter policy should have been pursued during the most recent period of accelerating inflation, 1977 through the beginning of 1981. Finally, at points during the most recent contractionary period, nonfinancial domestic credit would have led to a relatively more expansionary policy, while the debt proxy would have called for a tighter policy; which policy modification would have been more appropriate is still an open question.

Conclusion

In our view, there is no strong empirical evidence from recent history supporting use of a credit aggregate. However, such a view is an insufficient reason for discarding proposals to use credit aggregates as policy targets. In particular, even though credit would not have unambiguously aided the policymaker at critical points of the business cycle, limited existing theoretical work suggests that, in periods of substantial shocks to money, credit targets are more likely to be useful policy targets. If the recent financial innovations are viewed primarily as distorting the monetary aggregates, then credit aggregates are likely to be relatively useful, at least until the shocks to money subside.

James Fackler and Andrew Silver

Control of a Credit Aggregate

In the debate about which financial aggregates the Federal Reserve should target, a key question is how the Federal Reserve would go about controlling a credit aggregate. While the Federal Reserve can limit the supply of reserves, it is difficult to see a close connection between reserves and a broad financial aggregate, much (or all) of which is not reservable. Admittedly, some nations' central banks directly restrict the quantity of credit that their banking system may lend. And, in the United States under the special credit restraint program of 1980, guidelines were set for permissible expansion in loans and credit. Nevertheless, in this country, direct restrictions on the quantity of credit, particularly for extended periods of time, have not generally been regarded as either a desirable or a feasible way to operate.¹

How, then, could a credit aggregate target be achieved in the United States? One approach, advocated by some Wall Street economists, is to impose a high capital requirement on banks. (This capital requirement would be set above the level demanded for prudential purposes by the bank supervisor.) The additional need for capital to support bank credit expansion could, according to the proponents, act as a

substantial brake on both bank lending and total credit. A second approach is to impose reserve requirements on credit expansion, making it more costly for firms and households to borrow. A third possibility is use of a "shadow" reserve requirement with some broad measure of credit; the implicit "reserves" calculated in this fashion could be used to guide the actual amount of reserves provided by the Federal Reserve.

In this article, I examine the effectiveness of capital ratios as well as these alternatives as control devices. The analysis indicates that

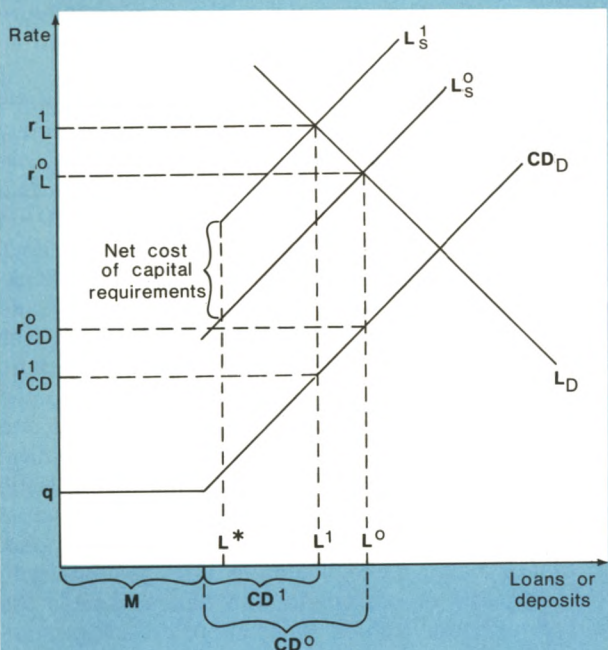
- Capital ratios on bank assets (above the prudential level that banks would maintain to satisfy the supervisors or their equity holders) would curb domestic bank lending. But much of any increase in credit demand would be accommodated in other markets.
- To the extent that credit needs were easily met elsewhere, capital ratios would put little pressure on the general level of interest rates and would have little effect on spending and on a broad credit measure.
- Reserve requirements on bank credit suffer from some of the same problems as capital requirements.
- Shadow reserve requirements on a broad credit aggregate, however, might be an effective mechanism to influence both spending and credit in the economy.

I owe thanks to Henry Kaufman whose ideas provided much of the impetus for this paper and to Don Kohn of the Board of Governors of the Federal Reserve System as well as to many of my colleagues at the Federal Reserve Bank of New York who provided useful comments.

¹ Irving Auerbach has suggested that such limits on credit expansion be adopted to replace the present system whereby reserves must be maintained against liabilities. According to his proposal, banks would be able to buy or sell their allocations.

Diagram

Market for Bank Loans and Certificates of Deposit



Assume banks have core deposits on which they pay an average rate of interest q . Banks raise additional funds through certificates of deposit (CDs). In turn, banks make loans, basically charging a rate of interest that is a constant markup over the CD rate. Thus, L_S^0 , the supply function for bank loans before capital requirements, is represented in the diagram as parallel to the demand for CDs (CD_D). L_D is loan demand. In equilibrium, loan volume will be L^0 , and the interest rate charged on loans will be r_L^0 . Part of L^0 will be funded with deposits (M) and the remainder with CDs, in quantity CD^0 .

With the imposition of capital requirements, the banks' required return on loans jumps, shown by the L_S^1 curve. L^* is the level of loans above which marginal capital requirements take effect. In the new equilibrium, the interest rate charged on loans increases to r_L^1 , and loan volume falls to L^1 . A smaller volume of CDs is thus necessary (CD^1), causing the CD rate to fall to r_{CD}^1 from r_{CD}^0 .

Loan volume and capital requirements

Suppose there is an increase in the demand for loans stemming from a planned increase in spending. How would the results differ if expansions of bank credit beyond some point were subject to high marginal capital ratios?

To examine the effect of capital ratios, some background assumptions about monetary policy must be

specified. For simplicity, assume that capital ratios would be superimposed on a system in which there is still a monetary target, implemented through reserve provisions.

When the demand for loans increases, banks typically raise funds through repurchase agreements on securities in their portfolios or through the issue of more certificates of deposit (CDs); they may also sell some securities or buy fewer than they had planned. The additional need for funds, if it is widespread, will cause the CD rate to rise since investors need to be induced to hold a larger volume of CDs. Also, if reduced bank holdings of securities push up the rates on these securities, CD investors will also typically require a higher return. The higher cost of funds will, in turn, induce banks to raise the rates charged on loans.

How would capital requirements affect this process? Capital requirements, if they exceed the capital ratios that banks would otherwise maintain, represent an additional cost attached to expanding a bank's asset portfolio. The markup on the cost of funds will therefore probably be greater than in the absence of capital ratios. As a consequence, some borrowers who have direct access to funds in the commercial paper market or bond market will elect to raise funds that way instead of through the intermediation of banks. In addition, they may seek to borrow from foreign banks or other institutions not subject to the capital requirement.

The results of an expansion of loan demand under this regime are:

- The loan rate rises by more than in the unconstrained case;
- Loans may expand but not by as much as in the unconstrained case;
- Domestic bank profits will not rise as much;
- The capital requirement does not act as a complete bar against loan expansion except in the extreme case where banks cannot raise capital at all (even through retained earnings) and they have no securities in their portfolio that they can sell.²

Quantitative impact of capital requirements

The impact of capital requirements on the volume of loans and the rates charged depend upon a number

² A bank may wish not to sell securities whose market value is below par value because, by selling them, they would be forced to show a loss on those securities.

of factors including (a) the ease of raising capital (either through equity or long-term subordinated debt) and (b) the level of the capital requirement relative to the capital ratio that would otherwise be maintained.

Suppose, for example, that on bank credit expansion which exceeded the target a bank had to maintain a marginal capital requirement of 2 percent above the capital ratio that banks needed for prudential reasons. Further, suppose capital would be raised in the form of equity rather than subordinated long-term debt and that expected annual earnings of 20 cents per dollar invested would need to be offered to new equity buyers. (In August 1982, the thirty-five large banks included in the Salomon Brothers Inc average had an earnings-price ratio of 19.2 percent.) Since the new equity represents a source of funds which could substitute for liabilities, such as deposits or other forms of borrowing, the net extra cost of the capital acquired would be 20 percent minus the aftertax interest cost on these liabilities. Suppose that the interest rate on these liabilities is 15 percent per year and that, after Federal income taxes, this costs the bank roughly 8 percent (state and local taxes are ignored for this calculation). Then the net cost of financing with equity rather than with debt would be 12 percent. The capital requirement would therefore add 24 basis points (the 0.02 undesired capital requirement multiplied by the 12 percent marginal cost of equity finance) per dollar to the cost of expanding loan volume.

Some of the 24 basis points would be reflected in a higher loan rate, some in a lower CD rate, and some in a reduction of bank profits (diagram). The fewer the alternatives to bank loans, the more willing potential borrowers would be to pay a higher rate and still obtain credit from banks. In this case, where the demand for loans is "inelastic", borrowers will end up paying almost 24 basis points more. In contrast, in the case where borrowers have good alternatives to bank loans, they will pay an increase which is much less than 24 basis points.

Naturally, if the original assumptions were not a good description of the real world, the loan rate could increase by more (or less) than 24 basis points. For example, if the supply curve of equity capital to the bank were upward sloping, so that the bank had to offer successively higher expected returns to shareholders to raise more capital, the effect on the loan rate could be greater. Further, there may be subjective costs involved in raising new capital. For example, a bank may be reluctant to issue new stock if the market price of its stock is below book value. In this case, current earnings would be a key factor in capital expansion: banks with high earnings could retain earnings to finance expansion, while those with

lower earnings would not expand their portfolios. Moreover, if capital ratio requirements reduce earnings, banks would have to reduce dividends in order to retain earnings. Aversion to reducing dividends may create a lower desired capital ratio than would be true in the unconstrained case. Thus, the capital requirement could exceed the desired ratio by more than an initial comparison would suggest.

If current earnings were a key factor in capital growth, then the bank's earnings per dollar of equity would provide an upper limit on asset growth. For example, earnings on equity of, say, 20 percent would permit an expansion of capital and assets of something less than 20 percent. Capital growth above this level would then be very "expensive" in terms of stockholders' preferences. At the extreme, the bank would raise the loan rate enough so that loan demand was at or below the point where the marginal capital ratio applied.

In any event, the loan rate would tend to rise and some customers of banks would then try alternative, cheaper ways of raising funds. Those that could issue commercial paper or bonds might do so. Others would seek to borrow from foreign banks located abroad. Still others would make financing arrangements with either suppliers or customers who had access to the commercial paper market. In addition, if bank guarantees were not subject to reserve requirements, banks could insure credit extended by other parties to businesses with which the banks are familiar. Letters of credit are one way the banks could provide such guarantees. In this fashion, banks could, in principle, continue to perform the role of rating customers not known to the general public and putting themselves as guarantors between the public and those customers. In this way, they would continue to facilitate the expansion of credit.

The higher the capital ratio imposed, the more would loan demanders seek these alternative routes. Thus, the reduction of domestic bank loans would be offset, at least in part, by expansion in other sources of credit. Twenty years ago when many of these alternative markets were either undeveloped or completely nonexistent, the demand for bank loans was less elastic. Then the imposition of capital ratios would have raised loan rates more substantially and the reduction of loans would have been offset only to a small extent by other credit sources. Today, however, because of the availability of substitutes, the rise in the loan rate is likely to be small and the offset to bank credit provided by the alternatives is likely to be sizable.

Effects of capital ratios on credit and spending growth

Marginal capital ratios would presumably be applied to banks when credit expansion was above a specified target range. (These special marginal capital ratios would have to be set above the level that would be maintained otherwise to have an effect on interest rates.) Bank asset growth which is subject to the marginal capital ratio would be accommodated by banks only at a higher interest rate. And higher interest rates—if they occur—are likely to influence the spending decisions of households and firms. Then, as spending responds and credit needs change, total credit as well as bank credit would be reduced.

The train of events, however, might not follow this pattern. First, if a sufficient number of borrowers had low-cost alternative sources of credit, these borrowers would not be willing to pay higher rates to banks. Instead, they would take their funding needs elsewhere, leaving banks with no expansion in assets that was subject to the capital ratio. Interest rates would differ little from what they would be without capital ratios, and spending decisions that depend upon interest rates would also be little affected.

Another problem with the simple system of marginal capital ratios is that it works only when credit growth is rapid. When credit growth is low or negative, such as during a recession, the capital ratio would not work to lower interest rates more than they would fall naturally: a marginal capital ratio *below* the prudential level will not change the capital ratio that banks maintain and therefore will not change their costs.

Other noteworthy effects of capital ratios

Capital ratios could have relatively little effect on the *general level* of interest rates and on *total* credit. But they could nevertheless have a large impact on the banking industry, and related industries, as well as on the financial markets. The banking system's profits, in aggregate, would probably be reduced somewhat and the banking system would have a smaller relative asset volume as potential borrowers shift to alternative sources of funds.

Another effect of a high marginal capital requirement is to reduce a bank's leverage. Lower leverage means a lower average return on equity and a greater degree of safety. Both factors will tend to induce banks to increase risk and raise return by altering their portfolios away from investments and toward loans and by making loans to riskier borrowers. Indeed, Koehn and Santomero³ have argued that constraints such as capital ratios can actually increase the probability of bank

failures. On balance, though, capital ratio requirements are likely to make banks safer institutions.

Capital ratios will affect different banks to different extents. One factor is the relationship between the height of the marginal capital ratio and the capital ratio a bank would otherwise seek to maintain: a bank with a relatively low initial capital ratio would tend to be affected more than a bank with a higher capital ratio. Another problem with marginal capital ratios on rapid expansion in bank credit is that they penalize banks in regions where there is rapid economic growth; at the same time, they have no effect on banks in areas which are growing slowly or contracting. It is possible, however, that banks in growing areas would induce others to do loan participations or that banks in growing areas would concentrate on loans, reducing their securities holdings.

Another effect of capital ratios might be to change the relationship between various *interest rates*. Compared with the situation that could prevail without such capital ratios, commercial paper rates would probably be higher as more firms seek nonbank financing. CD rates would be lower because there would be less need to issue CDs.

Reserve requirements

In principle, reserve requirements could be imposed on bank assets or even on other types of domestic credit such as finance company credit or bonds issued in the United States. Marginal reserve requirements were, in fact, imposed upon certain types of consumer loans during 1980.

Reserve requirements on bank assets, or marginal reserve requirements on expansions in bank assets, would have effects very similar to those of capital ratios. A reserve requirement on the increases in asset volume would make it more expensive to expand loans, just as did a marginal capital ratio. For example, a marginal reserve requirement of 2 percent would mean that the bank would have to raise \$1.02 for each \$1 it lent out. Thus, its borrowing cost would effectively be raised 2 percent. At an interest rate of 15 percent, say, this cost is 30 basis points. As a consequence of the greater effective cost, loan rates would tend to be higher and the loan volume smaller than in the absence of the reserve requirement.

In several other respects, too, reserve requirements on bank credit are similar to capital ratios. For example, a marginal reserve requirement on bank credit expansions would encourage borrowers to circumvent the domestic banking system. It would also tend to reduce bank profits. In contrast to capital ratios, however, reserve requirements are unlikely to improve bank safety. In fact, in the effort to improve their aver-

³ See M. Koehn and A. Santomero, "Regulation of Bank Capital and Bank Portfolio Risk", *Journal of Finance* (December 1980).

age returns, banks would probably choose riskier loans and investments. Reduced safety is thus the likely result.

If reserve requirements were also imposed upon nonbank credit, borrowers would not gain by shifting to nonbank sources of funds. For example, assuming that commercial paper issues were also reservable, borrowers would not shift from bank loans to commercial paper. Nevertheless, such reserve requirements could be circumvented by borrowing abroad or, if only public issues were covered, by arranging private deals.

Shadow reserve requirements

Another way of implementing a credit target would be to utilize a system of shadow reserves. (Indeed, a system of shadow reserves can be used with any aggregate containing nonreservable components.) Assume that reserve requirements remain on deposit liabilities; the tightness in the reserves market, however, depends not on money growth but rather on the growth of a selected credit aggregate.⁴ One way of connecting reserves availability to credit growth is to:

- Set a target for the credit aggregate. This credit aggregate could include credit raised from nonbank sources—it would not matter whether the institutions (or the market) were under the purview of the Federal Reserve;
- Calculate the deviation of credit from its target level;
- Apply a shadow reserve requirement to that deviation to obtain the adjustment to the Federal Reserve's objective for nonborrowed reserves;
- Reduce the path for nonborrowed reserves by this amount. (If the adjustment were negative, nonborrowed reserves would be increased.)

For example, if credit moved \$10 billion above its target range and the shadow reserve requirement was 5 percent, the nonborrowed reserves path would be lowered by \$0.5 billion (equal to $0.05 \times \$10$ billion). Thus, rapid growth of credit would be translated automatically into reserves shortages which would put upward pressure on interest rates.

Because of the generalized effects on interest rates,

this shadow reserves mechanism is more likely to affect total credit usage than a system which imposes capital ratios or reserve requirements only on banks—since a mechanism focused on domestic bank lending may have little effect if alternatives to bank loans are readily available.

Of the three mechanisms considered—capital ratios on bank assets, reserve requirements on bank assets, and shadow reserves on total credit—the shadow reserves mechanism has some clear advantages. First, since it is a variant of the reserves targeting mechanism currently in use, a rough estimate of its impact on interest rates could be based upon the experience of the last few years: the typical spread between the Federal funds rate and the discount rate that results from that reserves shortage. In contrast, the impact of capital ratios or reserve requirements on interest rates depends upon the elasticities of loan demand and CD demand whose magnitudes are now well-known. Second, it is a system which discriminates less between credit expansion by banks versus nonbanks.⁵

Fundamentally, though, control of a broad financial aggregate, whether through capital ratios or through shadow reserve requirements, would be quite indirect. The mechanism by which shadow reserve requirements (or for that matter capital ratios) influence the volume of credit is:

- Interest rates are altered by overly rapid (or overly slow) growth of the financial aggregate;
- These interest rate changes affect spending decisions of households and firms and the credit demands that go along with those spending decisions.

Also, the level of shadow reserve requirements is not much easier to set than an actual reserve requirement or a capital ratio. In a general sense, the higher the shadow reserve requirement, the more the Federal funds rate will change when the financial aggregate deviates from the target range. And the shadow requirement would have to be set high enough to ensure that, when the rate of inflation accelerates, interest rates rise by more than the rate of inflation. That is, rapidly expanding credit must produce an increase in real rates of interest or else GNP and credit demands will tend not to recede. Economic models at the present time, however, do not yield a unique answer on exactly how much of an interest rate change is needed to

⁴ Tightness in the reserves market could be made to depend upon a combination of money and credit growth. For simplicity of exposition, it is here assumed that only credit affects tightness in the reserves market (*i.e.*, deposit growth is accommodated).

⁵ But any rise in short-term interest rates increases the cost of reserves, which yield no interest, and thus affects the institutions that must hold reserves.

produce the credit reduction that is sought. The responsiveness of spending decisions and credit usage to interest rates needs to be studied further to design appropriate implementation procedures for credit targets.

Concluding remarks

In this article, I have examined various mechanisms for using a credit measure in monetary policy. Other key issues, such as the potential problems involved in focusing on credit, have not been addressed here. For one thing, pressures for special treatment of one category of credit or another are bound to arise. In

addition, changes in the distribution of income or spending or in the tax laws may produce an increased demand for borrowing through the credit markets while total spending is unchanged. (For example, firms doing the bulk of the investment in one year may be those who have poor earnings and as a consequence need to borrow a lot, whereas in other years it could be firms with large profits who are doing most of the investment with retained earnings.) How the monetary authorities would deal with these shifts in demand could develop into an important issue if credit aggregates become the primary focus of monetary policy.

