Using a Credit Aggregate Target to Implement Monetary Policy in the Financial Environment of the Future

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One of the greatest problems central bankers face is that the financial environment in which they decide on and execute monetary policy is continually changing. Although central banks operate almost exclusively in the financial markets, the basic reason for having a monetary policy in the first place is to protect, or even improve, the nonfinancial economy's ability to deliver economic wellbeing to its nation's citizens. Hence there is always a gulf between what a central bank actually does and the results it seeks to achieve, and without at least some conceptual notion of the bridge spanning that gulf there is no basis for doing anything at all. When the financial environment changes, the bridge connecting the central bank's actions to the nonfinancial economy changes too. The challenge confronting central bankers is then to avoid "fighting the last war" — that is, to see that the conceptual framework by which they make monetary policy does not reflect the old reality while distorting the new one.

In the United States the Federal Reserve System has significantly altered its monetary policy framework several times since World War II, as both the financial environment and other policy considerations have changed. First, the immediate post-war policy of pegging bond prices gave way to that of targeting the net free reserve position of the banking system. Then that policy gave way to setting short-term interest rates, which in turn gave. way to targeting the growth of selected monetary aggregates (first via an interest rate procedure and most recently via a bank reserves procedure). In each case the evolving financial environment was an important factor dictating change in the conceptual framework of policy.

The challenge confronting the Federal Reserve today in this context is to design an appropriate monetary policy framework for the 1980s.

Just as the emergence of rapid and volatile price inflation severely hampered the usefulness of the interest rate framework that it used in the 1960s, changes in financial practices and institutions have already eroded the advantages of the monetary targets framework it has used since the 1970s. Moreover, these financial market changes appear not just unlikely to reverse themselves but, indeed, likely to proceed substantially further. Disillusionment with the monetary targets strategy is already widespread and will probably become more so.

The purpose of this paper is to advocate, as an alternative way to implement monetary policy in the 1980s, a two-target framework focused not only on the money stock but also on the quantity of credit outstanding. No one knows with certainty what the financial environment of the future will be, of course, but a combined money-and-credit framework for monetary policy would have at least two features that are desirable in light of the current direction and momentum of evolution in the U.S. financial markets. First, and most importantly, recent changes in the financial environment suggest that relying exclusively on any one set of signals is unwise. Because it would focus explicitly on the liability as well as the asset side of the economy's balance sheet, a two-target money-and-credit framework would broaden the information base underlying the systematic response of monetary policy to unfolding economic developments. Second, recent changes also suggest that narrow financial aggregates are especially subject to problems of definition associated with financial innovation. Because the available empirical evidence indicates that the appropriate credit measure to use as a monetary policy target is total net credit (that is, the outstanding indebtedness of all U.S. nonfinancial borrowers), the broadness of the credit aggregate would complement the Federal Reserve's apparent preference for the narrow M1 monetary aggregate.

Section **I** examines the need for a new monetary policy framework by reviewing the recent experience under the monetary targets approach in the particular context of changes in the financial environment. Section **II** outlines some of the basic notions underlying the use of intermediate targets for monetary policy, and identifies four important criteria for choosing suitable targets. Section **III** summarizes the evidence indicating that, on each of these four criteria, total net credit represents a potentially useful monetary policy target. Section **IV** describes the two-target money-and-credit proposal. Section **V** concludes by summarizing the paper's principal conclusions.

I. The Need for a New Monetary Policy Framework

A useful place to begin in thinking about how to implement U.S. monetary policy in the 1980s is to ask how the Federal Reserve System amved at the framework within which it implements monetary policy today. From the specific perspective of the financial environment, the key development that led the Federal Reserve to abandon the setting of short-term interest rates, its basic approach to monetary policy as of the late 1960s, was the emergence in the U.S. economy of rapid and volatile price inflation.' Once the new inflationary environment took hold in the financial markets, the problems inherent in basing monetary policy on nominal interest rates became apparent.'

Although there are a number of reasons why nominal interest rates per se do affect many kinds of activity in the U.S. economy (for example the effect of deposit, interest ceilings), most of the logic that suggests a connection between interest rates and nonfinancial economic activity more appropriately refers to real interest rates — that is, the nominal interest rates observed in the market, adjusted for borrowers' and lenders' expectations about inflation. In an era of high and volatile inflation rates, performing this adjustment appeared to be just too difficult. Moreover, the interaction between inflation and the tax code complicates the matter still further, since borrowers can deduct from taxable income the part of their nominal interest payments which serve to compensate lenders for the erosion in value of their outstanding principal, while at the same time most lenders pay tax on this premium.

As the awareness of inflation and its effects became more widespread, therefore, interest rates became less useful as a focus for monetary policy. By contrast, a monetary policy based on the growth of the money stock — an idea that some economists had proposed for a long time — appeared to be unaffected by this new development.[2] The Federal Reserve adopted the monetary targets framework in the early

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1. To be sure, the emergence of inflation was not an independent event; a different course of monetary policy would have led to a different experience with inflation. In this sense the reason for the demise of the interest rate approach to monetary policy was the conduct of monetary policy under that approach.