Marcelle Arak

Reserves against Debits

Financial developments during the last few years have provided some valuable insights into the problems the Federal Reserve is likely to encounter in targeting a narrow monetary aggregate over the next few years. The rapid growth of NOW accounts since 1981 illustrates how difficult it is to interpret M-1 growth when a single account contains both savings and transactions balances. Working in the opposite direction, the increased emphasis on cash management by the corporate sector has spurred the development of financial innovations, resulting at times in weak growth of M-1 relative to income and interest rates since the mid-1970s. Analysts are increasingly questioning the future usefulness of M-1 as a guide to policy.¹

As the financial system continues to evolve, that is, as interest rate ceilings are phased out and consumers and corporations continue to find new ways to hold transactions and investment balances, it will become increasingly difficult to measure a transactions concept of money. This raises the question whether monetary policy should be formulated in terms of a reserves path linked to balances in certain types of accounts or whether the reserves path should be tied to deposits in some way other than daily average balances.

This issue has been raised before, and it seems

worthwhile to reexamine the solutions that were proposed as a first step toward finding answers for current policy problems. In 1932, the Committee on Bank Reserves of the Federal Reserve System proposed that reserve requirements be placed, not only on the level of deposits, but also on the volume of debits to those deposits:²

These withdrawals, which are shown by debit entries on the books of member banks, are the only real test of the activity of a deposit account and furnish the only basis by which that activity can be equitably and effectively reflected in requirements for reserves. Under this proposal, therefore, each deposit will carry a total reserve based on its activity as well as on its amount.

Could a reserves path approach to policy be improved if reserve requirements were also placed on the daily average outflows or debits from certain accounts rather than only on balances in accounts used for transactions purposes? Debits, it can be argued, give a good indication of the volume of transactions a given account is used for whether or not it contains some savings balances as well as transactions balances. Hence, with reserve requirements on debits in addition to balances, an account of a given size used extensively for transactions would have a higher re-

¹ For example, Frank E. Morris, "Do the Monetary Aggregates Have a Future as Targets of Federal Reserve Policy?", *New England Economic Review* (March/April 1982); Anthony M. Solomon, "Financial Innovation and Monetary Policy", *Annual Report-1981* (Federal Reserve Bank of New York).

² *Annual Report* (Board of Governors of the Federal Reserve System, 1932), page 262.

serve requirement than one of the same size not used for transactions as much because it also contains savings balances. Because the volume of income-related transactions or debits should reflect the state of the economy, reserve requirements on debits would automatically give a signal about undesired strength or weakness in the economy, as the demand for reserves deviates from path. Moreover, the structure of reserve requirements on debits and balances could be so designed that financial innovations would not necessarily result in an easing in policy which could occur when reserve requirements are placed on balances only. The additional debits necessary to manage balances at lower levels would still generate reserves pressures as would the income-related debits. In some sense, it could even be said that such an approach would bridge part of the gap between those arguing that the Federal Reserve should focus on money and those arguing that the Federal Reserve should target nominal GNP directly.

Debits have been growing much more quickly than GNP or M-1 since about the mid-1960s (Chart 1).³ The more rapid growth of debits, however, should not be surprising during a period of increasing inflationary pressures. As higher inflation rates were reflected in higher nominal rates of interest, the increased emphasis on cash management not only reduced desired cash balances but also increased the volume of debits required to keep money balances at the lower desired levels. This has resulted in much more rapid growth of velocity, measured as the ratio of debits to money, than in the more conventional measure of velocity calculated as the ratio of GNP to money balances.

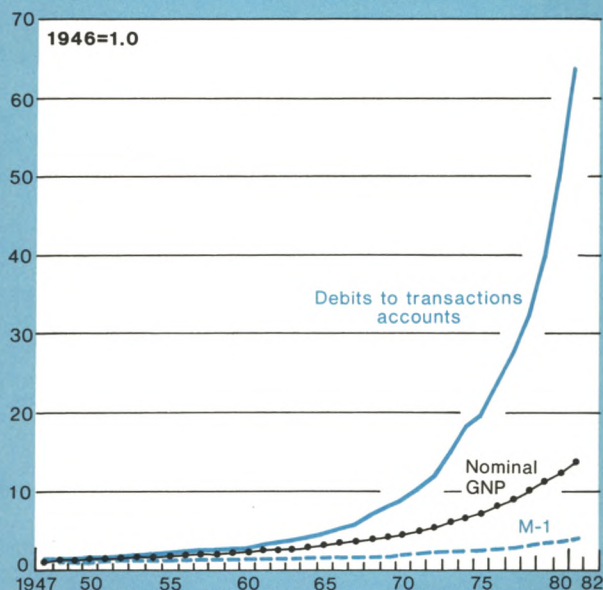
In the next section of this article, the potential use of debits in the policy process is explored in detail. Some econometric results are presented in Appendix 1, using the debit statistics to show the effects of financial innovation on the demand for money since the mid-1970s. The results suggest that:

- Prior to 1973 debits explained the transactions demand for money about as well as income.
- Since 1973, however, debits appear to be a better proxy for financial transactions undertaken to reduce money balances while still allowing the same volume of income-related transactions.

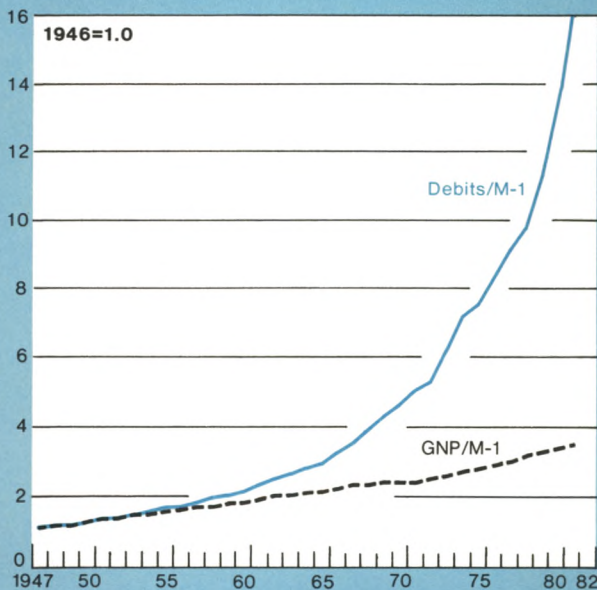
³ The debit statistics are published in the *Federal Reserve Bulletin*. The series is based on a limited sample which has been changed over the years. On a month-to-month and quarterly basis, the debits statistics are very volatile. For a detailed discussion of this series, see George Garvy, "Debits and Clearing Statistics and Their Use" (Board of Governors of the Federal Reserve System, 1958).

Chart 1

With the volume of debits to transactions accounts growing much faster than M-1 or nominal GNP . . .



. . . the velocity of M-1 measured in terms of debits has increased much more rapidly than velocity measured in terms of GNP.



Source: Board of Governors of the Federal Reserve System.

Table 1

Effects on Required Reserves of Alternative Reserve Requirements on Debits*

In dollars; figures in parentheses are percentage deviations from initial conditions.

Example	Daily average balances	Daily average debits		Levels of required reserves†			Velocity = income debits ÷ total balances
		Income related	Financial	r = 0.15 y = 0	r = 0.05 y = 0.05	r = 0.02 y = 0.065	
Initial conditions ...	200	400	0	30.00	30.00	30.00	2.0
(1)	130	400	10	19.50 (-35)	27.00 (-10)	29.25 (-2.5)	3.1
(2)	130	260	10	19.50 (-35)	20.00 (-33.33)	20.15 (-32.83)	2.0
(3)	130	120	10	19.50 (-35)	13.00 (-56.67)	11.05 (-63.17)	0.9
(4)	130	400	70	19.50 (-35)	30.00 (0.00)	33.15 (10.50)	3.1
(5)	200	200	0	30.00 (0.0)	20.00 (-33.33)	17.00 (-43.33)	1.0

* The table was constructed assuming that the \$200 in NOW account balances in the initial conditions case is equally divided into savings and transactions balances (\$100 each). In all the examples, the assumption is made that transactions balances are held in a constant proportion to income debits (4 = \$400/\$100). Savings balances are assumed not to be related to the level of income debits. The figures in parentheses represent percentage deviations in required reserves for examples (1) through (5) from the levels in the initial conditions case.

† Assuming reserve ratios (r on balances, y on debits), first, for a 15 percent reserve requirement on daily average balances only, second, for a 5 percent reserve requirement on daily average balances and debits, and, third, for a 2 percent reserve requirement on daily average balances and 6.5 percent on daily average debits.

* * * *

This part of the table is intended for readers who desire a more general understanding of the example above. It is not necessary for following the main points of the article. If money (M) has both a savings (S) and a transactions (T) component, then total income-related debits (D) are equal to debits to the savings component (DS) plus debits to the transactions component (DT).

$$(1) M = S + T$$

$$(2) D = DS + DT$$

The income turnover or velocity of transactions balances (VT) is equal to the volume of income-related debits to the transactions component (DT) divided by the level of transactions balances (T). Similarly, the income turnover of savings (VS) is calculated as income-related debits to the savings component (DS) divided by savings balances.

$$(3) VT = DT/T$$

$$(4) VS = DS/S$$

Required reserves (R) are equal to the reserve ratio on deposits (r) multiplied by the daily average level of deposits plus the reserve ratio on debits (y) multiplied by the daily average volume of debits.

$$(5) R = rM + yD$$

Equation (5) can also be written as:

$$(6) R = rS + rT + yDS + yDT$$

Solving equations (3) and (4) for DT and DS and then substituting into equation (6) yields:

$$(7) R = (r + yVT)T + (r + yVS)S$$

If VS is equal to VT, then a change of a given size in either savings or transactions balances will result in the same short-run movement in the demand for reserves. (This is also the result when there are reserve requirements on balances only.) But, since VT is considerably greater than VS, reserve requirements on debits give greater weight, in effect, to movements in the transactions component.* In the numerical example above, VT (income debits/transactions balances) was set equal to 4, and VS equal to zero by assuming there were no income debits to savings balances. VT and VS were treated as constants. But they could vary in practice. If so, the impact on the demand for reserves would depend upon the relative sizes of S and T, and whether the change in VS or VT was caused by a movement in income debits or in balances.

* Here, the focus has been on income-related debits. If the analysis is extended to include the financial debits as well, total velocity of each component (income debits plus financial debits/balances) would determine the relative weights given to the transactions and savings components.

Appendix 2 contains an analysis of placing reserve requirements on debits in the context of a simple IS-LM model. The main conclusions are:

- Reserve requirements on debits could help stabilize income from shocks originating in both the monetary and real sectors.
- At what level to set reserve requirements on debits relative to requirements on balances is an open question. It depends upon the type of shocks the economy is likely to encounter.

Potential use of debits in monetary policy

Would monetary policy be more responsive to changes in economic activity if reserve requirements were placed against debits as well as balances? In this section, this question is explored for both the corporate and consumer sectors. Suppose that an increase in the demand for transactions balances occurs because income is expanding more rapidly than expected. Businesses are assumed to manage demand deposits at minimal levels on a continuous basis. Thus, they would increase the volume of debits to their demand accounts, as sales improved and more funds than usual accumulated in their accounts and needed to be invested daily in liquid (overnight) instruments. Likewise, debits would increase as corporate payrolls and other variable business costs rose along with the more rapid growth of aggregate demand and production. Under such circumstances, the increased demand for reserves relative to the target path caused by the greater volume of debits would push interest rates higher. Conversely, as the economy slowed in response to higher rates, a smaller volume of funds would accumulate each day in corporate accounts for overnight investment, and firms would cut back on their spending for labor and other variable factors of production. This would cause the volume of debits to fall, thereby easing reserve pressures. Under the assumption used here—that firms in the future will be very effective in managing cash balances—reserve requirements against debits would automatically apply pressure to correct deviations in the demand for “money” and hence reserves from target. In contrast, under the same assumption that firms manage balances at constant minimal levels, reserves on balances only would have little automatic effect on controlling “money” held by the corporate sector.

For consumers, who would be holding both savings and transactions balances in their NOW accounts, the consequences of having reserve requirements on both debits to and balances in NOW accounts are more difficult to analyze. To illustrate how it might work, a simple example was constructed

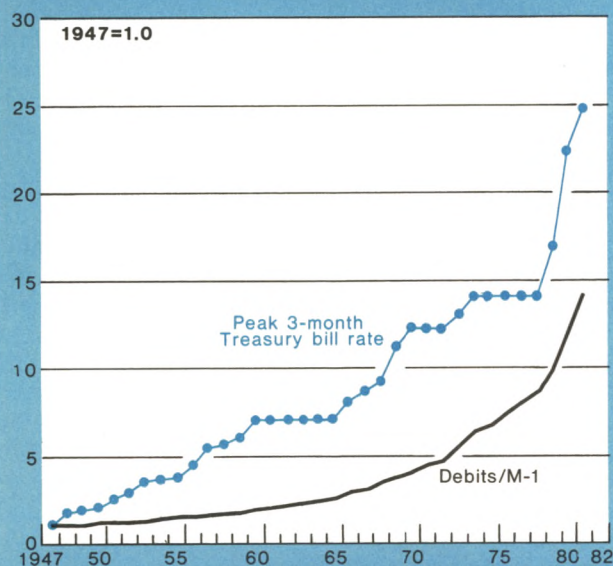
(Table 1). The numbers were chosen for the sake of ease of illustration. In the first row, the example shows three different ways a given level of required reserves (\$30) could be generated. The first column shows daily average balances, the second column daily average income-related debits, and the third column financial transactions. The numbers in the middle group of figures of the table are required reserves, first under the assumption of a 15 percent reserve requirement on daily average balances only, then under the assumption of a 5 percent reserve requirement on both daily average debits and daily average balances, and finally required reserves when there are reserve requirements of 2 percent on daily average balances and 6.5 percent on daily average debits. In each of the next three examples, it is assumed that balances in NOW accounts are reduced by \$70 from the levels in the “initial conditions” case as a result of a single substitution out of NOW accounts into some other financial instrument at the beginning of the week. Therefore, daily average financial debits for the week increase by \$10 ($\$70 \div 7$). Depending on the source of that \$70 reduction of NOW account balances (savings or transactions balances), the percentage drop in the demand for required reserves will vary in the short run according to how reserve requirements are set.

The *first example* is constructed to show what would happen to the demand for reserves in the short run when NOW account balances decline from \$200 to \$130 because of a \$70 reduction of the savings component of NOWs. Since the reduction stems from a decline in savings balances, income debits remain at the same level and velocity measured in terms of total balances rises from 2 to 3.1 (final column of table). If reserve requirements are on balances only, there is a 35 percent reduction of the demand for reserves, compared with the initial conditions. But, if there are reserve requirements on debits also, a much smaller percentage decline in the demand for required reserves would occur. The latter seems to be a more correct result when the savings or investment component, not the transactions component of NOWs, is being reduced. In other words, if the reserves levels in the initial conditions are target levels, then the interest rate reduction with reserve requirements on debits and balances would be smaller than with reserve requirements on balances only. And, since economic activity has not declined even though total NOW account balances have, the smaller reduction of rates seems more appropriate.

In the *second example*, savings and transactions balances are reduced in proportional amounts. As a result, the decline in total NOW account balances is proportional to the fall in income debits, and velocity

Chart 2

Peak Three-Month Treasury Bill Rate and Velocity of M-1 in Terms of Debits



Source: Board of Governors of the Federal Reserve System.

is stable. Thus, in this very special case, the decline in total NOW account balances is an accurate indicator of what is happening to economic activity, even though NOW accounts contain both savings and transactions balances. Under these circumstances, the decline in the demand for reserves is much the same, regardless of how reserve requirements are set.

Turning next to the *third example*, it is assumed that the \$70 reduction of NOW account balances occurs because of a reduction of the transactions component of NOW accounts. Income velocity—measured in terms of total balances—declines to about one as a result. In other words, the economy declined more sharply than total NOW account balances. As in the previous two examples, if reserve requirements are on balances only, the demand for reserves in the short run declines by 35 percent. But, when there are reserves on debits also, the percentage decline in reserves demand is considerably larger because of the greater percentage decline in income debits than in total balances. In this case, if the reserves levels in the initial conditions case are the target levels for reserves, interest rates would decline considerably more, when there are also re-

serve requirements on debits, than when reserves are on balances only. Again, this seems to be a more correct policy response.

Example four is designed to show what happens if a financial innovation is developed that enables the consumer to undertake the same volume of income-related debits with lower average transactions balances. In this example, balances are reduced 35 percent by a \$70 overnight investment at the end of each business day. It is assumed that the next day the funds are brought back into the account and can be used again for transactions purposes. Thus, rather than having a daily average volume of \$10 in financial debits as was the case in examples (1) through (3), financial debits average \$70 because withdrawals are done daily, not just once, to attain the lower average balance. In this case, reserves only on balances give completely the wrong signal, that is, the demand for reserves falls 35 percent below the assumed reserves path even though the economy has not weakened. With equal reserve requirements on debits and balances, the reserves freed by lower average balances are absorbed by the higher volume of financial debits, and there is no deviation from path as a result. When there is a higher ratio on debits than on balances, required reserves would increase. The latter would produce an unnecessary tightening in the reserves market.

In the *fifth example*, the economy is assumed to be weakening. Transactions balances decline as a result, but total balances remain unchanged because it is assumed that consumers increase precautionary savings balances. Income velocity falls because, while balances remain unchanged, income debits decline along with the drop in transactions balances. With reserves on balances only, the demand for reserves remains unchanged. If there are reserves on debits also, the demand for reserves falls, leading to an easing in the reserves market, an appropriate policy response since the economy has weakened. In the bottom panel of Table 1 is the basic model underlying the numerical examples just discussed. It is not necessary to read that part of the table to understand the rest of the article.

When the proposal was made back in 1932 to put reserves against debits as well as balances, stable growth of money did not seem to be an issue. Basically, the concern was that, even if the Federal Reserve controlled the reserves base and therefore in some sense money, income could still expand more rapidly than desired because of an increase in velocity that might not be recognized immediately. When reserve requirements are against debits as well as balances, policy would automatically tighten when velocity increases and ease when it falls. Moreover, the

higher the reserve ratio on debits is set relative to the reserve requirements on balances, the greater would be the policy response to changes in velocity. The 1932 Federal Reserve committee, in fact, proposed setting reserve requirements on balances at 5 percent and on debits at 50 percent. However, at that time the distinction between income-related debits and cash-management debits had not been made, and the above examples suggest that under certain circumstances it might be better to set the same reserve requirement ratio on both debits and balances (Appendix 2).

Is such an approach practical?

It appears at least in theory that monetary policy might be more responsive in the future to changes in economic conditions if required reserves were linked to debits against transactions accounts as well as to balances in those accounts. But the practical implementation of such an approach would still require far more research.⁴ If an increase in financial debits not related to cash management occurred, both the balances in transactions accounts (as is the case currently) and debits could increase, causing the demand for reserves to be above path. To the extent that this represented "speculation" in the stock, bond, money, or commodities markets, some tightening of monetary policy might be desirable. But to the extent the increase in financial debits represented a financial panic or crisis, during

which the public shifted from one type of financial asset to another, such a tightening in policy would not appear to be appropriate.

It is also possible that the volume of transactions debits associated with a given level of GNP could change over time, causing monetary policy to ease or tighten for reasons not related to the general level of economic activity. For example, the degree of integration of different business activities within one company influences the number of transactions routed through banks. A shift toward smaller firms would cause an increase in the volume of debits associated with a given level of GNP. Moreover, if banks explicitly charged customers according to the volume of debits against their accounts, there would be an incentive to use currency more for transactions and perhaps find other ways to avoid debiting accounts when making transactions.

In addition, the debits statistics, as currently compiled, are very volatile on a month-to-month and even on a quarterly basis. This would probably add to interest rate variability. However, it is difficult to know how much of a problem this would be in practice because the statistics are now based on a limited sample. Moreover, much of the volatility of the debits statistics might be eliminated if reserve requirements were not placed on the accounts of certain dealers and brokers of financial instruments. All in all, it appears that much more work is needed on this topic before any firm conclusions could be reached, but it does appear to be a proposal that is worthwhile reconsidering some fifty years later.

John Wenninger

⁴ For additional discussion of difficulties with such an approach: W.L. Smith, "Reserve Requirements in the American Monetary System", *Monetary Management* (Commission on Money and Credit), 1963.

Appendix 1: Debits and the Demand for Money

From the point of view of money demand, it is not clear how debits fit in. Some analysts have argued that debits are a better measure of the total transactions demand for money than GNP because debits would also allow for demand for money for non-GNP transactions and financial transactions.* However, those financial transactions (debits) undertaken to manage money balances more efficiently, *i.e.*, overnight repurchase agreements (RPs) or sweeps into money funds, would be actions that reduce money balances, as measured at the close of business, not increase the demand for money. To the extent that the growth of debits since the mid-1960s and the even more rapid growth of debits since the mid-1970s (Chart 1) represent increased emphasis on cash management, the growth of debits might serve as a reasonable proxy for the effects of financial innovation on the demand for money. Some analysts have proxied for the effects of financial innovation by using an interest rate ratchet variable, *i.e.*, a variable that rises to new peaks but never declines.† Chart 2 shows the close timing in the movements of this variable as

compared with the debits/M-1 ratio, suggesting that perhaps the volume of debits might also be a relatively good proxy for the effects of financial innovation on money demand once the levels of income and interest rates are allowed for. Reported in Table 2 are some results using a standard money demand equation.

Equations (1) and (2) are money demand equations estimated through 1982-III and 1973-IV, respectively. As has been well documented in other studies, the equation deteriorates when the sample period is extended, with the coefficient on the lagged dependent variable rising to almost one and the income elasticity declining sharply. Equations (3) and (4) show the results of using debits rather than income as the transactions variable. For the shorter sample period, debits work about as well as income—compare equations (2) and (4)—but for the longer sample period the estimated coefficient on debits becomes insignificant. In equations (5) and (6) both debits and income are used. Debits are insignificant in the shorter period—equation (6)—suggesting debits and income are both measuring transactions and competing for explanatory power prior to 1974. In the longer sample period, however, both debits and income are significant, but debits have a negative coefficient. This could be because debits are increasing relative to income as a result of financial transactions geared toward managing money balances more efficiently, and hence more aggressive cash management has changed the relationship between debits and money demand.

* For example, Charles Lieberman, "The Transactions Demand for Money and Technological Change", *Review of Economics and Statistics* (August 1977).

† Richard D. Porter, Thomas D. Simpson, and Eileen Mauskopf, "Financial Innovation and the Monetary Aggregates", *Brookings Papers on Economic Activity*, 1979.

Table 2

Regression Results

(1) $M = -0.12 + 0.02Y - 0.02R + 0.97M(-1)$ (2.3) (2.6) (4.1) (36.6)	$\bar{R}^2 = 0.96$	M = ln (M-1/GNP deflator) Y = ln (nominal GNP/GNP deflator) R = ln (three-month Treasury bill rate) D = ln (debits/GNP deflator)
(2) $M = -0.55 + 0.12Y - 0.01R + 0.71M(-1)$ (3.6) (3.4) (2.7) (6.4)	$\bar{R}^2 = 0.97$	
(3) $M = -0.002 + 0.005D - 0.01R + 0.99M(-1)$ (0.1) (1.7) (3.3) (41.0)	$\bar{R}^2 = 0.96$	
(4) $M = 0.04 + 0.05D - 0.01R + 0.70M(-1)$ (1.0) (3.2) (2.0) (6.2)	$\bar{R}^2 = 0.92$	
(5) $M = -0.63 + 0.13Y - 0.04D - 0.01R + 0.88M(-1)$ (3.7) (3.7) (3.1) (3.4) (22.1)	$\bar{R}^2 = 0.97$	
(6) $M = -0.63 + 0.13Y - 0.01D - 0.01R + 0.75M(-1)$ (2.8) (2.8) (0.6) (2.9) (6.8)	$\bar{R}^2 = 0.98$	

Regressions were run with quarterly data, adjusted for first-order autocorrelation. Each equation was run for two time periods 1959-II through 1982-III and 1959-II through 1973-IV. The shorter sample period equations are reported in the second position in each group. Statistics in parentheses beneath coefficients are t-values.

Appendix 2: Economic Consequences of Reserve Requirements on Debits

A simple IS-LM model can be used to illustrate some of the economic consequences of putting reserve requirements on debits. Table 3 shows the basic model—equations (1), (2), and (3)—as well as the resulting reduced-form equations for income with and without reserve requirements on debits, equations (4) and (5). In this simple model, it is assumed that debits can be divided into three groups: income-related debits, cash-management-related debits that result in a shift in the money demand equation, and all other debits such as purely financial or non-GNP transactions.*

Equation (4) is the reduced form for income with reserve requirements on debits and balances, and equation (5) is the reduced-form equation when reserve requirements are placed on balances only. Comparing the coefficients on autonomous expenditures (X) in equations (4) and (5), it can be seen that the numerator is the same in both cases but the denominator is larger in equation (4). Thus, when there are reserve requirements on debits, a given increase in autonomous expenditures will have a smaller impact on income than when reserve requirements are on balances only. The same holds true for shifts in the demand for money (Z). This is because, when income begins to increase in response to an exogenous shock (an increase in autonomous expenditures or a reduction of money demand), it begins to absorb reserves and, given the fixed supply of reserves, the money stock is reduced.

An increase in cash management debits (CD) at first glance would seem to reduce income because it would absorb reserves. But, since it results in a reduction of the demand for money of the same size,

there would be no effect on income as long as the reserve ratio on balances (m) is equal to the reserve ratio on debits (y). Hence, if more aggressive management of cash balances is expected to reduce the demand for money further in future years, it might be worthwhile to consider setting the same reserve requirement on balances and debits. For this particular problem, the level of the reserve requirement ratios does not matter, only whether or not they are equal.†

However, for changes in autonomous expenditures or shifts in money demand not related to a greater volume of cash management debits, a greater reserve ratio for debits than for balances would help stabilize income. For example, looking at the coefficient on X, the greater the reserve requirement on debits (y), the smaller the impact a change in autonomous expenditures will have on income. If y is set equal to m, however, the reserve ratios cancel out of both the numerator and the denominator and it does not matter what level is set.

Thus, how to set the reserve ratios remains an open question. If it is felt that the major problem will be a greater volume of cash management debits being used to lower money demand, then it would pay to set the reserve ratios at the same level. On the other hand, if the major problems are likely to be other types of shifts in the demand for money or changes in autonomous expenditures, then the reserve ratio on debits should be set higher than the one on balances. This, of course, was the position taken by the 1932 Committee on Bank Reserves. Finally, if debits other than those related to income and cash management (OD) are very large and volatile, it might be better not to place reserve requirements on debits.

* For the sake of ease of presentation, it is assumed that the volume of income-related debits is equal to the level of income. In practice, however, there would be a proportionality factor involved that would not alter the results as long as it remained constant. The nonincome-related debits are assumed to be exogenous.

† It is implicitly assumed that the cash management debits are overnight investments only. Thus, the reduction of balances on a daily average basis equals the increase in cash management debits. To the extent that the investments are longer than overnight, the reduction of balances would be greater than the increase in daily average debits.

Table 3

Comparison of Reduced-Form Equations for Income with and without Reserve Requirements on Debits

$$(1) \quad M = -ar + bY + Z$$

$$(2) \quad Y = -cr + X$$

$$(3) \quad R = mM + yY + yCD + yOD$$

$$(4) \quad Y = \frac{c}{yc + ma + bmc} R + \frac{ma}{yc + ma + bmc} X - \frac{mc}{yc + ma + bmc} Z \\ - \frac{yc}{yc + ma + bmc} CD - \frac{yc}{yc + ma + bmc} OD$$

$$(5) \quad Y = \frac{c}{ma + bmc} R + \frac{ma}{ma + bmc} X - \frac{mc}{ma + bmc} Z$$

M = narrow money stock
 r = the interest rate
 Y = income
 Z = money demand shift
 X = autonomous expenditures
 R = total reserves, determined exogenously
 CD = cash management debits
 OD = debits for other than income
 or cash management
 m = reserve ratio on deposits
 y = reserve ratio on debits
 a, b, c = structural parameters

Impact of IRAs on Saving

The Congress passed legislation in 1981 broadening the eligibility criteria governing individual retirement arrangements. IRA contributions for 1982—the first year that the new rules applied—may have reached \$24 billion, substantially more than the estimated \$4 billion placed in IRAs in 1981 under the old legislation. Such a popular program (Appendix 1) could have vast implications for financial markets, in both the short and long term, and for the total volume of saving in the economy.

Indeed, one of the aims of the new law was to increase the amount of saving in the economy. This article considers to what extent the 1981 IRA legislation is likely to satisfy this objective. While personal saving has been increasing since the change in the law, it is not possible to say whether the two are really connected. The increased availability of IRAs in 1982 may have contributed to the expansion of saving, but other factors, such as a desire to hold greater precautionary balances during the recession, may have played a role as well.

In fact, our analysis shows that the individuals who were affected most by the new legislation are those who on average have substantial accumulated wealth and who save considerable sums each year. Their contributions do not have to and may not consist of additional saving. Instead, these contributions may reflect shifts of funds from other assets that these households already hold or simply the placement of saving that would have occurred anyway.

Thus, the amount of new saving induced by the extended IRA program may be significantly smaller than the level of IRA contributions might suggest.

Impact on saving: IRA incentives

The incentives to save embodied in the IRA program consist of the tax deferral on the contribution itself and on the earnings from it. There are two advantages for delaying the taxation of income until retirement. Deferred taxes on both annual contributions and their subsequent earnings accrue interest, part of which the individual may keep. The value of these deferred taxes can be substantial. Consider a 35-year-old individual in the 50 percent tax bracket. The present value of the tax saved on maximum annual contributions over thirty years (figured at a 15 percent interest rate) is about \$12,000. The present value of the tax saving on the interest earnings of this investor is more than \$88,000 (Appendix 2). In addition, since retirement income is likely to be lower than that earned during an individual's working years, the applicable marginal tax rate in retirement might be lower. Thus, the expected rate of return from an IRA contribution should be higher than the yield from the same contribution to an identical but nontax-deferred instrument.

Households may take advantage of this higher return, however, without increasing saving. For example, individuals with sufficient non-IRA assets might shift these assets into IRAs rather than increase saving. Again, consider a 35-year-old individual in the 50 percent tax bracket with at least \$2,000 in non-IRA assets. These assets, invested at 15 percent, earn 7.5 percent per year after taxes. An investment of these funds in an IRA, however, would earn an after-tax yield of at least 14 percent (Appendix 2). Abstracting from the illiquidity of an IRA, it would be advantageous for this individual to shift \$2,000 of existing

Table 1

Eligible Individuals Contributing to Individual Retirement Arrangements (IRAs)*

In percent

Annual income (dollars)	1975	1976	1977	1978	1979	1980†
Less than 5,000	0.11	0.20	0.20	0.20	0.18	0.11
5,000-9,999	0.94	1.26	1.33	1.50	1.15	0.82
10,000-14,999	2.40	3.05	3.38	3.65	3.07	2.55
15,000-19,999	4.58	5.24	5.97	6.19	5.89	5.45
20,000-49,999	19.28	21.04	23.65	24.44	23.01	22.57
50,000 and above	33.92	41.94	45.87	49.82	51.01	48.78
‡ All income groups	2.7	3.7	4.6	5.2	5.3	5.6

* Assumes the same proportion eligible in each year where eligibility is defined as not being covered by another pension plan.

† Preliminary data.

‡ Weighted average.

Sources: Estimated by authors using data reported in Internal Revenue Service, *Statistics of Income: Individual Income Tax Returns*; Bureau of the Census, *Perspective on American Husbands and Wives* (Special Studies Series No. 77); *Report of the President's Commission on Pension Policy*.

Table 2

IRA Contributions in Perspective

Year	Eligible number of individuals (millions)	Arrangements established (millions)	Potential level of IRA contributions* (billions of dollars)	Total contributions (billions of dollars)	Tax revenue loss† (billions of dollars)
1975	52.7	1.3	54.6	1.4	‡
1976	54.2	1.9	56.1	2.0	0.6
1977	56.4	2.5	57.8	2.6	0.7
1978	58.1	2.7	62.6	3.0	0.9
1979	59.9	‡	64.9	3.2	1.0
1980	61.1	‡	66.2	3.4	1.2
1981	62.3	‡	67.5	3.8§	1.3§

* The potential amount of IRA contributions in a given year was estimated by multiplying the number of eligible workers in each income class by their respective maximum permitted annual IRA contribution.

† Tax revenue loss reflects only deductions for contributions not deferred tax on interest earnings.

‡ Not available.

§ Estimated from preliminary data.

Sources: Estimated by authors using data reported in Internal Revenue Service, *Statistics of Income: Individual Income Tax Returns*; Bureau of the Census, *Perspective on American Husbands and Wives* (Special Studies Series No. 77); *Report of the President's Commission on Pension Policy*, and Joint Committee on Taxation.

assets into an IRA. After this is done, he or she would still earn only 7.5 percent after tax on any additional saving. Consequently, for this individual there is no incentive to increase saving.¹

¹ The possibility that households shift assets in response to tax-incentive savings programs may explain to a large extent the Canadian experience with these types of programs; see Gregory V. Jump, "Tax Incentives to Promote Personal Saving: Recent Canadian Experience", *Saving and Government Policy* (Federal Reserve Bank of Boston, Conference Series No. 25, October 1982), pages 46-64.

Alternatively, since both the current and expected future incomes earned on their existing assets, now including IRAs, are higher, these investors might actually increase consumption. In other words, since their stock of wealth is accumulating faster because of the earnings from the deferred taxes, IRA investors might decrease their rate of saving.

Although such households may not increase saving to fund an IRA, reallocation of their wealth into IRAs

Table 3

Distribution of IRA Contributions among Income Groups

In millions of dollars; numbers in parentheses represent percentage shares of total for the year.

Annual income (dollars)	1975	1976	1977	1978	1979	1980
Less than 5,000	17.5 (1.2)	39.0 (2.0)	43.7 (1.8)	40.6 (1.4)	19.5 (0.6)	14.5 (0.4)
5,000-9,999	95.4 (6.6)	119.3 (6.1)	123.5 (5.1)	152.1 (5.1)	122.6 (3.8)	57.5 (1.7)
10,000-14,999	270.5 (18.8)	316.3 (16.1)	364.0 (14.9)	370.2 (12.5)	282.1 (8.8)	215.1 (6.3)
15,000-19,999	182.1 (12.7)	263.5 (13.4)	273.1 (11.1)	311.3 (10.5)	370.2 (11.5)	324.3 (9.6)
20,000-49,999	718.7 (50.0)	1,003.4 (51.0)	1,343.0 (54.9)	1,668.0 (56.2)	1,872.1 (58.1)	2,045.7 (60.5)
50,000 and above	152.2 (10.6)	227.0 (11.5)	300.5 (12.2)	427.1 (14.4)	557.0 (17.3)	726.4 (21.5)
All income groups	1,436.4 (100.0)	1,968.5 (100.0)	2,447.8 (100.0)	2,969.3 (100.0)	3,223.5 (100.0)	3,383.5 (100.0)

Source: Internal Revenue Service, *Statistics of Income: Individual Income Tax Returns*.

might raise the share of assets being held for retirement. The higher relative return on an IRA may persuade individuals to hold fewer assets for the near or medium term, e.g., a car or house, and more assets for retirement.

IRA contributions can come from sources other than existing assets and still not constitute increased saving. For instance, an IRA contribution can be financed by borrowing through a personal loan or against some other asset, although the IRA itself may not be used as collateral.² Even payroll deduction contributions do not necessarily represent new saving. Although the deposit added to an IRA is drawn from current income, participants may correspondingly reduce other saving from income or liquidate assets to finance consumption.

Another source of funds is the tax saving associated with an IRA contribution. An individual who contributes to an IRA pays less in taxes for that year. This tax saving may be used, in part, to finance an IRA. These lower taxes represent a transfer from the Federal Government to households. While the Government's saving declines (i.e., the Government's deficit rises), by the associated IRA tax loss, household aftertax income rises by the same amount. With individuals saving exactly their additional aftertax income, net saving for the

economy as a whole—the sum of private and Government saving—is unchanged.

People who do not have enough assets or cannot borrow to fund IRAs would obtain the higher yield of an IRA only by increasing saving. Whether they do so depends on the responsiveness of their saving to the expected rate of return and the illiquidity of IRAs. There have been many attempts to estimate the relationship between interest rates and personal saving. While some researchers have found that people tend to save more when the rate of return is higher, others have found just the opposite—that people tend to save less when the rate of return is higher. There has been no definite indication that any additional saving is generated by an increase in the rate of return.³

Moreover, even if individuals would tend to save more in response to a higher rate of return, they may not necessarily save more because of the availability of IRAs which are less liquid than other types of assets. An IRA could have drawbacks if it had to be cashed before retirement. Except in special cases, e.g. disability or death of the investor, the drawdown of an IRA before age 59½ is subject to a 10 percent penalty as well as to the payment of ordinary income tax on these withdrawals. Individuals might be better off in-

² Because of the tax deductibility of interest payments, individuals in high enough tax brackets may be able to make a profit by borrowing funds to place in tax-deferred IRAs.

³ William Jackson, "Saving and Rate of Return Incentives: Estimates of the Interest Elasticity of Personal Savings" (Congressional Research Services, Report No. 81-198E, 1981).

vesting in a taxable asset that carries no penalty for withdrawal rather than an IRA if they expect to need these funds before the earnings on the deferred tax exceed the IRA penalty (Appendix 2). Thus, individuals who want to retain access to their assets in the near future may decide against contributing to an IRA because of its illiquidity. For instance, people may save as a precaution against unexpected declines in income or to accumulate the wherewithal to purchase high-priced items or services. Both of these motives may require saving to be held as assets which can be converted to cash more readily than IRAs.

The combination of the illiquidity of IRAs and the possibility of funding an IRA contribution by shifting assets suggests that the liberalization of the IRA law may have only a limited impact on saving. Those individuals with sufficient assets to shift into IRAs may do so without expanding saving. People without enough assets may decide that the attractive return on an IRA is not sufficient compensation for its illiquidity. In addition, even households who participate in the IRA program eventually may choose to discontinue making contributions when the liquid share of their assets reaches a minimum level.

Interestingly, another relatively new saving-incentive program, known as the 401(k) deferred compensation plan, may encourage more new saving than the IRA program. Participants in 401(k) plans may be permitted to borrow against their funds. In addition, participants may be able to withdraw funds for several purposes before their retirement. Thus, 401(k) assets are not so illiquid as IRAs. Moreover, an individual may elect to have his or her employer defer as much as 25 percent of his or her income, up to a maximum of \$30,000, to a 401(k). For example, a person earning \$50,000 could contribute \$12,500 to a 401(k), 6.25 times the maximum IRA contribution. In general, persons with an annual income above \$8,000 can contribute more to a 401(k) than to an IRA. These people may find that they do not exhaust the attractive return of a 401(k) by shifting assets. Thus, they may decide to increase their saving as well as to reallocate assets. Because of these advantages, 401(k)s might be expected to grow strongly, perhaps surpassing IRAs, as more firms offer them to their employees.