2. Friedman [14], for example, argued for a monetary policy focused on the money stock, along just these lines, very early on in the development of the inflation.

1970s, and the M's have occupied center stage in the design and implementation of U.S. monetary policy ever since.'

Changes in the financial environment, of course, were hardly the only reason underlying the adoption of the monetary targets framework. The increasing focus on price inflation itself as a major economic policy problem, together with the belief that the rate of money growth placed an effective ceiling on the economy's inflation rate, was an important factor in this development. So too was the belief among many economists that the supply side of the U.S. economy was essentially stable, and that economic fluctuations were due mostly to instability in aggregate demand which a more stable money growth rate could help avoid.[4] Finally, a matter of importance at least to economists was the belief that behavior in the economy's financial markets, including especially decisions by households and businesses about how much money to hold, was more dependably stable than were important aspects of behavior in the economy's product and factor markets.[5]

Now further changes in the financial environment have led to widespread disillusionment with the monetary targets framework. In response to changes in economic conditions, changes in competitive pressures, changes in available technologies (especially for communications and data processing), and changes in government regulations, financial market participants have introduced a wave of new financial instruments and new ways of using old ones. The immediate implication of these innovations — including NOW accounts, sweep accounts, money market mutual funds, money market certificates, repurchase agreements, and so on — is that measuring "money" has become anything but straightforward. Acting in response to these developments, the Federal Reserve Board in 1980 undertook a major redefinition of the major monetary aggregates, in effect abolishing the

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3. It is difficult to be precise about when the Federal Reserve began focusing on monetary targets in an important way. Congress did not ask the Federal Reserve to announce its monetary targets in advance until 1975, but the Federal Open Market Committee started including a monetary growth target in its monetary policy directives in 1970. For evidence on the importance of monetary aggregate targets in Federal Reserve policymaking during these years, see De Rosa and Stem [5m, Diggins [6], Feige and McGee [7], and Lombra and Moran [25].

4. The work of Friedman and Schwartz [17] had contributed importantly to this view. See also, for example, Brunner [1] and Mayer [25].

5. Poole [27] first formalized this distinction in the context of the choice of a monetary policy framework, although it was implicit in the earlier work of Friedman and Meiselman [16].

traditional M1 and M2 measures that an entire generation of economists had studied.[6] Further, less sweeping redefinitions of the new M's have subsequently occurred on an irregular basis.

These same changes in the financial environment have also called into question some of the other key presumptions underlying the adoption of the monetary targets framework. The money demand function, once a standard example of an easily estimated relationship to use as an exercise in elementary econometrics course, all but collapsed in its conventional form in the mid 1970s.[7] Subsequent empirical work emphasizing the effects of financial innovations on the demand for money has discovered new relationships that fit the historical data better, but there is little ground for confidence in the face of potential further changes.[8] Similarly, the relationship between the inflation rate and the growth rate of any particular monetary aggregate is now more difficult to pin down. Meanwhile, oil shocks and agricultural price shocks during this same period have powerfully illustrated the importance of instability on the economy's supply side as a cause of economic fluctuations.

For all of these reasons, today's disillusionment with the monetary targets framework now underlying U.S. monetary policy is not simply a matter of unhappiness over the economy's recent performance. After all, any specific adverse economic experience could be due to either poor policy decisions or poor execution, or even bad luck, rather than an inadequate framework. The desire for change today is instead more fundamental, and therefore more persuasive. The well understood propositions that would favor the exclusive reliance on monetary aggregate targets, if they were true, just do not match today's financial environment.

Moreover, the financial environment of the future appears unlikely to revert to its earlier — from the perspective of the monetary targets framework, more hospitable — state. The problem is not just that the innovations of the past ten years are unlikely to be reversed. Freezing financial institutions and practices at today's point of evolution would probably be adequate to provide, after some time, a sufficient basis for whatever confidence in the monetary targets framework

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6. See the articles in the *Federal Reserve Bulletin* in January 1979 and February 1980.

7. See, for example, Goldfeld [19].

8. See, for example, Leiberman [24], Garcia and Pak [18], Porter et al. [28] and Simpson and Porter [30].

was appropriate before. The problem, instead, is that change is endemic to financial markets, and the innovations introduced to date are unlikely to be the end of the process.

While the financial innovations of the future are no easier to predict than any other aspect of collective economic behavior, consideration of the innovations of the last decade does suggest two lessons for the design of a framework for implementing monetary policy in the 1980s. First, the effect of financial innovations on the economic relationships that matter for monetary policy is often quite localized. Specific instruments become either more or less attractive, and specific aggregates consequently gain or lose importance without major consequences for many other aggregates. The chief implication of this lesson is that diversification, in the sense of relying on disparate sources of signals, is likely to be superior to exclusive reliance on any one source. Second, the evidence for substitution within financial portfolios is substantially stronger than any evidence found to date on financial-nonfinancial substitutions. Hence a sharp movement of portfolios into some new (or newly am-active) instrument is very likely to be associated with a movement out of something else. The chief implication of this lesson is that broader aggregates, which internalize many such shifts, are likely to be superior to narrow ones.