Historical evidence

While last year's tax legislation changed retirement arrangement rules in several respects, the past record of IRAs provides some insights into their likely growth and possible savings impact.

Participation rates have been very low. In no year did participation exceed 6 percent of eligible individuals (Table 1). Part of the explanation may be that

most eligible persons earned a low income and, consequently, were in a sufficiently low tax bracket to make the IRA tax incentive relatively small. Also, the illiquidity of IRAs may have dissuaded some individuals from participating. This last reason might explain why only about half of eligible individuals with incomes greater than \$50,000 a year contributed to IRAs.

Table 4
Average Holdings of Liquid Assets by Income Group, 1977

In dollars

Income group	Maximum IRA contribution minus associated tax saving	Average holding of liquid assets
Less than 3,000	1,500	2,650
3,000-4,999	1,290	2,100
5,000-7,499	1,260	3,300
7,500-9,999	1,245	3,700
10,000-14,999	1,215	5,100
15,000-19,999	1,170	5,500
20,000-24,999	1,125	6,700
25,000 and above . . .	915	12,700

Sources: Estimated by the authors using data reported in Board of Governors of the Federal Reserve System, 1977 *Consumer Credit Survey*; Internal Revenue Service, *Statistics of Income: Individual Income Tax Returns*.

Table 5
Estimated IRA Contributions in 1982

January-October; by institution

Financial institution	Billions of dollars
Commercial banks	7.2
Mutual savings banks	1.1
Savings and loan associations	6.5
Credit unions	0.7
Mutual funds	2.6
Life insurance companies	1.5
Total	19.6

Sources: Estimated by the authors using data reported by Board of Governors of the Federal Reserve System, *Statistical Release H.6*; Federal Home Loan Bank Board; Investment Company Institute, American Life Insurance Council; Credit Union National Association.

Table 6

Impact of 1981 Legislation on Potential IRA Contributions

Before and after the enactment of the Economic Recovery Tax Act of 1981 (ERTA)

Annual income (dollars)	Number of eligible individuals millions		Potential level of IRA contributions* (billions of dollars)	
	Before ERTA	After ERTA	Before ERTA	After ERTA
Less than 7,500	24.3	28.6	10.7	12.6
7,500-14,999	12.3	17.8	14.9	21.8
15,000-22,999	13.8	23.0	21.8	48.0
23,000-29,999	6.0	13.5	9.8	28.5
30,000-74,999	6.6	26.6	10.7	56.6
75,000 and above	0.5	1.9	0.8	4.0
All income groups	63.5	111.4	68.7	171.5

* The potential amount of IRA contributions in a given year was estimated by multiplying the number of eligible workers in each income class by their respective maximum permitted annual IRA contribution.

Sources: Estimated by authors using data reported in Internal Revenue Service, *Statistics of Income: Individual Income Tax Returns*; Bureau of the Census, *Perspective on American Husbands and Wives* (Special Studies Series No. 77); *Report of the President's Commission on Pension Policy*.

Reflecting the relatively low participation in this program, the total IRA contributions in any given year were small compared with their potential level.⁴ In 1975, for instance, \$1.4 billion out of a possible \$54.6 billion was placed in 1.3 million IRAs (Table 2). In 1981, IRA contributions totaled \$3.8 billion compared with the maximum permitted of \$67.5 billion. Between 1975 and 1981, annual IRA contributions averaged 4.4 percent of their potential level.⁵

There is no hard evidence, however, on the amount of new saving that was stimulated by IRAs. Investors may simply have shifted assets. Indirect evidence suggests that this was at least a possibility for most IRA contributors. More than two thirds of all IRA contributions between 1975 and 1980 were made by individuals with over \$20,000 in annual income (Table 3). For these individuals, a maximum annual IRA contribution typically would not have represented a large share of their wealth. For instance, a \$1,500 annual IRA contribution minus the associated tax reduction

would have amounted to less than 11 percent of their average liquid assets—the assets generally easiest to shift (Table 4).⁶ In contrast, for individuals earning less than \$20,000 a year, a maximum IRA contribution net of the associated tax reduction would have been closer to 39 percent of their liquid assets.⁷

Despite the large amount of assets individuals held, they still may have increased their saving to fund IRAs. They may have wanted to retain liquidity of their existing assets for near-term purposes. Nonetheless, it can be concluded that in the past most IRA contributors were part of the income group that typically had enough assets to fund IRAs without saving more. To the extent that they held these assets solely for retirement, they most likely would have shifted them into IRAs instead of increasing saving. Analysis of recent data suggest that these conclusions may apply to IRA contributions made in 1982 as well.

Recent expansion of IRAs

Subsequent to the enactment of the Economic Recovery Tax Act of 1981 (ERTA), IRA contributions in 1982 have exceeded their level in any prior year. Based on

⁴ The potential amount of IRA contributions in a given year was estimated by multiplying the number of eligible workers in each income class by their respective maximum permitted annual IRA contribution.

⁵ The Government's tax loss associated with the annual deduction of IRA contributions was correspondingly small, never exceeding \$1.3 billion a year. The tax reduction typically represented about a third of annual IRA contributions. Besides the tax losses produced by annual IRA contributions, the Government also lost revenue because the interest earned on outstanding IRA funds was tax deferred. By 1981, annual interest on IRA accounts amounted to about \$5 billion. Applying a tax rate of one third produces an estimated revenue loss of about \$1.7 billion in that year.

⁶ These shifts could continue for many years. Saving that would occur in any case could replenish these assets as well as fund IRAs.

⁷ Besides liquid assets, many individuals have other forms of wealth. The distribution of ownership of these other assets also tends to be tilted toward upper income groups. Thus, for individuals with at least \$20,000 in annual income, a maximum IRA contribution may have required a much smaller share of assets to be shifted than our calculations with liquid assets suggest.

several surveys, we estimate that from January through October, IRA contributions at commercial banks, mutual savings banks, savings and loan associations, credit unions, mutual funds, and life insurance companies amounted to \$19.6 billion (Table 5).⁸ Continued growth at this rate over the balance of the year would result in new IRA contributions in 1982 of \$23.5 billion.⁹ Several factors, however, may cause the amount of IRA contributions for the year to be above or below this figure. On the one hand, the pace of monthly IRA contributions at commercial banks and mutual savings banks has slowed since April. Continuation of such a slowdown among all financial institutions would lead to a lower level of IRA contributions for the year. On the other hand, many firms are beginning to offer IRAs through voluntary payroll deduction plans. These may encourage people to participate. In addition, as the law permits an IRA contribution for a given tax year to be made up to April 15 of the following year, some individuals may be postponing participation to retain the liquidity of their saving until the last moment.

The rise in IRA contributions followed an increase in potential IRA contributions. Since participants of an employer-provided pension are now permitted to contribute to an IRA, the number of individuals eligible for an IRA expanded by about 75 percent, from 63.5 million people to 111.4 million people (Table 6). In addition, the increase in the maximum annual IRA contribution per worker—by about a third on average—enlarged the potential level of IRA contributions. Taking account of the greater eligibility and higher maximum annual contribution, the aggregate pool of new funds that can be placed in IRAs more than doubled, from \$68.7 billion to \$171.5 billion.

Relative to their potential level, the annualized amount of IRA contributions was larger in 1982 than it was in earlier years—about 14 percent of potential in 1982, compared with under 6 percent between 1975 and 1981. Does this mean that the IRA program this year attracted more individuals from lower middle-income groups who might actually need to save to set up an IRA?

⁸ Besides placing their IRA contributions in the special IRA accounts established by financial institutions, individuals may place their contributions in any other type of qualified investment. Data on these IRA contributions may not be included in the available surveys. However, the level of these contributions is not considered to be significant in the aggregate.

⁹ The Treasury's projection of the associated tax loss of \$2.5 billion for 1982 seems to reflect an underestimate of the growth of IRAs. Using the relationship between tax loss and IRA contributions during the 1970s—adjusted for the 1982 10 percent individual tax cut—the tax loss resulting from IRA contributions made in 1982 most likely will be between \$7 billion and \$8 billion.

The expanded eligibility affected individuals earning \$30,000 or more annually to a greater extent than others. (Most people in this group are covered by pension plans and were not eligible under prior legislation.) In the past, this income group had the highest rate of participation in the IRA program. Now the number eligible in this group is four times larger than before the new law. These individuals also own a large share of assets with which they might fund IRAs (Table 7). In contrast, among individuals who earn less than \$30,000 a year eligibility increased by only 47 percent.

While information on IRA contributions in 1982 by income group is not yet available, calculations can be made to ascertain whether increased participation rates are needed to explain the rise in IRA contributions. Alternatively, the expanded eligibility, holding participation rates constant, may provide the answer. When the 1980 participation rates for different income groups are applied to our estimate of eligible individuals in 1982, the amount of IRA contributions that results is about \$18 billion, just below the annualized 1982 level. Thus, the primary reason for the program's apparently greater appeal seems to be the fact that ERTA expanded IRA eligibility the most for the income group that in the past had the highest rate of participation. It is not known whether these individuals increased saving to fund IRAs. However, since this group contains those individuals who already own

Table 7

Average Holdings of Liquid Assets by Income Group, 1982

In dollars

Income group	Maximum IRA contribution minus associated tax saving	Average holding of liquid assets
Less than 4,500	2,000	3,900
4,500-7,499	1,760	3,100
7,500-11,249	1,730	4,800
11,250-14,999	1,710	5,400
15,000-22,499	1,680	7,400
22,500-29,999	1,630	8,000
30,000-37,499	1,580	9,800
37,500 and above . . .	1,340	18,540

Sources: Estimated by the authors using data reported in Board of Governors of the Federal Reserve System, 1977 *Consumer Credit Survey*; Internal Revenue Service, *Statistics of Income: Individual Income Tax Returns*; Commerce Department, *National Income Accounts*.

many assets, the chances that they increased saving in response to the availability of IRAs are small.

Concluding remarks

Although only a year has passed since the legislated expansion of the IRA program, some observations can be made concerning its impact on household saving. IRA contributions in 1982 may total about \$24 billion. As a percentage of potential level, these IRA contributions are about twice as large as the contributions of earlier years. Much of the improved popularity probably reflects the fact that the liberalization of eligibility

requirements affected mostly income groups with the highest participation rates in the past. Individuals in these groups on average already have accumulated assets that may be used to fund IRAs. IRA contributions that reflect only shifts of assets do not constitute increased saving. Thus, the gain in new saving may be well below the level of IRA contributions. However, shifts of assets to fund IRAs decrease tax revenue. For example, the tax loss resulting from IRA contributions in 1982 may fall between \$7 billion and \$8 billion. Consequently, the IRA program may not be the most effective policy approach to stimulate saving.

Robin C. DeMagistris and Carl J. Palash

Appendix 1: Savings Incentive Plans

The Economic Recovery Tax Act of 1981 (ERTA) significantly increased the availability of IRAs. As of January 1982, any employed person under 70½ years of age is eligible to open a tax-deferred individual retirement arrangement (IRA). The original legislation creating IRAs—the Employee Retirement Income Security Act of 1974 (ERISA)—had limited the availability of IRAs to persons not covered by any other retirement plan. In addition, the new law raised the maximum annual deductible IRA contribution to \$2,000 or 100 percent of earned income, whichever is less. ERISA had set the ceiling at \$1,500 or 15 percent of earned income. An amendment effective in 1977 raised the maximum deduction for an eligible individual with a nonworking spouse to \$1,750. ERTA increased this latter ceiling to \$2,250.

Few restrictions have been placed on the type of investments held as IRAs. Three types of IRAs were established: accounts at financial institutions, annuities offered by insurance companies, and retirement bonds issued by the Treasury.* The accounts must be administered as trusts by a financial institution or other organization approved by the Treasury. Allocation of funds among assets within these trusts can be arranged by individual investors. However, IRA monies cannot be used to purchase life insurance or collectibles.

* Retirement bonds were discontinued in April 1982.

Similar to an IRA, a Keogh or H.R.10 plan, established by law in 1962, allows a self-employed individual to deduct annually a certain amount of earned income for investment and defer the tax on it as well as on interest earnings until retirement. ERTA increased the ceiling on deductions from \$7,500 to the lesser of \$15,000 or 15 percent of yearly income through 1983. The ceiling is scheduled to be even higher thereafter.

The 401(k) or deferred compensation plan is an arrangement which is part of a firm's profit-sharing or stock bonus plan. The 401(k) was created by a change in the tax law in 1978, but only recently has the Internal Revenue Service issued guidelines governing these plans. An individual may choose to have his or her employer make payments as contributions to a trust on his or her behalf. These payments may represent up to 25 percent or \$30,000 of the participant's annual income. For many individuals this may be a larger proportion than the \$2,000 limit set for IRA contributions. Participants may borrow against 401(k) funds. They may also withdraw their funds without penalty before attaining 59½ years by meeting a need or "hardship" requirement. Further, distributions from 401(k) plans may qualify for the favorable tax treatment of ten-year averaging not afforded to IRA distributions. Thus, 401(k)s are less illiquid and, because of ten-year averaging, can provide a higher return to investors than IRAs.

Appendix 2: Improved Rate of Return from an IRA

To measure the improvement in rate of return from an IRA, two hypothetical investment choices may be compared. The first investment choice is an annual \$2,000 deposit in a fully taxable instrument earning 15 percent per year. The alternative investment is an annual deposit of \$2,000 minus the part financed by the tax deduction in a tax-deferred account also earning 15 percent annually. The maturity of both investments was set at the retirement age of the investor which was assumed to be 65 years. It was also assumed that no funds would be withdrawn prior to retirement and that the income tax faced by the investor during the working years was constant. The future value of each of these contributions was obtained.

Then, assuming a fifteen-year period of retirement, an annual income stream from an annuity based on the accumulated funds was derived. Since the IRA-type investment is taxable upon withdrawal, appropriate tax rates were applied to the retirement stream generated by IRA funds to obtain an aftertax income stream. Both a marginal tax rate based solely on income derived from the IRA and a tax rate based upon the rate paid during the working years were used.* The income stream resulting from the hypothetical annuity based on the non-IRA investment was not taxed. In fact, the interest earned on an actual annuity would be taxed, lowering the stream of retirement income. However, this bias serves only to understate the spread between the returns on the two investment options. Each retirement annuity was assumed to earn the same rate as the original investments, 15 percent per year. All compounding was annual. The rate of return on each investment was obtained using the stream of annual outlays and the retirement income stream.

The gains in return from annual IRA contributions can be substantial. For investors currently in the 50 percent tax bracket, the rate of return can be double or triple that available on a taxable investment (depending upon the holding period of the IRA) when retirement income tax is based solely on IRA funds (Table A). Interestingly, the oldest investors in this income group gain the most from IRA contributions because the retirement income stream generated by IRA funds is sufficiently small as to be tax free.

If investors faced the 50 percent tax rate both before and after retirement, the return is two-thirds higher to about double that otherwise available, again

* Assuming an inflation rate of 10 percent per year of investment and perfect indexing of current tax rates, the tax rate based only on IRA income was calculated. In most cases, the retirement tax rate was significantly lower than that faced while working.

Table A

Expected Improvement in Aftertax Rates of Return from IRA Investment*

In percent

IRA investment (years to retirement)	Retirement tax rate based only on IRA income			Retirement tax rate equals working tax rate		
	Marginal tax rate during working years (percent)					
	20	35	50	20	35	50
40	21	54	116	21	48	95
30	21	56	124	20	45	92
20	22	59	140	18	40	85
10	33	81	201	13	29	65

* Improvement expressed as a percentage increase over taxable yield.

Table B

Value of Each Type of Tax Saving when IRA is Held to Retirement*

In dollars

IRA invest- ment (years to retire- ment)	Contribution			Interest		
	Marginal tax rate during working years (percent)					
	20	35	50	20	35	50
40	3,300	7,010	12,590	25,510	77,060	199,700
30	3,220	6,740	11,810	15,330	40,220	88,820
20	2,990	6,060	10,200	7,690	17,640	33,550
10	2,260	4,350	6,860	2,380	4,780	7,900

* Present value is calculated using the aftertax rate of return based on 15 percent before-tax rate as the discount factor. Assumes contributions of \$2,000 each year.

Table C

Number of Years Non-IRA Investment Return Exceeds IRA Return

In years

Before-tax rate of return (percent)	Marginal tax rate during working years (percent)					
	25	30	35	40	45	50
5	22	20	19	18	18	18
7	16	15	14	14	13	13
9	13	12	11	11	11	11
11	11	10	10	9	9	9
13	10	9	9	8	8	8
15	9	8	8	7	7	7

Source: J. Snailer, "IRAs: A Nonretirement Investment", Federal Reserve Bank of New York memorandum dated April 26, 1982.

Appendix 2: Improved Rate of Return from an IRA (continued)

depending on the length of time the IRA investment is held. Lower income individuals obtain smaller tax advantages and consequently reap smaller but still significantly improved rates of return from investing in IRAs. Their gain ranges from about 20 to 60 percent.

The difference in rate of return between the IRA and the taxable investment is a consequence of both the deduction of the annual contribution from taxable income and from the deferral of tax on the interest earnings. Each of these tax advantages can be viewed as a stream of future payments to the investor. The present value of the annual deductions and that of the deferred tax on earnings may be compared.

On average, the value of the deferred tax on the annual contributions exceeds that of the deferred tax on interest for the first nine to fourteen years of the investment. For older individuals or those planning only a short-term IRA investment (subject to penalties), the present value of the deferred tax on the

contribution outweighs that of the deferred tax on interest. For younger investors or investors planning longer term investments in IRAs, the tax saving on interest accumulates rapidly, far surpassing that of the contribution by the retirement age (Table B). In general, the higher the return on the IRA and the higher the working tax rate, the faster the tax saving on interest overtakes the tax saving on the contributions.

For some investors, however, the higher return available from an IRA may not be sufficient to offset its illiquidity. The 10 percent excise tax for early withdrawal reduces the rate of return on an IRA to below that of a non-IRA asset if funds are withdrawn before the compounded interest on the deferred income tax exceeds the penalty. For a 15 percent rate of interest, drawdown in less than seven to nine years (depending on tax bracket) would make the IRA a less desirable investment (Table C). For lower interest rates, this time period can be longer.

Economic Effects of Enforcing Due-on-Sale Clauses

The housing industry in the United States has been in a severe slump over the past three years. High interest rates have sharply reduced both new housing starts and sales of existing homes. Although the housing industry recently has begun to show signs of recovery, existing single-family home sales are still nearly two million below the peak of almost four million reached in 1978.

Potential sellers of houses have developed several methods of "creative financing" in an attempt to make their homes more attractive to buyers. The most popular creative financing technique has been the assumption of an existing mortgage by the home buyer. This technique enables the buyer to continue to make payments on the existing mortgage of the house that is purchased. In 1981, about one million home sales—almost half of the sales of existing homes—involved assumptions of existing mortgages.¹ Many of these assumptions took place at interest rates substantially below market interest rates.

In October 1982, the Congress passed the Garn-St Germain Depository Institutions Act, which among other things will permit enforcement of due-on-sale

clauses in many mortgage contracts. These clauses allow lenders to require full payment of the remaining mortgage debt when a home is sold (box). The Congressional action was a response to actions taken by the legislatures and courts in several states which limited due-on-sale enforcement.

This article examines the impact of the Congressional action and concludes that stricter enforcement of due-on-sale clauses could lower mortgage rates and stimulate housing activity. In addition, the earnings of thrift institutions that issued low-rate mortgages may be improved substantially by the repayment of these loans. However, there are some losers, namely, homeowners who formerly could offer attractive financing via assumptions of old mortgages issued at low interest rates. The net result most likely will be a benefit to home buyers as a group, lending institutions, and the construction industry and a loss to homeowners who are no longer released from the due-on-sale clauses in their mortgages.