Within these broad guidelines, the choice of a monetary policy framework for the 1980s is a more open issue today than has been true for quite a few years. As people have continued to examine closely the course of monetary policy and its impact on economic events, they have increasingly begun to question not just the specific stance of monetary policy at any time but also the underlying framework that defines monetary policy at the basic decision-making level. Some students of the subject have advocated a focus on new targets, some have advocated retention of the old ones, and some have advocated abolition of any explicit targets whatsoever. The range of choice is unusually broad, and the issue is of paramount importance.

II. Using and Choosing Monetary Policy Targets

Central banks have often found it useful to formulate and implement monetary policy by focusing on some intermediate target or targets. Under an intermediate target strategy, the central bank specifies some

financial variable(s) — in the United States today, the major monetary aggregates — to stand as proxy for the real economic targets at which monetary policy ultimately aims, such as economic growth, price stability, employment, and international balance. The result is, in effect, a two-step procedure. The central bank first determines what growth of the intermediate target is most likely to correspond to the desired ultimate economic outcome. It then sets some operating instrument over which it can exert close control — in the United States either a short-term interest rate or, since October 1979, the quantity of reserves — so as to achieve that growth rate for the intermediate target itself.

The essence of the intermediate target strategy is that, under it, the central bank is required to respond quickly and fully to any information reflected in the movements of whatever the intermediate target happens to be.[9] Under the current framework in the United States, with monetary aggregates used as the intermediate targets, any movement in the public's money holdings immediately creates a presumption that the Federal Reserve System should react. In principle the Federal Reserve is always free to change the money growth targets, of course, but in practice it is typically reluctant to do so. The intermediate target strategy instead calls for actions aimed at regaining the stated targets, so that the economic signals contained in movements of the monetary aggregates create a presumption of immediate response. By contrast, the presumption of this strategy, strictly implemented, is that there will be no response to signals arising from other sources but not reflected in the intermediate targets.

If the intermediate target strategy with the monetary aggregates as the central targets is faulty, what should the Federal Reserve do in its place? One plausible response to the changed circumstances summarized in Section I would be to reject the usefulness of any intermediate target at all for monetary policy. Without an intermediate target, the Federal Reserve would focus its policy directly on the nonfinancial economy — which, after all, constitutes the ultimate reason for having a monetary policy. For example, some economists have argued that the Federal Reserve should directly target the growth

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9. Brunner and Meltzer [2, 3] provided the first systematic analysis of the role of intermediate targets for monetary policy. The "information variable" interpretation relied on here was developed in Kareken et al. [23] and Friedman [8].

rate of nominal gross national product.[10]

Such a direct approach may well constitute the most effective policy framework, and an informed public discussion of the idea would be highly useful.[11] Primarily for reasons that are more political than economic in any narrow sense, however, both the Congress and even the Federal Reserve itself appear firmly committed, at least for the immediate future, to having some kind of intermediate target to facilitate monitoring monetary policy on an ongoing basis. If the Federal Reserve simply reported to Congress a target for nominal income growth, for example, there would be no straightforward way to determine after the fact whether a failure to meet this target reflected an inappropriate monetary policy, an inconsistent fiscal policy, unexpected oil or other supply shocks, or still other relevant factors. In order to judge whether monetary policy in particular is (or has been) on the promised course, it is necessary to move the discussion of monetary policy to a point in the economic process closer to the source. Intermediate targets, whatever their other failings, do just that. The central factor dictating their use today is probably the desire to provide at least some form of accountability of monetary policy in this sense.

The question at hand, then, is whether there is some alternative intermediate target that the Federal Reserve can use in addition to (or possibly even instead of) the monetary aggregates, as a focus of monetary policy. To be sure, an enormous variety of financial variables is available for this purpose. The problem is not just finding potential targets but identifying targets which, if used, would lead to a superior performance for monetary policy.

The structure of the intermediate target strategy itself suggests four important criteria for choosing a suitable target. First, and most obviously, the target should be closely and reliably related to the nonfinancial objectives of monetary policy. Despite the proven seductiveness of discussions about whether any given M will or will not be within the announced target range, it is important never to lose sight of the simple truth that any such aggregate has no policy significance in and of itself.

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10. The idea of targeting the growth of nominal income, while economic preferences presumably refer to real growth and price inflation separately, usually reflects the view that monetary policy can affect nominal income but not its division into real and price components; see Friedman [15] for a theoretical statement along these lines. By contrast, the evidence presented in Friedman [11] indicates that separating the real and price components of nominal income is important for understanding how monetary policy affects nonfinancial economic activity.

11. Elsewhere [8, 9] I have also argued for a form of the direct approach.

What matters is the effect of monetary policy on the nonfinancial economy, and intermediate targets not reliably related to that effect have no role at all to play in the monetary policy process.

Second, the relationship between the intermediate target and nonfinancial economic activity should be more than that of a mirror providing a reflection. For example, targeting a financial aggregate that just moved in step with nominal income, without affecting the subsequent movement of nominal income, would provide no advantages over directly targeting nominal income itself.[12] Instead, movements of the intermediate target should contain information about the future movements of the nonfinancial objectives of monetary policy.