The value of an assumable mortgage

At times of high interest rates, assuming a low-interest mortgage is similar to obtaining a new loan at an interest rate below the market rate. A loan carrying an interest rate lower than the market rate on new loans is a valuable commodity to someone who needs a loan. That is, a home buyer would be willing to pay a premium to obtain such a loan. In 1981, three quarters of the mortgages assumed had an interest rate more than 2 percentage points below the going market rate.

The author wishes to acknowledge the assistance of David Kroop and Daniel Rossner of the Legal Department in preparing the box.

¹ National Association of Realtors, *Attitudes of Real Estate Industry* (November 1981), page 9. This figure includes homes purchased "subject to" an existing mortgage. This technique is similar to a mortgage assumption except that liability in event of default lies with the original owner rather than with the new home buyer.

The value of the assumable mortgage to a home buyer is the difference between the present discounted cost of payment streams on the old assumable mortgage and a new market-rate mortgage for the same amount. The table shows some sample calculations of the value of a below-market-rate mortgage. For example, the present discounted cost of a \$100,000, 8 percent mortgage with a ten-year maturity is \$78,140 if the current interest rate is 14 percent, whereas a mortgage

of 14 percent has a present discounted cost of \$100,000. This means that a home buyer would be willing to pay up to \$21,860 to assume a \$100,000 mortgage with an 8 percent interest rate. Ignoring tax considerations for the moment, a buyer should be indifferent between (1) paying \$121,860 for a house and assuming a \$100,000 ten-year mortgage at 8 percent and (2) paying \$100,000 for the same house and obtaining a \$100,000 ten-year mortgage at 14 percent.

Present Discounted Value of a Below-Market-Rate Mortgage

In dollars

Market rate (percent)	Original Mortgage Rate and Years Remaining to Maturity								
	8 percent original rate			10 percent original rate			12 percent original rate		
	10 years	15 years	20 years	10 years	15 years	20 years	10 years	15 years	20 years
14	78,140	71,760	67,260	85,110	80,690	77,600	92,400	90,120	88,550
16	72,430	65,070	60,120	78,890	73,170	69,360	85,650	81,720	79,140
18	67,330	59,340	54,200	73,340	66,730	62,530	79,620	74,530	71,350

Entries show the estimated present discounted value of a payment stream for a \$100,000 mortgage with an original 8, 10, or 12 percent contract rate when the market rate is 14, 16, or 18 percent.

Source: *Thorndike Encyclopedia of Banking and Financial Tables*, Revised Edition (Boston: Warren, Gorham, Lamont, Inc., 1980).

Recent Developments Affecting the Due-on-Sale Clause

Many conventional mortgages have clauses requiring immediate payment of the entire mortgage debt upon sale of the home. The enforcement of these so-called "due-on-sale" clauses was restricted or challenged by state law, including court rulings, in eighteen states.* In these states, due-on-sale clauses were generally unenforceable and mortgages could be "assumed" from the previous owners by home buyers.

On June 28, 1982, the United States Supreme Court ruled that certain due-on-sale clauses could be enforced. Specifically, Federally chartered savings and loan associations could, in accordance with a 1976 Federal Home Loan Bank Board (FHLBB) regulation, require full payment on outstanding mortgages containing a due-on-sale clause if the property were transferred or sold. On October 1, 1982, the Congress enacted the Garn-St Germain Depository Institutions Act of 1982, which among other things preempts state

laws restricting the enforcement of due-on-sale clauses. The measure was signed into law by President Reagan on October 15, 1982.

The act gives lenders the right to enforce due-on-sale clauses contained in real property loan agreements in most cases, notwithstanding state constitutional, statutory, and judicial restrictions on such enforcement. However, a state's restrictions on enforcement of due-on-sale clauses will continue to apply until October 15, 1985 to loans made by lenders during a "window period" specified as the period prior to the act's enactment when the state's restrictions were in effect. State legislatures may act prior to October 15, 1985 to regulate the terms of window-period loans made by non-Federally chartered lenders and, in so doing, can extend state restrictions on the enforcement of the loan's due-on-sale clauses to the period after October 15, 1985. Similar authority to regulate window-period loans is given to the Comptroller of the Currency with respect to national bank loans and to the National Credit Union Administration Board with respect to national credit union loans. No window period applies to loans by Federal savings and loan associations or Federal savings banks.

* The states are Arizona, Arkansas, California, Colorado, Florida, Georgia, Illinois, Iowa, Michigan, Minnesota, Mississippi, New Mexico, New York, North Dakota, Ohio, Pennsylvania, Utah, and Washington. For a state-by-state summary, see "Due-on-Sale—The National Picture", *Mortgage Banking* (October 1981), pages 24-27.

(This assumes the buyer is able to finance the \$21,860 premium at a rate of 14 percent.) The assumable mortgage adds \$21,860 to the value of that house.

Several factors reduce the value of an assumable mortgage below the present discounted value of the difference in payment streams between market-rate and low-rate assumable mortgages. First, tax considerations tend to reduce the value of an assumable mortgage. An individual not deducting interest payments from income is indifferent between two dollar-equivalent payment streams that have differing proportions of principal and interest. However, a home buyer deducting interest prefers a payment stream with a higher proportion of interest. Assumption of a low-rate mortgage involves trading off lower interest payments for higher levels of payments of principal. Thus, the value of the low-rate mortgage is less to high tax bracket buyers (itemizing deductions) than to lower tax bracket buyers.

Another factor to consider is the need to obtain funds in addition to the assumable mortgage. The remaining balance on an assumable mortgage might be substantially less than the value of the house because of repayments of principal and increases in home prices. A buyer assuming a mortgage might have to obtain a second mortgage to finance the difference between the value of the house and the remaining balance on the assumable mortgage, plus any premium paid for the assumable mortgage. A low-rate assumable mortgage combined with a second mortgage may entail a higher monthly payment stream for some period due to the shorter maturity of the assumed mortgage. This increased monthly payment stream may affect buyer qualification for a mortgage or create cash-flow problems, both of which would reduce the value of the assumed mortgage.²

Economic impact of due-on-sale enforcement

The buyers of homes that originally carried low-rate mortgages probably will be no worse off with the enforcement of due-on-sale clauses since the benefits of below-market-rate mortgages are likely to be replaced by lower housing prices.³ The losers are the

owners of houses in states that had prevented the enforcement of due-on-sale clauses, who are no longer able to capture the value of the low-interest mortgage when their houses are sold. In short, wealth is redistributed by more stringent enforcement of due-on-sale clauses. State actions restricting due-on-sale enforcement produced windfall gains to some home sellers at the expense of lending institutions. The Depository Institutions Act prevents this wealth transfer.⁴

Effects on the supply and demand for mortgage finance

The reduction of the number of mortgage assumptions is likely to have a stronger effect on the demand for mortgage funds by home buyers than on the supply of funds by lending institutions. The enforcement of the due-on-sale clause means that, when the holder of the low-rate mortgage sells the house, the existing mortgage is repaid in full. This results in a flow of funds to the lending institution. If the lending institution channels all these new funds into the mortgage market, the total supply of mortgage money is unchanged in the short run.⁵

Total demand for mortgage funds, however, is likely to be affected by more widespread enforcement of the due-on-sale clause. If a due-on-sale clause is enforced, the price of a house with a low-rate mortgage will not incorporate a premium attributable to the desirable financing. Thus, a smaller amount of financing would be required by buyers of existing homes with due-on-sale clauses. Initially, then, the total demand for mortgage funds would fall. If the supply of funds offered by lending institutions is unchanged, mortgage rates probably would be lower than they would be without the increased amount of due-on-sale enforcement.

Effects on thrift institutions

More rigorous enforcement of the due-on-sale clause should have a favorable impact on the earnings of the thrift industry. The approximately one million existing home sales in 1981 that involved assumption of a mortgage amounted to an estimated dollar volume of as-

² See "Accelerating Inflation and Nonassumable Fixed-Rate Mortgages: Effects on Consumer Choice and Welfare", Patric Hendershott and Sheng Hu, *Public Finance Quarterly* (April 1982), pages 158-84.

³ If markets are efficient, the drop in the housing price should exactly compensate the buyer for the increased present discounted value of the payment stream from the market-rate mortgage. For empirical evidence that the value of the below-market-rate mortgage is capitalized into housing prices, see Kenneth T. Rosen, "Creative Financing and House Prices: A Study of Capitalization Effects" (University of California, Berkeley, Center for Real Estate and Urban Economics), Working Paper 82-52, August 1982.

⁴ Those who gain from the Congressional action may have a lower or higher demand for housing than the wealth losers. For example, if the sellers of houses with low-rate mortgages had planned to use all their profits to buy more expensive houses and the gainers (e.g., savings and loan association stockholders) invested all their gains in Treasury bills, then housing demand would fall when due-on-sale clauses are enforced. To the extent that beneficiaries of higher lending-industry profits are identical to the home sellers, the net wealth effect is diminished.

⁵ This is a good assumption for thrift institutions, since most new lending by savings and loan associations and mutual savings banks is in the form of mortgages. This assumption may hold even for banks, if they wish to maintain a constant fraction of their asset portfolios in mortgages.

sumable mortgages of about \$20.8 billion.⁶ Since about 60 percent of the dollar volume of all mortgages made is held by thrift institutions, about \$12.4 billion of mortgages from thrift institutions was assumed in 1981. This figure includes Federal Housing Administration and Veterans Administration (FHA/VA)-insured mortgages, which do not contain due-on-sale clauses. FHA/VA mortgages constituted about 20 percent of home mortgage debt in 1981, declining from about 30 percent in 1972. Allowing that 25 percent of mortgage assumptions in 1981 involved FHA/VA mortgages gives an estimate of about \$9.3 billion in mortgages containing due-on-sale clauses which were assumed in 1981.

Data from the National Association of Realtors suggest that the average mortgage assumption made in 1981 was 4.3 percentage points below the market rate. If these assumed mortgages would have been replaced by mortgages at the then market rate, thrift revenues would have increased by 0.043 times \$9.3 billion, or about \$400 million.⁷ This amounts to about 7 percent of their losses in 1981. For 1983, the increase in thrift revenues will depend on the difference between the level of market mortgage rates and the rate on mortgages which will have due-on-sale clauses enforced as a result of the Congressional action.

Another estimate of the effect of increased due-on-sale enforcement on thrift institution earnings is available from a Federal Home Loan Bank Board study. The FHLBB has estimated that the "potential earnings [gains] two years after a nationwide [enforcement] on due-on-sale clauses run from \$1.0 billion to \$1.3 billion for all Federal and state associations".⁸ This estimate is somewhat larger than the one given above, but it is

not far different since it is based on two years' worth of assumable mortgages being replaced by market-rate mortgages. The FHLBB has projected that, without these transfers, the number of savings and loan associations encountering "net worth deficiencies" would be about 17 percent higher than if the due-on-sale clause were enforced.⁹

Effects on the housing market

The enforcement of due-on-sale clauses could have a favorable impact on the housing market. As noted earlier, due-on-sale enforcement reduces the demand for mortgage money since the value of the below-market-rate assumable mortgage no longer need be financed by the buyer. This initially lowers the mortgage rate, making it less expensive to finance a home purchase. As a consequence, demand for housing should increase. The greater demand for housing increases its price and encourages new construction.¹⁰

Summary

The Garn-St Germain Depository Institutions Act, passed by the Congress in 1982, contains a provision which will enable many lending institutions to enforce due-on-sale clauses in mortgage contracts in states that had previously prohibited such enforcement. The major impact of the stricter enforcement of due-on-sale clauses will be a redistribution of wealth from owners of homes with mortgages (which had due-on-sale clauses restricted by state actions) to the lending institutions holding these mortgages. This transfer of wealth could amount to several hundred million dollars, depending on the amount by which market interest rates exceed contract rates on outstanding mortgages. In addition, the increased enforcement of due-on-sale clauses may well lower the rate on new mortgages, thereby increasing the demand for housing and stimulating home building.

⁶ The following assumptions were made: (1) the average age of assumed mortgages was ten years and the initial maturity was twenty-seven years, (2) the initial sales price was \$32,500, of which 78 percent was financed using a mortgage with a contract rate of 7.50 percent.

⁷ The \$400 million figure is an overestimate for at least two reasons. First, many mortgages with due-on-sale clauses have been renegotiated at higher rates when the underlying property was sold. The assumed mortgage is often combined with a second mortgage at a "blended" rate between the contract rate on the original mortgage and the market rate. These types of agreements may continue after the Congressional action. Second, some mortgages which are not FHA/VA insured do not contain due-on-sale clauses.

⁸ "Final Report and Technical Papers of the Task Force on Due-On-Sale" (Federal Home Loan Bank Board, March 1982), page 2.

⁹ These increased profits allow the thrift industry to compete more readily for funds and thus might increase the supply of money available for mortgage finance. This effect would reinforce the lowering of mortgage rates described in the previous section.

¹⁰ The rise in the price of housing offsets some of the gain to new buyers from the lowered mortgage rate. Offsetting new construction is a possible reduction of the supply of existing homes. For any given market price of houses, the seller who had a low-rate formerly assumable mortgage obtains less on a home sale when a due-on-sale clause is enforced.

Howard Esaki

New York City's Property Tax Problems in an Era of Changing Price Trends

From 1979 to 1981, New York City property tax revenues barely grew though inflation and economic growth pushed property values sharply upward. What retarded the growth of these tax revenues was the state-imposed ceiling on the amount of revenues the city may raise from its property tax. Over this period the ceiling actually dropped slightly. As a result, the city lost out on some \$1.2 billion in property tax revenues it would have been able to collect if the ceiling had kept pace with property values. While some analysts might argue that this slow response of property tax revenues to an increase in property prices was a healthy restraint on expenditures, the revenue shortfall came at a particularly bad time for New York City. Not only was the city trying to balance its budget, but also it was faced with the higher costs of providing public services as a result of inflation. Under the present system, the city will continue to lose revenues during periods of inflation as increases in the ceiling lag the upturns in property prices. Thus, if responsiveness of revenues to property price increases is considered to be a desirable attribute for the tax system, changes are needed in the method for determining the property tax ceiling.

The ceiling: five-year averaging and full values

The state constitution restricts the amount of property tax revenues that New York City may raise yearly

for operating purposes.¹ This ceiling is set at 2½ percent of the full (market) value of taxable real estate in the city, averaged over the latest five years. With the amount of property taxes collected by the city at or near the maximum allowed by the ceiling, changes in its level effectively determine the city's ability to raise revenues from this tax (Chart 1). If the ceiling grows at a slower rate than property prices, the city must either delay increasing assessed values or lower the statutory tax rate.² If the ceiling rises faster than property prices, the city can capture this increase in taxing power through either higher assessments or tax rates.

The movement in the ceiling from one year to the next is critically affected by two factors: the constitutional requirement for five-year averaging and the method used to estimate full values. These factors result in a ceiling which varies widely as a fraction of the current full value and responds poorly to changes in property price trends.

¹ New York State Constitution, Article VIII, Section 10. Property tax revenues raised for debt service—approximately two fifths of the total levy—are not covered by this restriction. These debt-service revenues have stayed fairly constant lately and so have not had much impact on year-to-year changes in the total property tax levy. (It should be noted that the state constitution does place restrictions on the total amount of debt the city may have outstanding.)

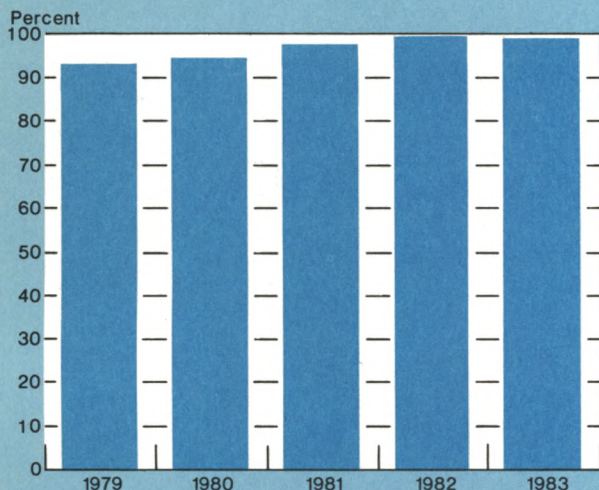
² Property tax liability is determined by multiplying the statutory tax rate by the assessed value recorded on the city's tax rolls for the particular piece of property.

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Chart 1

Property Tax Levy for Operating Purposes as a Percentage of the Ceiling

1979-83



Source: New York City Council Tax-Fixing Resolutions for fiscal years 1979, 1980, 1981, 1982, and 1983.

Averaging would not be a problem if property prices were basically trendless. In fact, under such circumstances, averaging would help smooth out short-term fluctuations. But, when prices are on an upward (downward) trend, the averaging requirement imparts a downward (upward) bias to the ceiling. The faster prices are rising over the five years spanned by the average, the lower the ceiling as a percentage of the latest full value. For example, when property prices grow at a steady 10 percent per year, the five-year average is almost one-sixth smaller than the latest full value, thus lowering the effective level of the ceiling from 2.5 percent to 2.1 percent.

Averaging also slows the response of the ceiling to changes in price trends. New full values are only gradually incorporated into the average. As a result, the average is slow to reflect the new growth rate. For example, the first year of 10 percent price inflation following a period of stable prices triggers a mere 2 percent rise in the average. Prices must grow at the same rate for five consecutive years before the average will move in step.

Estimating full values

Another source of divergence between property price movements and those of the ceiling is the method

used to derive full values for the city's taxable real estate. To estimate full values, the State Board of Equalization and Assessment (SBEA) uses market surveys—appraisals of properties sampled from the city's tax rolls. In the past, these surveys were conducted relatively infrequently. For the 1979 fiscal year, for example, the latest available survey related to July 1974. Recently, however, surveys are being conducted annually and completed within the year. But, even now, the last two full values used in the average postdate the latest survey results.³

To bridge this information gap, the SBEA extrapolates price growth based on a weighted average of previous property price changes.⁴ As a result, full value estimates for recent years are based on price changes many years out of date. For example, the fiscal year 1979 ceiling relied on growth rates dating as far back as 1968.

This lack of up-to-date information on full values and this reliance on old growth rates to project current full values produce a ceiling which behaves poorly during periods of wide swings in property price growth. The last fifteen years were just such a period for New York City. Property prices rose rapidly in both the late sixties and the late seventies but grew very slowly in the interim period (Chart 2).

A look at 1979-83

Over the fiscal years 1979 to 1981 the ceiling fell slightly while property prices rose (Chart 3).⁵ The main reason for this decline in the ceiling was the lack of up-to-date data on property prices. Only one survey was completed during this period—in time for computing the 1980 ceiling—and it covered an earlier time when property price growth was slowing, thus leading to downward revisions of the full values previously estimated. Five-year averaging created an additional downward bias, and the ceiling dropped farther and farther below 2½ percent of actual full value. The result was a loss of taxing power of almost \$1.2 billion over these three years.

The ceiling for fiscal years 1982 and 1983 rose rapidly as survey completions revealed for the first

³ The lack of information on two years' worth of full values results because (1) the ceiling must be computed in advance of the start of the fiscal year (July 1) to which it applies and (2) surveys are conducted on July 1 while the full values used in the five-year average are dated as of January 1, the midpoint of the fiscal year.

⁴ Property prices are regressed on a time trend to obtain the growth factor.