Third, the intermediate target should be closely and reliably related not only to the nonfinancial objectives of policy but also to the operating instruments that the central bank can control directly — in the U.S. context, once again, either reserves or a short-term interest rate. For example, although common stock prices in the United States are a well known'leading indicator of business activity, there is little evidence to suggest that the Federal Reserve could exert sufficiently close control over the stock market to make it a good monetary policy target.[13] There would be little point in having an intermediate target that the central bank could not expect to affect reasonably closely, within some plausible time horizon determined by considerations of what matters for the economy as well as what provides political accountability.

Fourth, at the most practical level, data on the intermediate target must be readily available on a timely basis. An aggregate not measured until long afterwards is of little operational value. Moreover, the relevant data must be not only available but also reasonably reliable.[14]

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12. An exception, which is probably not of much practical importance, is the case in which data on the aggregate are available before data on income. The data-lag case has received a good deal of attention in the literature, primarily because it is isomorphic to the more relevant case of structural economic lags; see Friedman [8].

13. Shiller [29] has also questioned the central bank's ability to influence real interest rates. Although most economists have accepted the central bank's ability to control short-term interest rates, at least over short time horizons and in nonpathological circumstances, doubt about the ability to control long-term interest rates is of long standing.

14. An outstanding example of a monetary policy error due to inaccurate data occurred in the early summer of 1974 when, despite the recession, the Federal Reserve allowed interest rates to rise to record highs because the then-available data indicated that money growth during that spring had far exceeded the specified target range. In fact, data now available indicate that money growth was within range throughout the spring of 1974.

These four criteria will largely determine the suitability of any financial variable — including the monetary aggregates as under the current framework, or a credit aggregate as proposed in this paper, or for that matter any other alternative — as an intermediate target for monetary policy.

III. Evaluating Credit as a Monetary Policy Target

The proposal of a credit target for U.S. monetary policy rests on the finding that at least one specific credit aggregate, total net credit (the outstanding indebtedness of all U.S. nonfinancial borrowers), satisfactorily meets each of the four criteria for a suitable intermediate target stated in Section II. Before proceeding to such a conclusion, it is essential to ask at the outset, "satisfactory" in comparison to what? Because the current framework used by the Federal Reserve System relies on monetary aggregate targets, the immediate standard required to support a proposal to use a new target in place of the M's is that the new target must meet these four criteria better than do the monetary aggregates that are the current focus of monetary policy, and the standard for a proposal to use a new target together with the M's (or at least one M) is that the new target meet these four criteria as well as do the monetary aggregates. The available evidence indicates that the total net credit aggregate does meet the latter standard.

A. Relationship to the Nonfinancial Economy.

Results based on a variety of methodological approaches consistently indicate that total net credit in the United States bears as close and as stable a relationship to U.S. nonfinancial economic activity as do the more familiar asset aggregates like the money stock (however defined) or the monetary base. Moreover, in contrast to the familiar asset aggregates, among which there seems to be less basis for choice from this perspective, total net credit appears to be unique in this regard among major liability aggregates. Unlike the asset aggregates, the stability of the relationship for total net credit does not just represent the stability of a sum of stable parts.

The U.S. nonfinancial economy's reliance on credit, scaled in relation to economic activity, has shown almost no trend and but little variation since World War II. (See Figure 1.) After falling from 156

percent of gross national product in 1946 to 127 percent in 1951, and then rising to 144 percent in 1960, total net credit has remained within a few percentage points of that level ever since. (The yearend 1981 level was 143 percent.) Otherwise it has exhibited a slight cyclicality, typically rising a percentage point or two in recession years (when gross national product, in the denominator, is weak) and then falling back. Although the individual components of this total have varied in sharply different directions both secularly and cyclically, on the whole they have just offset one another. In brief, the secular rise in private debt has largely mirrored a substantial decline (relative to economic activity) in federal government debt, while bulges in federal debt issuance during recessions have mostly had their counterpart in the abatement of private borrowing. .

The first four columns of Table 1 summarize the stability of the ratios to gross national product of six financial aggregates — total net credit and five others — by showing 'the coefficient of variation (standard deviation normalized by mean) for each ratio computed from both annual and quarterly U.S. data over the 1959-80 sample period.[15] In each case the table shows the coefficient of variation computed from raw data, and also computed from detrended data. Total net credit consistently displays the smallest coefficient of variation among the six aggregates, and by a substantial margin, regardless of whether the data are annual or quarterly, or raw or detrended.

What matters for monetary policy, of course, is not just stability in the sense of zero time trend but stability in a more subtle (and, importantly, a dynamic) sense. Simple ratios of precisely contemporaneous observations may therefore fail to capture the relevant concept of stability in the relationship among variables that move over time with some general lead or lag pattern between them. The remaining columns of Table 1 present the respective standard errors, coefficients of determination and Durbin-Watson statistics of six estimated regression equations, in each case relating the growth of nominal gross national product to a moving average of the growth of one of these six financial aggregates listed in the table, plus a moving average of a fiscal

15. The three monetary aggregates all follow the Federal Reserve's new (post-1980) definitions. The reason for including bank credit is that the Federal Reserve currently reports a bank credit target to the Congress, along with the targets for the monetary aggregates. Table 1 is from [12], as are Tables 2 and 3 below. For a more thorough examination of this evidence, including earlier sample periods and pre-1980 definitions of the monetary aggregates, see [13].

policy measure. The equations are estimated, again using quarterly data for 1959-80, in the familiar form made popular by the Federal Reserve Bank of St. Louis.[16] Here again total net credit exhibits a closer relationship to nominal income than any of the other aggregates except the narrow money stock.