⁵ Property taxes levied for operating purposes increased over the 1979-81 fiscal years (the fiscal year for New York City ends on June 30), but only because the city was able to tap some unused taxing power (Chart 1).

time the renewed growth of property prices of a few years earlier. The five-year averaging requirement, however, substantially dampened the rise in the ceiling. Over the 1981-83 period, the ceiling as a percentage of the latest full value then being projected fell from 95 percent to 84 percent.

Outlook: growth rates of property tax revenues and property prices likely to diverge again

Property price growth in the city is apparently entering a new, more moderate phase. If property prices should stabilize, the ceiling would not stop growing immediately but would keep on increasing for several more years (Chart 3). As a result, the ceiling would rise toward the 2½ percent level and could even surpass that level by a small margin. But any “excess” taxing power would hardly begin to offset the large losses earlier in the decade.

Continued growth of the ceiling would result from both the five-year averaging and the projection system. Even with prices holding steady at their July 1981 survey level, the five-year average would rise until all the earlier years with their lower full values were eliminated. Further pushing up the average would be full value estimates based on the previous rapid price growth. In fact, with the present projection method, property taxes may eventually exceed

2½ percent of actual full values. In 1986, for example, the average would consist of the actual values for fiscal years 1982, 1983, and 1984 and projected full values for the following two years. Even if property prices were stable from now until 1986, the growth rate used to project these latter two full values would still be positive. The result would be “projected” values which exceed their actual levels.

Although the new, faster survey schedule helps reduce the erratic movements in the ceiling, it does not eliminate them. As long as the underlying trend of property prices varies over time, the continued use of the present projection system and of five-year averaging ensures that growth of property tax revenues will diverge from property prices.

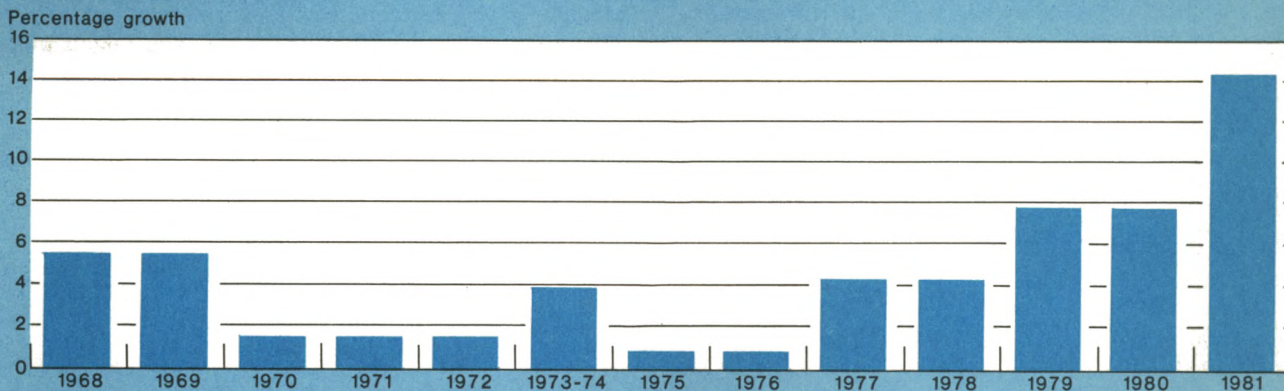
Resolving the problem

The problems caused by the present projection system could be reduced greatly through two modifications. First would be a further speedup in survey processing. Then, only the value for the upcoming fiscal year would have to be projected to set the ceiling for that year.

Second would be an improvement in the projection method. The present reliance on an average of past price movements to project into the future makes little sense during periods of changing price trends.

Chart 2

Property Price Growth Rates as Determined by the State Board of Equalization and Assessment 1968-81



Growth rates for 1968 through 1972 are for calendar years, determined from surveys conducted in January of 1968, 1970, and 1973. The growth rate for 1973-74 is the annual rate of change from January 1973 through July 1974, determined from surveys conducted in those two months. Growth rates for 1975 through 1981 are for fiscal years (July 1 to June 30), determined from surveys conducted in July of 1974, 1976, 1978, 1980, and 1981.

Source: New York State Board of Equalization and Assessment, computer printouts of Table A1 on the computation of special state equalization ratios, selected years.

A great deal of data is available on current inflation trends and levels of economic activity. Use of this more up-to-date information should reduce the likelihood of missing changes in price trends and so would help eliminate this source of divergence between movements in property prices and those of the ceiling.

Improved estimates of full values would still leave the ceiling with problems caused by five-year averaging. Unless changes are made in this requirement, the ceiling will continue to fall below 2½ percent of the current full value during periods of rising prices and fail to respond quickly to changing price trends. Such behavior is particularly troublesome during inflationary times.⁶

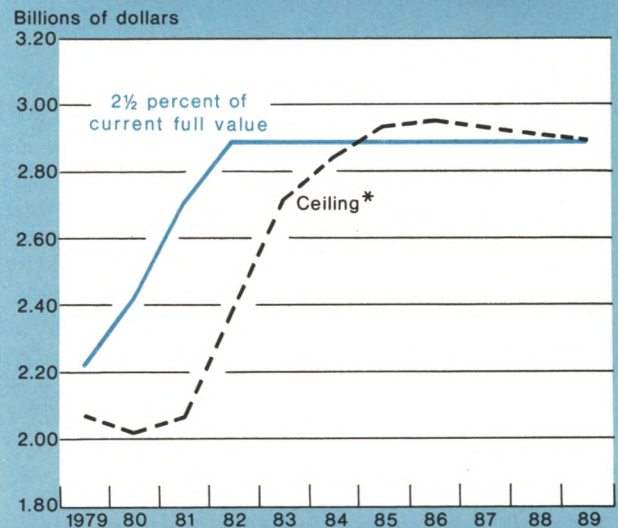
The ceiling could in fact be made more inflation neutral. One way would be to eliminate the averaging requirement, thus basing the ceiling only on the latest full value. Another way to deal with the problem would be to base the average on full values which are adjusted for subsequent changes in the overall price level. For example, if the general price level increased by 10 percent from 1981 to 1982, then the 1981 full value would be revised up by 10 percent before being used in computing the 1982 average. With this approach, therefore, year-to-year changes in the relative price of real estate would be smoothed, but general inflation would not affect the city's property taxing power. Combining either of these options with an improved method for estimating the full value for the

⁶ New York is not alone in having a property tax ceiling which can limit the growth of revenues below that of inflation. Both California and Massachusetts, for example, have adopted property tax restrictions which, not only roll back tax levies, but also establish maximum growth rates for any subsequent increases. Proposition 13 in California limits the annual increases for an individual property to 2 percent a year, unless the property is sold, and Proposition 2½ in Massachusetts sets the limit on growth at 2½ percent a year.

Chart 3

Property Tax Ceiling versus 2½ Percent of Current Full Value

Assuming property prices stabilize beginning in 1982



*Ceiling values for 1979 to 1983 are actual (from New York City Council Tax-Fixing Resolutions for fiscal years 1979 through 1983). Ceiling values for later years are simulated using current State Board of Equalization and Assessment procedures and assuming that property prices are constant in 1982 and later years.

current year would produce a ceiling which holds closely to 2½ percent of the current full value and reflects more quickly the actual changes taking place in the full value of the city's taxable real estate.

Mark A. Willis and Daniel Chall

China's Rapid Trade Growth and Impact on the World Economy

China's foreign trade tripled in just five years (1977-81) and is continuing to grow rapidly. This growth rate for the People's Republic outstripped that for all other countries except Mexico, a major new oil exporter.¹ By 1981 China's exports and imports totaled more than \$40 billion. Only six other nonindustrial economies traded more. However, aside from Saudi Arabia, all these countries had significant trade deficits, with large import purchases boosting their trade figures. China, in contrast, ran a large trade surplus. On exports alone, the People's Republic ranked fourth among developing countries (Table 1).

China's emergence as a major world trader is clearly highlighted by the current trade dispute between the People's Republic and the United States. In January America unilaterally set textile import quotas on China, now its fourth largest textile supplier, when negotiations failed to produce a bilateral quota agreement. China, in turn, banned all further imports of American cotton, soybeans, and chemical fibers. Although this ban will cause a relatively small loss to the United States (at most \$300 million), given the low level of previously anticipated sales of these goods to the People's Republic, China has warned it is considering banning the purchase of other American products. With total American sales to China about \$3 billion in 1982, exceeding Chinese sales to the United States by over a half billion dollars, further trade bans could

potentially have a significant impact on American exports. This article will not deal with the specifics of this bilateral dispute but rather with the broader patterns and implications of China's emergence as a major trading country.

China's sharp trade growth follows the radically changed economic behavior of the People's Republic since the end of Mao Zedong's rule six years ago. Since then, China has seen the succession of two leaders—Hua Guofeng after Mao and Deng Xiaoping following Hua—as it moved gradually to more pragmatic economic policies. It has formalized its international position by entering the United Nations, the International Monetary Fund (IMF), and the World Bank. It normalized relations with the United States (1979). It also has opened its borders much more widely to trade. Although China had made movements in this direction earlier (President Nixon paid his historic visit in 1972), the changes initiated in 1977 marked a distinct and dramatic shift in China's focus of attention from seeking domestic political "purification" during the tenure of Mao to pursuing rapid economic growth thereafter. China is currently reorienting its whole economy. Increased foreign trade is an important part of the transformation.

The rapid emergence of China as a major trader in international commerce raises many important issues:

- China's trade growth has been both fast and unexpected. Chinese exports and imports have grown at varying rates, however, with the People's Republic currently running a large trade surplus. Are the policies behind this growth

¹ This paragraph refers only to countries who report their trade figures to the International Monetary Fund. Chinese trade figures reported in this article are those released by Chinese trade authorities. Trade partner figures often differ due to accounting practices, category definitions, timing, and similar discrepancy causes.

Table 1

Trade of China, Compared with Selected Developing Countries in 1981

In billions of U.S. dollars

Country	Total trade	Exports	Imports	Trade balance
China	41.4	21.6	19.8	1.8
Saudi Arabia	148.6	113.3	35.3	78.0
Mexico	50.3	21.2	29.1	- 7.9
Singapore	48.6	21.0	27.6	- 6.6
Hong Kong	46.6	21.8	24.8	- 3.0
Korea	45.3	20.2	25.1	- 4.9
Brazil	42.7	19.7	23.0	- 3.3
Indonesia	35.6	22.1	13.5	8.6
Venezuela	32.4	19.6	12.8	- 6.8
United Arab Emirates	29.6	20.1	9.5	10.6
India	22.9	7.8	15.1	- 7.3
Malaysia	22.8	11.2	11.6	- 0.4
Number of developing countries exceeding China	6	3	6	
Of which: nonoil	4	1	4	

Sources: International Monetary Fund, *International Financial Statistics* and *Direction of Trade Statistics Yearbook 1982*.

Table 2

Examples of Special Trade Arrangements

Term	Description	Example
Compensation trade	A foreign firm provides machinery, equipment, technology, supervision, and at times raw materials and is paid back with finished products, usually at an agreed-upon price.	Mitsubishi Corp. with two other Japanese firms agreed to be compensated with talcum powder by two Chinese mining units.
Export processing	A foreign firm pays a fee to a Chinese enterprise to process or to assemble products for which the former supplies raw materials, semiprocessed goods, and other components.	Sanhill Co. of Hong Kong contracted for a Chinese radio factory to assemble radio receiver instruments.
Cooperative production	A foreign firm provides technical assistance to a Chinese enterprise to produce an item under license from the foreign firm. Payment is made in the form of the goods produced.	Aalborg Vaerft of Denmark agreed to coproduce ship auxiliary boilers along with a Chinese shipbuilding firm.
Joint ventures	A foreign firm provides equity capital—usually 50 percent or more—with profits distributed according to capital shares.	Gillette Co. of the United States agreed with a Chinese firm jointly to produce razor blades, plastic razors, and uncoated blades for industrial use.

Source: The National Council on U.S.-China Trade, *Chinese Business Review*, various issues.

and current surplus position the result of short-run trading decisions or do they reflect more fundamental change in the economy?

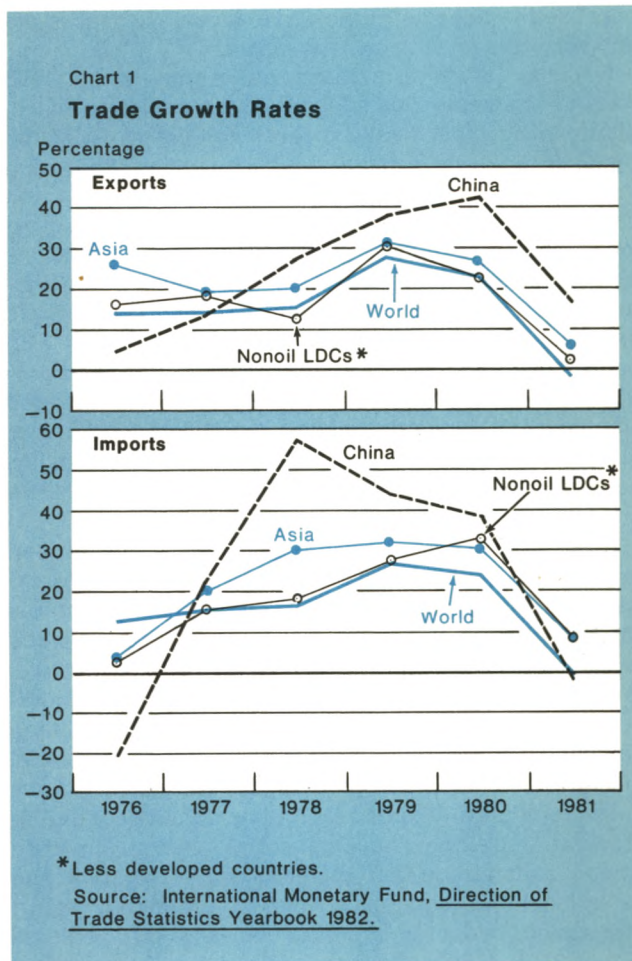
- China's trade growth has been relatively concentrated among three partners: Japan, the United States, and Hong Kong. The composition of China's trade differs among the three, however. How have these partners fared in terms of import and export growth? What are the future prospects for the three as China's trade composition shifts over time?
- The large population of the People's Republic makes it a significant world producer and consumer of certain goods. China may thus affect international markets for some of these items. To what extent has China's new presence altered conditions in individual product markets and what is likely to happen in the future?
- China has borrowed relatively little in world credit markets even though it has been able to obtain commercial loans on very favorable terms. Rather, the People's Republic has relied primarily on the concessional funds available from official lenders. This could have significant implications for other poor-country borrowers as China assumes a large international presence and position at concessional lending institutions. Where does China stand in both world official and private credit markets?
- Where does China stand in general? How does the experience of the People's Republic compare with those of other countries who have experienced export surges? How will China's trade growth affect its development prospects?

The following sections will offer some answers to these questions.

China's trade accomplishment

China's exports and imports each grew in value by an average of about 30 percent a year during 1977-81. This was double the average annual growth of trade for industrialized economies and 50 percent greater than the average for nonoil-developing countries (Chart 1). China, consequently, moved from being the twentieth largest nonindustrial country trader in 1976 to being the seventh largest in 1981.

China's exports and imports did not expand uniformly during this period, however. Exports grew relatively strongly throughout the five-year period. Even



during the world recession year of 1981, they were up 20 percent notwithstanding a 1½ percent decline in total world trade. Only in 1982 did their growth slow significantly to about ½ percent. Imports, in contrast, grew extremely fast only until the end of 1980. Then in 1981 imports fell slightly below their 1980 level. In 1982 they again declined, this time by about 2 percent. As a result, China moved from substantial trade deficit (\$2.7 billion in 1980) to substantial surplus (\$1.8 billion in 1981).

The evolution of China's trade reflects the country's pragmatic economic policies since 1976. One early aspect of this policy approach was the recognition that imports are essential to China's rapid modernization because they embody important technology. However, in 1980 China's leaders made a reassessment of general economic progress to date. They appear to have decided that the large trade deficits running from 1978 through 1980 should not be continued in 1981 or 1982

because the benefits of the large import purchases did not justify the finance costs involved.

China's general pragmatic philosophy since 1976 has led to some broad changes in the economy which, although not specifically meant for this purpose, did result in spurring foreign trade and, later, improving the trade balance. A major change was emphasizing decentralization of economic institutions, giving provinces and other government agencies more autonomy. As a consequence, these units have become more attuned to market prices and profits and more trade oriented. Since 1980, increasing emphasis has also been placed on agriculture and consumer goods production. There has been, correspondingly, a decreased emphasis on industrial goods production and major capital investment projects which have a higher import content. This switch contributed to a fall in China's import bill.

Specific measures dealing with trade have been taken as well. Special economic zones catering to export markets have been established. Legal structures related to trade have been put in place. These include regulations dealing with foreign banking and finance, joint ventures and the taxes they must pay, oil exploration and development, and labor issues (hiring, firing, compensation) in the special economic zones. Material incentives, such as tax advantages, are given to firms manufacturing for export. China has eagerly sought innovative trade and financing arrangements, including compensation trade (a foreign firm provides capital and expertise in exchange for finished products), export processing, cooperative production, and joint ventures (Table 2). The People's Republic has even encouraged the establishment of wholly owned foreign enterprises on its soil, provided they manufacture for export. On the import side, China has dramatically cut purchases since 1980, using its centralized planning system. Almost all foreign exchange must be turned over to the Bank of China. A central government decision is made on how to disburse this money. The central government also sets tariffs and quantitative restrictions to manage the demand for foreign goods. More directly, it purchases the large import items, such as plant and equipment. Starting in 1981, the government also cut import growth by postponing or canceling large industrial projects that entailed heavy foreign imports.

China's trade partners

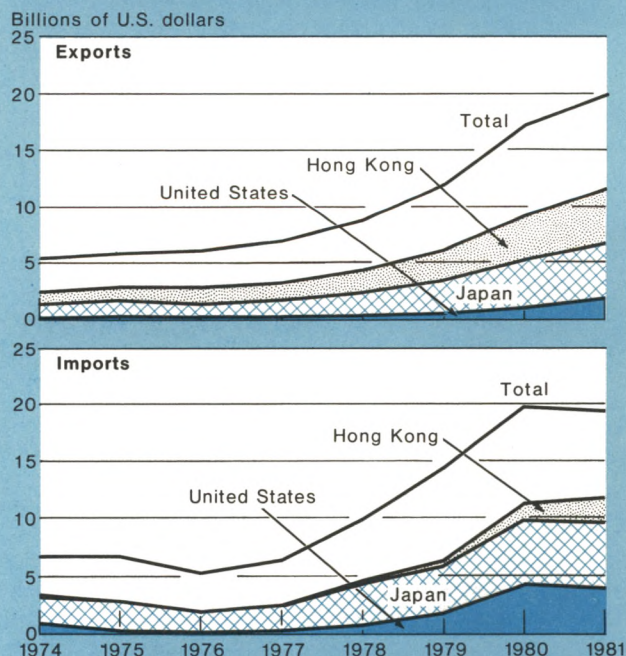
The most rapid expansion in China's trade has been with Japan, the United States, and the developing countries. Most of the developing country trade, however, is channeled through the entrepôt of Hong Kong. Japan, the United States (particularly after official relations were normalized in 1979), and Hong Kong

accounted for most of China's trade growth since 1977, and they are continuing to grow in importance. By 1981, China sold over half its exports and purchased over 60 percent of its imports from these three trading partners. Export and import values and balances, however, differ among the three (Charts 2 and 3).

Japan is the largest exporter to the People's Republic and the second largest market for China's goods. Imports from Japan are primarily machinery and equipment. The People's Republic sells most of its exportable fuels (crude oil and coal) to Japan in return. Sino-Japanese trade was near balance in 1981 but turned more in China's favor in 1982 as its exports continued to expand while its imports shrank.