Other, more sophisticated methodologies lead to essentially the same results. In part because of the extent to which regressions of the St. Louis form have been discredited by a variety of criticisms, researchers examining the money-to-income (or, here, credit-to-income) relationship have increasingly turned to "vector autoregression" methods that allow for a richer dynamic interaction between money and income by relating the variation of income not to the entirety of the variation of money but only to that part of it which cannot already be deduced either from the past history of money itself or from the joint past history of both money and income.[17] In this context a key indication of the stability of the' relationship to income of any financial aggregate is the behavior of that relationship following just such an "innovation," or unanticipated movement, in the aggregate (or in income). In addition, a further aspect of the tendency in recent research to avoid simple nominal income regressions of the St. Louis form has been a reluctance to ignore the distinction between the real and price components of nominal income variation. Hence some researchers have also treated real income and prices separately in carrying out this kind of analysis.

Results of using the vector autoregression methodology again indicate that the relationship between total net credit and nonfinancial economic activity is as close as is the analogous relationship for any of the monetary aggregates.[18] Indeed, these results reinforce those for the St. Louis regressions shown in Table 1, in that they suggest the superiority of total net credit and the M1 money stock over other monetary or credit aggregates. An "innovation" in either M1 or total net credit apparently leads to movements of both real income and prices which equickly restore the initial relationship between the aggregate and nominal income. Other aggregates exhibit this property to a noticeably lesser extent.

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16. See [12] for the details of the specification.
17. See Sims [32, 33] for the development and application of the vector autoregression technique.
18. For the specific results and details of the method used, see [12, 13].

Finally, it is important to point out that the stability of the credit-to-income relationship is a phenomenon in no way restricted to the United States in the post-World War II period. The U.S. nonfinancial economy's reliance on credit relative to economic activity has shown essentially no trend not just over the past thirty years but over the past sixty. (The 1921 level was also 143 percent.) Nonfinancial borrowers' outstanding debt rose significantly in relation to gross national product only during the depression years 1930-33, when the economy was deteriorating rapidly and many recorded debts had defaulted de facto anyway. Otherwise the postwar stability in the United States appears to be a continuation of a pattern that dates back at least six decades. Among foreign economies, empirical research thus far has demonstrated a similar comparability of the credit-to-income and money-to-income relationships in Britain, Canada, Germany, and Japan.

In sum, there is ample ground for believing that total net credit, measured by the total outstanding indebtedness of all of the economy's nonfinancial borrowers, is as closely related to nonfinancial economic activity as are the monetary aggregates which are so central to today's monetary policy framework.

B. Information Content of the Relationship.

The finding that the credit-to-income relationship is as regular and as stable as the money-to-income relationship would be of little interest in a policy context if the economic behavior underlying these results were such that money "causes" income while income in turn "causes" credit. In that case movements of total net credit would simply mirror movements of income, and credit would be no more useful a target for monetary policy than income itself. Causality among economic phenomena is a difficult issue to resolve empirically, but some methods do exist for examing the available evidence. Results based on two such methods sharply contradict the notion that the causal link between credit and income is such as to vitiate the usefulness of the relationship for monetary policy.

First, in so far as the concept of causality that matters in this context is equivalent to econometric exogeneity, the results are not consistent with any simple notion that money causes income while income causes
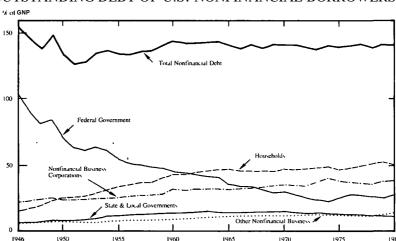
FIGURE 1

OUTSTANDING DEBT OF U.S. NONFINANCIAL BORROWERS

credit.[19] If anything, they suggest the opposite. Table 2 summarizes the evidence on these relationsips, based again on quarterly data for 1959-80, by presenting F-statistics for a series of tests of the null hypothesis that all of the coefficients on one variable are zero, in each successive equation in several systems of regressions relating real income, prices, the M1 money stock, and total net credit.[20] Credit plays a more significant role in determining the variation of either real income or prices in the middle panel than does money in the top panel. Similarly, both real income and prices are highly significant in the money equation in the top real income and prices are highly significant in the money equation in the top panel, but only prices are (marginally) significant in the credit equation in the middle panel. Moreover, the corresponding results shown in the bottom panel of the table for the four-equation system including all four variables at once are also inconsistent with any simple money-then-income-then-credit reasoning.[21]

19. The association of causality with econometric exogeneity is due to Granger [20]; Sims [31] first introduced it in the macroeconomics literature in the context of monetary policy questions.

20. See [12] for details of the estimation method used.

21. The exogeneity test results shown in Table 2 differ in several interesting respects from those presented in [11] on the basis of the pre-1980 definition of M1 and the 1953-78 sample period. In brief, the earlier results indicated more fully parallel roles for money and credit.

TABLE 1
COMPARATIVE STABILITY TESTS FOR RELATIONSHIPS TO NOMINAL INCOME

| | Coefficient of Variation | | | | Regression Results | | |
| | *Annual Data* | | *Quarterly Data* | | *Quarterly Data* | | |
	Raw	*Detrended*	*Raw*	*Detrended*	*SE*	—	*DW*
Aggregate							
Total Net Credit	0.012	0.012	0.014	0.013	0.00789	0.37	2.15
Bank Credit	0.053	0.032	0.055	0.033	0.00871	0.24	1.77
M1	0.192	0.021	0.188	0.020	0.00756	0.41	2.01
M2	0.024	0.024	0.023	0.023	0.00811	0.32	1.76
M3	0.057	0.024	0.058	0.025	0.00827	0.29	1.71
Monetary Base	0.053	0.019	0.125	0.018	0.00843	0.28	1.91

Second, the "variance decomposition" technique of vector autoregression analysis directly addresses the question of how much independent information movements of one variable contain about subsequent movements of another — the precise question that matters in the context of using intermediate targets for monetary policy. The specific results of any one variance decomposition exercise depend heavily on the sample period used, the time horizon considered, 'and the ordering in which the variables in the analysis are considered. Nevertheless, the results of applying this method for a range of different sample periods, horizons and orderings consistently suggest that total net credit does contain information about future movements of real income and prices which is both statistically significant and economically substantial. Moreover, in most cases the results indicate that total net credit contains more information about real income and prices than does the M1 money stock.[22]

C. Relationship to Monetary Policy Instruments.

The broader the scope of any financial aggregate — on either the asset or the liability side of the economy's balance sheet — and the greater the variety of institutions and individuals involved in supplying and demanding it, the more problematic at the a priori level is the connection between that aggregate and the instruments under the central bank's direct control. Even in the case of the narrow money stock, the number and complexity of the linkages relating M1 movements to movements of reserves (or the monetary base) is fairly burdensome at either the analytical or the operational level.[23] The number of linkages is even greater for the broader monetary aggregates or for total net credit. In the end, however, the potential controllability of any such aggregate, either narrow or broad, depends on a diverse set of substitution responses characterizing the behavior of many different kinds of individual and institutional portfolios.

Table 3 presents the respective standard errors, coefficents of determination and Durbin-Watson statistics for a series of regressions, again based on quarterly data for 1959-80, relating the growth rates of each of four financial aggregates—total net credit and the three M's—to past values of nominal income growth and the Federal Reserve discount

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22. For the specific results and details of the method used, see [12].
23. See, for example, the apparatus used by Johannes and Rasche [21, 22] or Tinsley et al. [34].

rate, and to current and past values of either of the Federal Reserve's two available policy instruments, the growth of nonborrowed reserves or the federal funds rate.[24] The table also shows the corresponding results for analogous regressions which also include as explanatory variables the past growth rate of whichever aggregate the equation is seeking to track.   .

Regardless of the choice of reserves or the interest rate as the policy instrument, these results consistently show smaller standard errors for total net credit than for any of the monetary aggregates—about 0.4 percent per quarter (or 1.4 percent at an annual rate) in the regressions omitting lagged credit growth, and about 0.3 percent per quarter (or 1.1 percent at an annual rate) in the regressions including it. One possibility, of course, is that the smaller standard errors for the credit aggregate could just reflect its being a smoother series than the monetary aggregates, but the typically larger R^2 values in the credit equations contradict this explanation. The regressions do account for more of the variation of credit than of the monetary aggregates. Similarly, it is possible that the better tracking performance for credit could just reflect a tighter relationship to income, with no implications for the Federal Reserve's ability to control credit via either reserves or the federal funds rate, but the statistical significance levels of the relevant coefficients contradict this explanation too. (In the equations based on the reserves instrument and excluding the lagged dependent variable, for example, the t-statistics on the respective sums of the coefficients on current and lagged growth of reserves are 2.10 for credit versus 2.96 for M1.)

The pitfalls of relying on relationships like these to judge the Federal Reserve's potential influence over any specific aggregate, as an intermediate monetary target, are well known. Even so, the' available empirical evidence does suggest that total net credit is no less plausible an aggregate to try to target than are the monetary aggregates.

D. Availability of Data.

Although the standard vehicle in which the Federal Reserve publishes data on the total net credit aggregate is the flow-of-funds accounts, a publication which appears only once per quarter, the great bulk of the underlying data is actually available monthly. Indeed, the

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24. The format of the regressions estimated is due to Davis and Shadrack [4]. See [12] for further details, as well as for analogous results based on monthly data.