The United States is the second largest exporter to China and the third largest buyer of its products. Sino-American trade has doubled since full-fledged diplomatic relations were established in 1979. The com-

Chart 2
China's Trade Partners *



*Excluding trade with socialist countries, averaging about \$2 billion during 1978-81.

Sources: International Monetary Fund, Direction of Trade Statistics Yearbook 1982 and International Financial Statistics.

position of Sino-American trade differs from that of Sino-Japanese trade. The United States supplies mainly agricultural products, rather than machinery. Wheat, corn, and other grains made up about 40 percent of the \$4 billion worth of goods China bought from the United States in 1981. On the other side, textiles and other light manufactures dominate China's exports to the United States. (Japan and the United States import about the same total amount of Chinese textiles, but the United States does not make the large fuel purchases that Japan does.) In 1981 the United States had a substantial trade surplus—about \$2 billion—with the People's Republic. This surplus fell to about a half billion dollars in 1982.

The third largest supplier of goods to China is Hong Kong. Chinese imports from there include both products made locally—about one quarter of the total—and goods reexported to the People's Republic via Hong Kong from producers in other countries. In return for these exports, Hong Kong provides the largest market for China's goods. But 40 percent of sales to Hong Kong is reexported from there to other countries, particularly to developing economies. The larger part of this trade is in manufactured goods. In 1981, China had a large trade surplus of over \$3 billion with Hong Kong. The surplus in 1982 will probably be even greater.

The remaining 40 percent of China's exports are split about evenly between other industrialized and other developing economies. Textile sales predominate with the first group and simple manufactured goods sales with the second. On the import side, China buys about one quarter of its foreign goods, primarily machinery and fertilizer, from industrial countries other than Japan and the United States. About 15 percent of Chinese imports, mainly food and raw materials, come from developing countries other than through trade with Hong Kong. In 1981 the People's Republic had a \$1½ billion deficit with these other industrialized economies and a \$2 billion surplus with these other developing economies.

China's trade pattern—surplus with developing countries, moderate deficit with industrialized countries—leaves the People's Republic in a strong medium-term position. It is in surplus in the developing country market, which has had the fastest growth rate in world trade and will likely continue to grow fastest in the next decade despite the prospect for some near-term weakness. Other economies with income levels as low as China's, in contrast, typically sell very little to one another. On the other side, China benefits from the fact that it has oil and coal it can sell to industrialized countries, enabling it to hold down its deficit with those economies (Chart 3). More development can be expected in these fuel exports.

The evolving structure of China's trade

As China's total trade expanded and the People's Republic consciously moved from trade deficit in 1980 to trade surplus in 1981, the structure of both its exports and imports has changed (Chart 4). The most striking development on the export side is the rise in oil and coal sales. These energy exports now account for a quarter of total Chinese exports, up from about 10 percent in 1977. Currently, growth of both oil and coal production has leveled off. The volume of these exports is not expected to change much until offshore oil fields start producing at the end of the decade. This should slow the rapid growth of Japanese imports from the People's Republic, since Japan is the major purchaser of these fuels.

Chinese manufacturing exports have also done well in the past five years. They now account for over half of total exports, up from 45 percent in 1977. China is currently emphasizing light manufactures production, which requires less investment funds per factory and quickly generates foreign exchange earnings. Textiles and other light manufactures (such as rubber shoes, carpets, porcelain, paper) account for about two thirds of manufactured exports. But these products are expected to decline in importance, as exports of simple machinery and electrical equipment (e.g., electrical components, fans, sewing machines) increase in coming years. Sales to developing countries, the primary buyers of these latter products, should increase accordingly.

The most striking change on the import side is the sharp drop in machinery and construction goods purchases since 1980. This is primarily due to the cancellation or postponement of a number of large industrial projects. Imports of capital and construction materials fell 20 percent in 1981. In the first half of 1982, they fell even more sharply. Concomitant with this decline was an increased share in total imports of consumer products and inputs for agriculture and light industry. These goods now account for 60 percent of total foreign purchases, up from 42 percent in 1979.

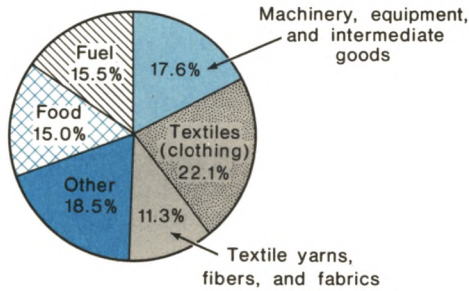
China is likely, however, to reverse this import composition pattern somewhat in the next few years. The People's Republic has acquired a high level of international reserves (about \$10 billion) and may start increasing imports rather than continue running large trade surpluses. Materials for the canceled or postponed industrial projects will probably be given first priority when purchases pick up. Negotiations have already resumed for some of these items.

The considerable manipulability of China's trade structure contrasts with many other developing countries. Large natural resource endowments and com-

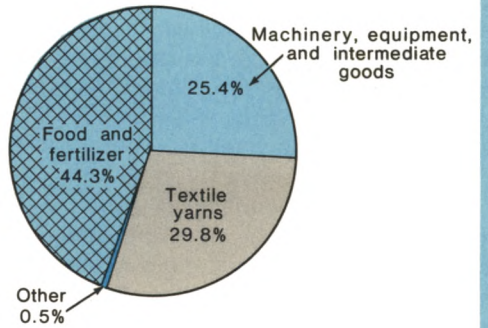
Chart 3

China's Trade Pattern in 1981

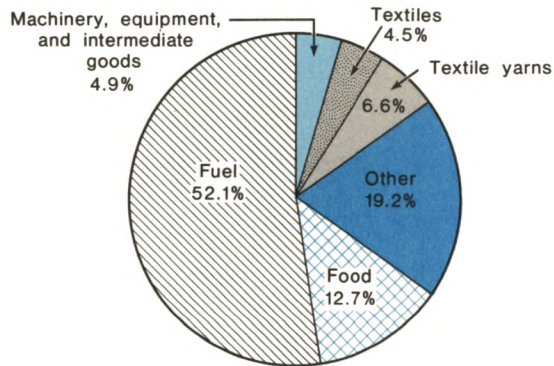
China's exports to the United States



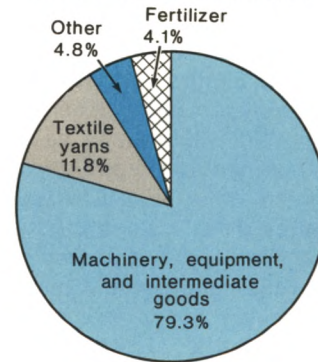
China's imports from the United States



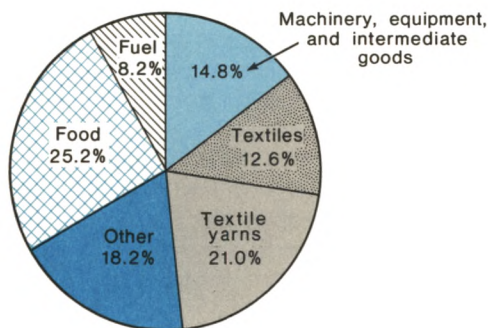
China's exports to Japan



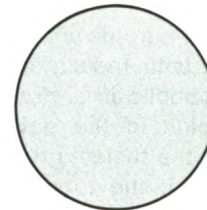
China's imports from Japan



China's exports to Hong Kong



China's imports from Hong Kong
Breakdown not available



Sources: United States Department of Commerce; Business America; and China Trade Report.

petitive prices (discussed in the concluding section) have helped the People's Republic expand and diversify its export market. Significant domestic production of most essential goods—food, oil, raw materials—has kept China's essential import needs relatively low. There was considerable room, consequently, to compress the total import bill in 1981, when China decided it no longer wanted to run trade deficits.

China's relative size and impact on major goods markets

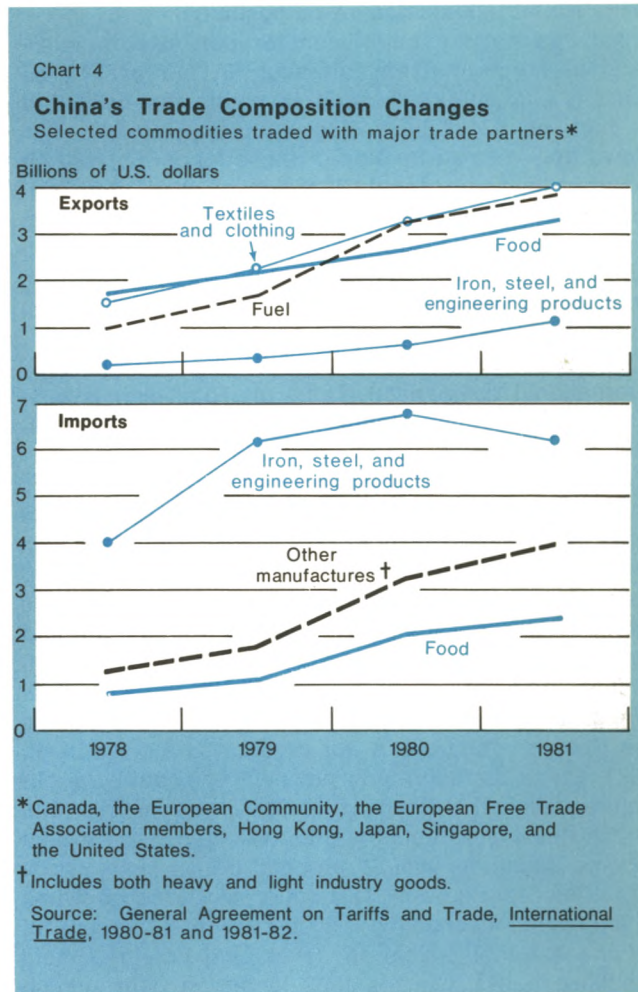
Increased trade growth has meant increased market size for China in a number of areas. For some traded goods, there is potential for China to affect world prices or to cut significantly into other producers' market shares or to become a major world consumer. As total trade continues to grow, this may become an even more important factor in the future. Trade now equals about 15 percent of China's approximately \$250 billion gross domestic product (GDP). China's exports and imports are, therefore, substantial. However, China's GDP per capita is a low \$250. As the People's Republic grows, exports and imports will likely grow as well.

Textiles are the most prominent case of China's increased market size. The People's Republic has already faced quota restrictions on some particular textile exports to both the European Community and the United States. As noted in the introduction, China is currently involved in a trade dispute with the United States over the issue. In general, because the United States and Europe follow policies of providing a certain level of overall protection to their domestic textile producers, increased Chinese textile exports have had some crowding-out effects for other sellers.

Although China's petroleum sales are a significant part of its total exports, they were well below 1 percent of world oil trade in 1981 and are unlikely to change much during the decade. China, consequently, has too small sales to have major impact on the world oil market.

But China could potentially affect world market conditions for a number of strategic minerals. The People's Republic has major deposits of tungsten, tin, antimony, zinc, vanadium, titanium, lepidolite, gold, copper, lead, molybdenum, bauxite, mercury, nickel, and iron. Deposits of the first seven metals are thought to be the largest in the world. China's iron deposits rank third in the world, and its gold output ranks fourth. The People's Republic helped depress the world price of vanadium in 1981 with its expanded sales.

China also has had a significant impact on world agricultural trade. In 1981-82 China was one of the three



largest wheat importers in the world, accounting for 13 percent of total world wheat imports. China accounted for 13 percent of total world raw cotton imports and about 10 percent of world rubber imports at that time. It has also been the largest importer of chemical fertilizers in recent years. On the other side, Chinese rice exports amounted to 5 percent of the world's total rice trade in 1981-82.

China is expanding exports rapidly in certain chemicals, certain pharmaceuticals, and shipbuilding. Some trade analysts in these fields argue that the People's Republic may have a significant effect on world trade for these goods. For imports, China is unlikely, however, to have significant market influence through its purchases of goods other than agricultural products in the near future. Its import demands are for fairly diverse items. For none of them is China likely to account for a significant proportion of world trade.

China's international borrowing position

China has not yet been a major borrower in international credit markets, although in the past three years it has attracted credit commitments estimated as high as \$30 billion. The People's Republic has drawn only a small fraction of these funds. For 1981 it reported lining up about \$9 billion in official and private long-term foreign credits but drew only \$2 billion of this. Japanese sources provided approximately one third of the 1981 capital inflow, the IMF one quarter, Hong Kong sources about one fifth, and American sources perhaps one tenth.

Chinese external debt outstanding is very small by international comparison (Table 3). Total debt is estimated at \$8 billion. Long-term debt of about \$6½ billion equaled only 2 percent of China's 1982 gross domestic product (GDP) and 25 percent of its goods and services exports. This contrasts sharply with most other developing countries. For these countries as a group, debt averaged 25 percent of GDP and over 100 percent of exports. For the lowest income countries (comparable to China), the figures are 25 percent and over 200 percent, respectively. In terms of net debt, China's holdings for foreign exchange exceeded its foreign obligations by about \$2 billion in 1982, making the People's Republic a net creditor to the world. In 1981, China had long-term net debt of about \$1½ billion, equaling ½ percent of its GDP, whereas this ratio for all developing countries, as well as for the lowest income countries, was 20 percent. Banks in industrial countries reported only \$1.3 billion in claims on China in mid-1982, accounting for less than 1 percent of all the external claims on developing countries held by these banks. China's 1982 long-term debt service payments amounted to about \$2 billion. This equaled only 7 percent of Chinese exports. In contrast, the overall developing country ratio of long-term debt service payments to export receipts was over 20 percent. For lowest income countries the figure was nearly 15 percent.

China's low overall borrowing level reflects its strongly expressed sensitivity to high interest rates as well as to high debt burdens. China has been able to obtain about \$2 billion, around one third of its long-term borrowing, on concessional terms, through international agency loans, intergovernment loans, and suppliers credits arranged with foreign export-credit agencies. Japan has been the primary source of such low-cost funds.

Although a substantial amount of China's long-term borrowing is already on concessional terms, the People's Republic could borrow a great deal more from official sources. This it may do in the next few years. Trade partners have been willing to offer conces-

Table 3

International Bank Claims on China and Selected Developing Countries*

In billions of U.S. dollars, December 1981

Country	Liabilities to banks	Net position with banks†
China	2.3	3.3
India	1.4	1.5
Indonesia	7.2	0.3
Malaysia	4.4	- 1.2
Brazil	52.7	-47.5
Korea	19.9	-16.3
‡ Hong Kong	31.3	- 2.7
‡ Singapore	36.6	0.1
Mexico	56.9	-44.6

* Banks in industrialized countries.

† Country assets held by the banks minus country liabilities owed to the banks.

‡ Offshore banking centers.

Source: Bank for International Settlements.

sional export financing and other subsidized credits, partly to sell their goods. China could borrow more. From its largest bilateral aid source—Japan—the People's Republic has drawn less than 5 percent of the concessional loan money offered. The low actual drawings in part reflect postponements and cancellations of large plant and equipment imports from Japan. This may change if China decides to cut its current large trade balance surplus.

International institutions are only beginning to include China in their fund disbursements following its formal admission to these organizations. From the World Bank's soft loan window—the International Development Association (IDA)—China has borrowed \$459 million to date. (This contrasts with India, the country most comparable to China, which in recent years has been drawing about \$1.5 billion annually from the IDA.) The People's Republic was admitted by the institution only in 1980, after most of the currently available funds had been committed. China will likely obtain increased concessional money from the World Bank after settlement of the IDA replenishment now being negotiated. In the future, large Chinese borrowing from concessional lenders could have a significant impact on the availability and international distribution of concessional loan funds to other borrowers.

Long-term commercial bank borrowing accounts for only about one third of China's total debt. To avoid high interest charges, China has repaid in advance large amounts of commercial bank debt, especially in 1981. The People's Republic was able to do this because of its strong current account position. In turn, China's low borrowing level has buttressed its current account position as interest payment outflows have been kept low.

China's low level of commercial borrowing helps make it very attractive to banks. By the end of 1981, banks in industrial countries reported \$5 billion in binding commitments to China, a figure greater than for any other developing country and more than twice the value of current outstanding claims on the People's Republic. China received interest rate spreads as low as $\frac{1}{8}$ to $\frac{1}{2}$ percent over LIBOR (the London interbank offer rate) on 1981 loans. This compares with an average spread of 1 percent for developing countries as a group that year. China continues to receive favorable terms even as spreads for most developing countries are widening.

China's trade growth and its development strategy from an international perspective

Several economies have achieved high income growth rates from export-led growth strategies, notably economies in Asia. Export-led growth may be defined as a conscious policy effort to promote exports and to attain rapid GDP growth. Fast GDP growth should result from the benefits gained by trade. Increased employment for the production of export goods is one benefit. Another is the rearrangement of produc-

tion to concentrate on goods that can be produced efficiently—*i.e.*, those goods a country has a comparative advantage in producing—while trading to obtain other desired commodities. Trade also allows a country to manufacture goods in sufficiently large volume to benefit from the cost savings of large-scale production. Finally, an economy gains vitality from production subject to international competition.

Factors within specific economies determine the degree to which those economies gain from each of these benefits. For example, larger economies may have less to gain from the potential economies of scale benefit. Due to different country situations, then, the boost to GDP growth obtainable from fast export growth varies greatly.

China may try to pursue a pattern of rapid export growth followed by rapid GDP growth, as have other countries. A clue as to whether it will follow this pattern may be found in comparing China's recent trade expansion with similar spurts in six other developing economies that experienced comparable periods of growth and in analyzing the degree to which China will be able to benefit from this expansion (Table 4).

China's export performance is impressive, even by comparison with the export spurts in other countries, particularly since it occurred during a time of slow world trade. The international environment was much more favorable during the trade spurts of the other economies. China may or may not continue with rapid export growth. If export growth continues, the question arises whether China can successfully convert to sustained rapid income growth. The question does not have a clear-cut answer. However, certain characteristics of

Table 4

Trade and Domestic Economic Growth of China, Compared with Other Developing Countries with Export Surges

Country	Years	Average export volume growth rate (percent)	Average export value growth rate (U.S. \$)	Average real GDP growth rate (percent)
China	1978-80	22.3	34.2	7.5
Brazil	1968-70	10.6	18.4	10.3
India	1974-76	10.5	23.4	6.6
Israel	1959-61	19.4	26.9	10.1
Japan	1954-56	25.2	29.8	7.3
Korea	1964-66	36.1	42.2	9.2
Malaysia	1976-78	25.1	12.7	8.7

Source: International Monetary Fund, *International Financial Statistics*.

the Chinese economy may affect the degree to which it will benefit from trade.

China's size distinguishes it from other export-led growth economies. Large size will probably dampen the benefits China can expect to achieve from an export-led growth strategy. Three reasons may be cited. The first is that China may not be able to sell internationally the goods that it has a comparative advantage in producing without adversely affecting the market for these goods. If China produced for export the same amount of textile fabrics and garments, for example, per member of its labor force as did the other Asian economies when they successfully pursued export-led growth, it could easily swamp world markets. The resulting sharp price declines and/or increased trade restrictions would significantly cut into China's trade benefits. A second consideration is that China has the potential to reap the benefit of large-scale production with manufacturing for domestic use. It, therefore, should gain less of this benefit from international trade than have smaller economies with smaller domestic markets. A final factor is that China could potentially have gained significant comparative advantage benefits through its own internal trade. This would contrast with the situation of smaller countries before they opened their international trade doors. China, therefore, may have less to gain from this benefit often provided by expanded international trade.