Federal Reserve currently maintains, on an unpublished basis, a monthly credit data file. As of yearend **1980,** for example, total net credit outstanding in the United States was **$3,907.5** billion, of which **$3,436.1** billion, or **88** percent, consisted of items regularly reported each month and included in the Federal Reserve's monthly data file. Somewhat ironically, many of the items not included in this monthly data file represent the lending activities of various components of the federal government itself. Of the **$471.4** billion of **1980** yearend total net credit not included in the monthly data file, **$290.7** billion represented credit advanced directly by the U.S. government or by its sponsored credit agencies and mortgage pools. If the Federal Reserve were merely to collect from the relevant agencies of the federal government the kind of data it already has on the private sector, therefore, more than **95** percent of the total net credit aggregate would be available monthly.

Even without any extra data reporting on the government's part, however, the information contained in the **88** percent of total net credit which is currently included each month is hardly without value for monetary policy. For the **1963-77** sample period (the longest interval for which seasonally adjusted monthly credit series now exist in the Federal Reserve's monthly data file[25]), the correlation between the total net credit series reported in the flow-of-funds accounts and the quarterly "total" net credit series formed by using only the end-of-quarter months of the corresponding monthly series is **0.99985.** Moreover, the relationship between nonfiancial economic activity and the quarterly "total" net credit series is fully comparable to that shown above for the actual total net credit series.

available on a monthly basis. Weekly credit data are unlikely ever to be available, so that it will never be possible to monitor total net credit as closely as the **M1** money stock; from this perspective the situation of credit is comparable to that of M2. Even so, movements of the weekly **M1** data are dominated by statistical "noise," and relying on them is questionable for purposes of monetary policy decision making anyway. The monthly availability of data on total net credit is adequate.

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25. After 1977 the Federal Reserve ceased performing seasonal adjustments to is monthly credit file.

E. Overview.

The total net credit aggregate satisfies each of the four basic criteria for selecting a monetary policy target as fully as do the major monetary aggregates. Total net credit has a strong relationship to both real income and prices; the credit measure provides potentially usable information about the future movements of these two aspects of the nonfinancial economy; movements in credit are related to either a reserves or a federal funds rate instrument; and credit data are available on a monthly basis. These findings are not sufficient to warrant dropping the monetary aggregates altogether in favor of a credit target for monetary policy. Especially in light of the changes in the financial environment discussed in Section I, however, they do suggest that total net credit would be a valuable target for monetary policy to use in conjunction with a monetary target.

TABLE 2

EXOGENEITY TESTS AMONG MONEY, CREDIT, INCOME AND PRICES

		F(X)	F(P)	F(M)	F(C)
Estimation of Autoregressive System (X,P,M)					
Equation:	X	65.68*	1.68	1.85***	——
	P	0.54	152.28*	0.86	——
	M	3.96*	3.01*	58.23*	——
Estimation of Autoregressive System (X,P,C)					
Equation:	X	5.10*	2.73'	——	2.01***
	P	1.14	45.81*	——	2.50**
	C	1.45	1.97***	——	66.00*
Estimation of Autoregressive System (X,P,M,C)					
Equation:	X	5.03	2.08***	1.15	1.28
	P	0.80	27.34*	.60	1.98***
	M	3.79*	3.62*	24.09*	1.23
	C	1.10	1.49	1.18	60.14*

Notes:	X	is gross national product in constant prices
	P	is gross national product price deflator
	M	is money stock (M1)
	C	is total net credit
	*	significant at 1% level
	**	significant at 5% level
	***	significant at 10% level

TABLE 3
FINANCIAL AGGREGATE CONTROL RELATIONSHIPS:
QUARTERLY DATA

		SE	$\overline{R}^2$	DW
Reserves Instrument				
Aggregate:	Credit	0.00360	0.58	1.17
	M1	0.00614	0.26	1.77
	M2	0.00619	0.34	1.20
	M3	0.00651	0.35	0.89
Reserves Instrument with Lagged Dependent Variable				
Aggregate:	Credit	0.00280	0.74	2.05
	M1	0.00612	0.26	2.00
	M2	0.00538	0.50	1.81
	M3	0.00519	0.58	1.95
Interest Rate Instrument				
Aggregate:	Credit	0.00356	0.59	1.13
	M1	0.00628	0.22	1.59
	M2	0.00477	0.61	1.17
	M3	0.00701	0.24	0.63
Interest Rate Instrument with Lagged Dependent Variable				
Aggregate:	Credit	0.00275	0.75	2.09
	M1	0.00610	0.27	2.04
	M2	0.00407	0.72	2.02
	M3	0.00489	0.63	2.03

IV. A Proposal for a Two-Target Money-and-Credit Framework

The Federal Reserve System should adopt an explicit two-target framework, in which it would focus both on the money stock and on the quantity of credit outstanding. The Federal Reserve should pick one monetary aggregate, presumably M1, and one credit aggregate, total net credit; specify target ranges for both; and provide the quantity of reserves (or set a short-term interest rate) aimed at achieving these two targets. A deviation of either money or credit growth from its respective target range would then constitute a signal warranting reassessment of that reserve provision path (or interest rate level).

One potential difficulty in implementing this hybrid money-and-credit framework is a problem inherently associated with any policy of pursuing two targets instead of one. What if both targets are not simultaneously achievable? For all practical purposes, however, the Federal Reserve's current policy framework already suffers from just this problem, as the experience of M1 and M2 during 1981 demonstrated. If only M1 had mattered, the Federal Reserve would have had to conclude early on that its policy was too restrictive in relation to the specified target. By contrast, if only M2 had mattered, it would have had to draw the opposite conclusion. In resolving these conflicting concerns, the Federal Reserve had to decide on the relative importance of M1 and M2, and to determine why one was growing more slowly than anticipated and the other more rapidly.

A two-target framework based jointly on money and credit would in part have the same features. If money and credit were both growing in line with their respective targets, then the Federal Reserve would judge the prevailing reserve provision path (or short-term interest rate) to be appropriate. If both were above target, then the implication would be to slow the provision of reserves (or raise the interest rate). If both were below target, the implication would be to speed the reserve provision path (or lower the interest rate). If one were above target and one below, however, then—just as now, with an M1 and M2 target—the Federal Reserve would have to access which was more important under the circumstances, and determine why one was moving in one direction and one in the opposite direction relative to their respective stated targets.

The key advantage of an explicit two-target framework based on both money and credit, in comparison to a two-target approach based on two separate definitions of the money stock, is that it would draw on a more diverse information base to generate the set of signals that presumptively matter for monetary policy. Money is, after ali, an asset held by the public, and each monetary aggregate is just a separate subtotal of the public's monetary assets. By having an M1 and an M2 target, as at present, the Federal Reserve is relying solely on the asset side of the economy's balance sheet but adding up those assets in two separate ways. By having a money target and a credit target, the Federal Reserve would create a presumption of responding to signals from both sides of the economy's balance sheet. The evidence that is now available indicates — not surprisingly, on some reflection — that

both sides of the balance sheet do matter.

Finally, as a practical matter it is useful to note that the Federal Reserve is free to implement this two-target money-and-credit policy framework at any time. No legislation is necessary. On the contrary, the Humphrey-Hawkins Act directs the Federal Reserve to specify a target for credit growth as well as for money growth. The Federal Open Market Committee has typically specified such a target, but it has chosen to focus only on credit extended through the banking system, which the available evidence indicates is far from the best source of information about the economy, even from within the liability side of the balance sheet. Moreover, the Federal Reserve's own discussions of monetary policy—in its reports to Congress, in the Open Market Committee's policy directives, and elsewhere—makes clear that the focus of policy is on money, not credit. Nothing in the legislation, however, requires that the Federal Reserve place its primary emphasis on money to the exclusion of credit, or that it focus only on bank credit among the available credit measures. From a legislative perspective, a two-target money-and-credit framework would simply have the Federal Reserve be even-handed within the requirements already laid down by the Humphrey-Hawkins Act.

The evidence available today suggests that a two-target money-and-credit framework for monetary policy would be superior to the current money-only framework, and that, over time, a monetary policy based on both money and credit would be likely to help achieve a more satisfactory performance in the financial environment of the future.

V. Summary of Conclusions

No one monetary policy framework is appropriate in all financial environments. As the environment changes, therefore, central banks must also sometimes alter the way in which they design and implement monetary policy. Because of major changes in the financial environment in the United States, the time has come for the Federal Reserve System to move beyond its current policy framework focused exclusively on monetary aggregate targets. Changes in the financial environment due to the advent of rapid and volatile price inflation were a major element in the move toward the monetary targets framework in the early 1970s. Now further changes in this environment, mostly involving an ongoing series of innovations in financial practices and

institutions, warrant further adaptation of the monetary policy framework.

A useful intermediate target for monetary policy must meet four basic criteria. The target must be closely related to the nonfinancial objectives of monetary policy. It must contain information about the future movements of those relevant aspects of the nonfinancial economy. It must be closely connected to the instruments over which the central bank can exert direct control. And data measuring it must be readily available on a timely basis.

Total net credit, measured by the aggregate outstanding indebtedness of all U.S. nonfinancial borrowers, satisfactorily meets each of these four criteria for choosing a monetary policy target. The relationship between total net credit and both real income and price measures of nonfinancial economic activity, judged by a variety of different methodological approaches, is as stable and reliable as is the corresponding relationship for any of the monetary aggregates (or the monetary base). The information about subsequent movements in nonfinancial activity contained in total net credit is at least comparable to that contained in money. Relationships between total net credit and either the quantity of nonborrowed reserves or the federal funds rate are comparable to the corresponding relationships for the principal monetary aggregates. Finally, data for a close approximation to total net credit are available on a monthly basis, and the relevant relationships based on the monthly data are also at least comparable to the corresponding relationships for the monetary aggregates.

The Federal Reserve System should therefore adopt an explicit two-target framework, in which it would focus both on the money stock (presumably the M1 measure) and on the quantity of credit outstanding as measured by total net credit. The key advantage of this two-target money-and-credit framework is that it would diversify, to include both sides of the economy's balance sheet, the information base providing the signals governing monetary policy responses to economic events. In comparison to today's money-only framework, a monetary policy based on both money and credit would be better suited to perform effectively in the financial environment of the future.

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