China's type of economic regime also distinguishes it from other export-led growth economies which are typically capitalist. The distinction will be less pronounced the more flexible China makes its price system and the more adeptly it handles its managerial and incentive issues. However, the more there is such a distinction, the more likely it is that the People's Republic will find less benefit in the export-led growth strategy. This may be seen from the problems experienced by other centrally planned economies in Eastern Europe and the Soviet Union. Four problems have typically arisen:

- With domestic prices determined apart from market forces, trade patterns may depart from what comparative advantage analysis would recommend. This would cut potential international trade gains.
- With nonmarket determined prices, investment decisions may cause subsequent trade patterns to be even further away from the comparative advantage criterion, again cutting potential trade gains.
- Problems of quality control often have been

encountered. These are generally attributed to strict adherence to production plan levels rather than product marketability. These problems dampen world demand for the products and, hence, trade growth.

- Problems of significant consumer goods rationing also have occurred because prices are relied on to a very limited extent as a means to allocate goods. This may cut the incentive to produce in order to buy since increased income need not yield increased consumption. This lack of incentive may be an obstacle to greater trade growth.

These constraints may explain why the unweighted average ratio of hard currency exports to GDP is relatively low, at about 10 percent, for the Eastern European and Soviet economies. The ratio for the Soviet Union is about 2 percent. China's ratio is estimated to be 8 percent.

China's trade strategy

What does China's recent trade performance suggest about its trade plan relative to other countries? China may be following a straightforward pattern of exporting the goods it can produce cheaply in exchange for the goods that would be expensive or prohibitive to make. On the other hand, there may be reasons why China's trade may reflect more than this simple type of comparative advantage analysis.

China has been selling its exports, generally labor-intensive products, at very competitive prices relative to other countries' exports of the same goods. In return, the People's Republic has been purchasing technological products (plant and equipment) more advanced than those which it produces domestically (as well as food staples). China's pricing strategy is clearly indicative of a desire to gain market share. However, it also indicates that the People's Republic is willing to accept a less favorable relative price ratio between its Chinese labor (embodied in Chinese exports) and imported technology than most other developing countries accept. China's lower price ratio may simply reflect standard analysis of China's comparative advantage in trade. The People's Republic may have a cost advantage resulting from its abundant, fairly well-educated labor force. It may also reflect a well-developed organization of production units and an established goods distribution network. Perhaps due to these factors China can produce more goods for the same amount of effort than can other countries and, thus, is able to charge less for each item produced.

However, the very competitive price ratio the Peo-

pie's Republic is setting between its own labor and imported technology may also be attributable to certain aspects of technology purchases and centrally planned economic regimes. One aspect is that benefits of technology generally become widely diffused throughout an economy, rather than captured entirely by the initial purchaser. For example, imported technology can be copied by others once a prototype is supplied. Licensing and other controls can reduce this problem, not completely eliminate it. Only an authority responsible for the total economy will, consequently, gain all the benefits of purchased technology. This, of course, is exactly what a centrally planned economic regime is. Such a regime or authority will be most likely to pay a price that reflects the total value of the benefits received from the imported technology. This contrasts with firms in a private market economy who are likely to pay only in accordance with the benefits they privately obtain from the technology purchase. A centrally planned economy may be willing to supply more labor effort than a free market per unit of foreign exchange earned to increase its foreign exchange revenue and foreign technology purchases.²

There is another reason why a centrally planned economy might act this way. Innovation may be slower for this type of regime than for a free market economy. This may be because individual inventors are unable to capitalize privately on their innovations in a noncapitalist economy. Imported technology may

² This is another way of saying a centrally planned economy may be willing to sell its labor-intensive exports at a cheaper price than a capitalist economy would. Implicit in this is the assumption that the price elasticity of excess demand in the rest of the world for these goods is greater than one. This assumption is generally valid for labor-intensive manufactures.

as a result be more important there than it is for a free market economy.

To what extent each argument—standard cost advantages or placing a distinctly high premium on technology imports—explains China's competitive prices and export success cannot be determined. China, of course, is not alone among developing countries in relying on other than free market mechanisms. However, most other developing economies do not take such direct responsibility for total investment or such a direct role in pricing exports (through central setting of input prices and the exchange rate). They are, thus, less likely to place such a premium on imported technology relative to the product of their labor.

What lies ahead?

China's future pricing strategy as well as its future trade performance could change significantly. The current strategy and trade surge occurred after a dramatic change in political outlook by the People's Republic. Such sudden wide changes could occur again and alter China's present trade orientation. Given current policies, however, it is likely that China's trade will continue to grow although at a declining rate. Exports will rise because of the recent growth of foreign investment (which is primarily aimed at exports) and the large number of compensation trade and cooperative production projects that are yet to be paid off. But, as the absolute size of China's export base increases and market size limitations become more pressing, the growth rate should slow. Imports by the People's Republic will rise with exports because China's demand for foreign technology and basic foodstuffs is likely to continue. However, conservative policy should limit growth of imports to China in line with that of exports to avoid large current account deficits.

Susan A. Hickok and Rosanna Arguelles

Treasury and Federal Reserve Foreign Exchange Operations

By the end of the August-October period under review the dollar had risen to record highs or to levels not seen in many years against several major currencies, strengthening even as U.S. interest rates dropped sharply and as interest differentials favoring dollar-denominated assets narrowed appreciably. Favorable prospects for the U.S. economy relative to other industrial countries, apprehension about the international banking system, and concern about economic and political conditions abroad resulted in an increased global preference for dollar-denominated assets which pushed dollar exchange rates sharply higher.

Concern over international credit exposures and developing financial strains in various markets around the world were sustaining factors behind the dollar's rise throughout the period. During August, market attention focused on Germany where a large multinational company was being forced into receivership and on Mexico where a foreign exchange crisis was unfolding. During September, concern over the international financial situation mounted as developments in Mexico, particularly in light of the unexpected move to nationalize domestic banks, raised doubts in the market about the ability and willingness of the government and other public-sector institutions in that country to meet their external obligations. Meanwhile, the list of countries experiencing payments arrears expanded, and there were well-publicized problems of various commercial

banks here and abroad. In this environment, traders did worry about the relatively large exposures of U.S. banks to Mexico and other Latin American countries, and developing pressures on the U.S. banking system were reflected, to an extent, in a widening of yield spreads between U.S. Government obligations and private credit instruments. But, with so much of the total international credit exposures made up of dollar-denominated claims, dollar-based institutions were thought to be in a better position than others to deal with emerging liquidity strains. Moreover, individual institutions sought to augment their liquidity positions, especially in dollars, against potential funding and cash-flow problems and in advance of important statement dates.

Meanwhile, prospects for economic recovery remained gloomy, and concerns intensified that many of the industrialized countries would tend to rely more on protectionist measures to deal with high and rising levels of unemployment and slack business investment at home and would welcome improvements in international competitiveness in increasingly restricted export markets. These concerns tended to coalesce in Europe when several Scandinavian countries devalued their currencies, at times by more than private and official observers thought necessary to regain competitive equilibrium. Market speculation developed that several European governments would seek to adjust their currencies downward, involving a realignment of the European Monetary System (EMS) joint float. Within that arrangement speculative selling pressures—largely against the French and Belgian francs, the Italian lira, and the Danish krone—intensified around mid-October. But they tended to moderate late in the

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Table 1

Drawings and Repayments by Foreign Central Banks and the Bank for International Settlements under Regular Reciprocal Currency Arrangements

In millions of dollars; drawings (+) or repayments (-)

	Out-standing July 31, 1982	August 1 through October 31, 1982	Out-standing October 31, 1982
Bank drawing on Federal Reserve System			
Bank of Mexico	700.0	{ +700.0 -700.0	700.0

Data are on value-date basis.

Table 2

Drawings and Repayments by the Bank of Mexico under Special Reciprocal Currency Arrangements

In millions of dollars; drawings (+) or repayments (-)

	Out-standing July 31, 1982	August 1 through October 31, 1982	Out-standing October 31, 1982
Drawings on			
United States Treasury special temporary facility for \$1,000 million	-0-	{ +825.0 -825.0	-0-
Drawings on special combined credit facility:			
Federal Reserve special facility for \$325 million	-0-	{ +236.3 -43.8	192.5
United States Treasury special facility for \$600 million	-0-	{ +438.8 -81.3	357.5

Data are on value-date basis.

Table 3

Drawings and Repayments by the Bank of Brazil under Special Reciprocal Currency Arrangement with the United States Treasury

In millions of dollars; drawings (+) or repayments (-)

	Out-standing July 31, 1982	August 1 through October 31, 1982	Out-standing October 31, 1982
Drawing on			
United States Treasury special facility for \$500 million	-0-	+350.0	350.0

Data are on value-date basis.

period after official actions were taken by several countries to raise domestic interest rates, to adopt domestic austerity measures, and/or to increase international borrowings. The monetary authorities of the EMS member states intervened heavily as sellers of dollars and, to a lesser extent, of currencies trading at the top of the joint float arrangement. Nonetheless, the EMS currencies as a group declined substantially against the dollar.

In addition, there were other international developments which reinforced the demand for dollars. These included uncertainties over the future political sovereignty of Hong Kong, which reportedly generated flows of capital to North America, and aggravated hostilities in the Middle East, which kept alive fears of a disruption of the flow of internationally traded oil. Certain currencies that had previously offered clear alternatives to investment in dollar-denominated assets also came under sometimes unfavorable exchange market scrutiny, as participants focused on unresolved political divisions over economic, social, and foreign policies in a number of countries. In Germany, Chancellor Schmidt's coalition government collapsed over disputes about economic policy. At first, the prospect of a new government generated expectations that the policy stalemate would be broken. But soon the market concluded that the new coalition government might face serious difficulties in winning a majority at upcoming federal elections next spring and that, in the interim, it had less room to reorient policies than had first been hoped. Also, in Japan, Prime Minister Suzuki unexpectedly announced that he would not seek reelection, and uncertainty over his successor clouded the outlook for the course of Japanese economic policy.

To some extent, developments in the U.S. current account also continued to support the dollar, largely because weaker than expected economic activity tended to limit the deterioration in U.S. trade performance associated with the eroding price competitiveness of U.S. exports. Thus, although many forecasters projected a modest current account deficit in the third quarter of 1982, few participants anticipated a major shift from equilibrium in the U.S. current account until the domestic economy moved decidedly out of recession. At the same time, Germany's current account had slipped from surplus to near balance, and some analysts, perceiving structural weaknesses in the German economy, predicted only limited further improvement in Germany's balance of payments in the absence of a recovery in world demand and output. At the same time, earlier optimistic forecasts of Japan's current account surplus were scaled back further.

For these various reasons, the United States was

viewed relatively favorably on economic and political grounds, and market participants bid up the value of the dollar. On occasion, however, the impact of these concerns on the dollar was offset, as market participants focused on actual and expected declines in U.S. interest rates. In late August, for example, a shift in the outlook for U.S. interest rates occurred. Whereas at midyear Federal Reserve authorities had indicated that they would tolerate monetary expansion at somewhat higher than the targeted annual rate in view of exceptional economic uncertainty and strong liquidity demands, market participants were skeptical that declines in interest rates would be sustainable so long as they expected an early recovery in economic activity. By late summer, however, evidence suggested a deepening of the U.S. recession, a weakening in short-term business credit demands, and a slowing in money supply growth that brought the narrow monetary aggregate—M-1—within the 2½-5½ percent annual growth range. By end-August, therefore, short-term U.S. market rates had dropped some 5 percentage points from end-June peak levels, the Federal Reserve had reduced its discount rate in four steps from 12 to 10 percent, and market participants gained confidence that these declines would stick. In addition, with inflation abating and with the Congress passing a tax increase, bond yields dropped as much as 2 percentage points amid an unusually strong debt-market rally, accompanied by record price increases in the stock market. Abroad, interest rates did not recede by nearly as much, although production and output declines continued and unemployment advanced further with a deepening of the recession in major foreign economies. As a result, interest differentials favorable to the dollar narrowed dramatically, for instance, on three-month Eurodeposits from 7½ to 3¼ percentage points *vis-à-vis* the German mark and from 9½ to 4 percentage points against the Japanese yen, and the dollar moved lower in the exchange markets.

Early in October the dollar's strengthening trend was again temporarily interrupted. Following the Federal Open Market Committee meeting early that month, it was announced that less emphasis would be placed in the immediate future on M-1 as an operating target of monetary policy and that somewhat more rapid growth of the broader aggregates would also be tolerated in an environment of extreme economic and financial uncertainty. As explained by Chairman Volcker, financial innovation and institutional change—such as the large volume of all savers certificates about to mature and the new money market deposit accounts to be introduced late in 1982—coupled with the still appreciable strengthening in the desire for liquidity served to distort M-1 as a reliable policy

Table 4

**United States Treasury Securities
Foreign Currency Denominated**

In millions of dollars equivalent;
issues (+) or redemptions (—)

	Amount of commit- ments July 31, 1982	August 1 through October 31, 1982	Amount of commit- ments October 31, 1982
Issues			
Public series			
Germany	2,610.6	—671.2	1,939.4
Switzerland	458.5	-0-	458.5
Total	3,069.1	—671.2	2,397.9

Data are on a value-date basis.

Table 5

**Net Profits (+) or Losses (—) on
United States Treasury and Federal Reserve
Current Foreign Exchange Operations**

In millions of dollars

Period	Federal Reserve	United States Treasury	
		Exchange Stabilization Fund	General account
August 1 through October 31, 1982	-0-	—0.6	+30.6
Valuation profits and losses on outstanding assets and liabilities as of October 31, 1982	—777.9	—1,472.9	+619.3

Data are on a value-date basis.

guide. Also, the rigid pursuit of targets in view of these developments would have had the practical effect of a more restrictive policy than intended when the targets were initially set out. Shortly following these statements deemphasizing the role of M-1, the Federal Reserve cut the discount rate another ½ percentage point to 9½ percent. In the market, these actions were widely interpreted as a shift toward greater monetary accommodation by the U.S. authorities and generated expectations that declines in U.S. money market and official interest rates, which had stalled during September, would again resume. Once again the dollar came on offer in the exchange market.

But, as in August, the dollar's decline proved temporary and market psychology toward the dollar re-

mained positive. Few market participants regarded the shift in operating procedure as an abandonment of the fight against inflation. Moreover, substantial progress had already been achieved in moving toward greater price stability in this country, with wage, salary, and price increases slowing markedly and unit-labor costs even more dramatically. In response, interest rates in longer term markets dropped another 1 percentage point in October alone. Yet, compared with other countries, the decline in U.S. nominal interest rates still lagged behind the reduction of inflationary pressures, so that real U.S. interest rates remained high, both absolutely and relative to other countries. Furthermore, foreign monetary authorities were expected to take fuller advantage of what by this time appeared to be sustainable declines in U.S. interest rates to ease credit conditions in their economies. These expectations were confirmed when official and market interest rates in major European countries declined considerably in the last weeks of October. Under these circumstances, financial markets were impressed with anecdotal evidence suggesting that foreign investors sought to benefit from the continuing potential for price appreciation in U.S. domestic capital markets by investing in longer term dollar-denominated securities. While foreign purchases of these securities were apparently financed largely out of existing dollar-denominated assets, talk of foreign investment activity nonetheless had a positive psychological effect on the dollar and may have been associated with renewed bidding for dollars in the exchange market.

By end-October the dollar reached record highs against several of the Continental currencies, levels not seen in nearly six years against the pound sterling and the Japanese yen, and a 14½-month high against the German mark. On balance, for the three-month period under review the dollar rose 8¼ percent against the Japanese yen, 6 percent against the Swiss franc, 5 percent against the German mark, and 4 percent against the pound sterling. With respect to the Canadian dollar, however, the dollar declined about 2 percent. On a trade-weighted basis the dollar rose 4¾ percent.

The U.S. authorities intervened on four trading days during the period when the dollar was bid up sharply to higher levels in unsettled markets. The Federal Reserve and U.S. Treasury intervened early in August and again early in October to purchase \$45.0 million equivalent of German marks and \$57.0 million equivalent of Japanese yen. The German mark purchases were split evenly between the Federal Reserve and the Treasury. Of the total Japanese yen acquired, \$38.5 million equivalent was for the Federal Reserve and \$18.5 million equivalent was for the U.S. Treasury.

In the August-October period, various short-term financing arrangements were concluded in support of Mexico's efforts to strengthen its economic and financial position. At the beginning of the period, the Bank of Mexico had outstanding a one-day \$700 million drawing on its swap line under the Federal Reserve's reciprocal currency arrangements used to finance a short-run liquidity need which was repaid on August 1. Then, with the Mexican authorities proceeding with the implementation of a previously announced stabilization program, the Bank of Mexico again drew \$700 million under its reciprocal swap line with the Federal Reserve on August 4, this time for a period of three months. The Mexican authorities also arranged a temporary new \$1 billion swap facility with the U.S. Treasury over the August 14-15 weekend, drew \$825 million, and then on August 24 repaid the entire drawing using an advance payment for oil from the U.S. Department of Energy. Meanwhile, negotiations among Mexico, the U.S. Treasury, Federal Reserve, and major foreign central banks resulted in a multi-lateral package to provide bridge financing to an International Monetary Fund (IMF) standby credit. The credit facility totaling \$1.85 billion comprised \$325 million with the Federal Reserve, \$600 million with the U.S. Treasury, and \$925 million with the Bank for International Settlements. During the period under review the Bank of Mexico drew for three months \$105 million and \$195 million on the Federal Reserve and U.S. Treasury swaps, respectively, as part of the first \$600 million it took down on the combined facility. The Mexican authorities also made one overnight drawing of \$250 million on the combined facility which was repaid. The drawing comprised \$43.8 million on the Federal Reserve, \$81.2 million on the U.S. Treasury, and \$125 million on the Bank for International Settlements. Subsequently, the Bank of Mexico also drew for three months \$87.5 million on the Federal Reserve and \$162.5 million on the U.S. Treasury, leaving \$1 billion still available on the entire combined credit facility as of October 31.

In other developments the U.S. Treasury provided \$1.23 billion of short-term financing to Brazil by arrangements which were under discussion since October. This additional short-term liquidity was made available in conjunction with economic policies adopted by Brazil at the October meeting of its National Monetary Council. The financing was provided under three swap facilities. One drawing on the first \$500 million facility was made on October 28 for \$350 million. Other facilities made available in November, when combined with the above-mentioned \$500 million, totaled \$1.23 billion and were announced by President Reagan during his visit to Brazil in the first week of December. The swap arrangements represent

bridging loans to Brazil's drawings under the Compensatory Financing Facility of the IMF as well as on its reserve position with the IMF.

On September 1 the U.S. Treasury redeemed further German mark-denominated securities equivalent to \$671.2 million. After this redemption, the Treasury had outstanding \$2,397.9 million equivalent of foreign currency notes, public series, which had been issued in the German and Swiss markets with the cooperation of the respective authorities in connection with the dollar-support program of November 1978. Of the notes outstanding as of October 31, 1982, a total of \$1,939.4 million equivalent was denominated in German marks and \$458.5 million equivalent was denominated in Swiss francs.

In the three-month period from August through October, the Federal Reserve had no profits or losses on its foreign currency transactions. The Exchange Stabilization Fund (ESF) lost \$0.6 million in connection with sales of foreign currency to the Treasury general account which the Treasury used to finance interest and principal payments on foreign currency-denominated securities. The Treasury general account gained \$30.6 million on the redemption of German mark-denominated securities. As of October 31, 1982, valuation losses on outstanding balances were \$777.9 million for the Federal Reserve and \$1,472.9 million for the ESF. The Treasury general account had valuation gains of \$619.3 million related to outstanding issues of securities denominated in foreign currencies.

U.S. MONETARY POLICY AND FINANCIAL MARKETS

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