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CLASS II - FOMC

February 4, 1982

Selection of a Credit Aggregate*

The members of the FOMC indicated at their December meeting an inclination to include a range for at least one broad credit aggregate among the Committee's 1983 objectives for growth in money and credit. To provide background for the selection of a satisfactory credit measure, this memorandum compares the empirical properties of alternative credit measures, focusing especially on the relative closeness of their movements with movements in GNP. Because the question often arises, comparable empirical results for the monetary aggregates also are shown; however, such comparisons should not be viewed as a legitimate "horse race" between money and credit measures for policy guidance purposes, since the techniques used clearly leave unresolved such important issues as cause and effect and controllability. An appendix treats the special problem of dealing with equity positions if one wishes to expand the coverage of a financial aggregate.

Introduction

Several aggregations of debt instruments have been proposed as intermediate targets or indicators for stabilization policy. The dissimilarities in the measures proposed suggest the absence of a common analytical basis. Indeed, the economics profession appears to lack a well specified theoretical framework that would help in the choice of a credit aggregate. Existing theoretical and empirical knowledge does not provide much concrete guidance with regard to the aggregative patterns of leverage or liquidity management in the economy. We know that individuals, and sectors, finance part of their holdings of real capital through debt and part through

*Prepared by Michael Prell, with substantial assistance from Richard Porter, Anil Kashyap, John Wilson, Stephen Taylor, and other members of the Board staff.

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equity¹ and that they simultaneously have debt instruments among both their assets and liabilities. The outcome of this process presumably is determined by relative expected yields, attitudes toward risk, legal considerations such as limited liability and bankruptcy, taxation, market imperfections affecting opportunities for borrowing and lending, and other influences. It is not clear that this vast set of factors can be pared down for practical purposes to a reasonably robust functional relation involving a manageable number of explanatory variables.

The fact is, however, that in terms of broad trends, debt and GNP have grown together through time. This observation--and the related thought that credit-GNP relationships are less likely to be distorted by institutional change than are money-GNP relationships--has provided the basic foundation for the advocacy of credit aggregates by a number of people. The statistical work reported below sheds some light on the regularity of shorter-run credit-GNP relationships and is particularly addressed to the question of which credit aggregate bears the closest, most predictable relationship to GNP. We have selected five aggregates for attention:

- (1) total credit market debt owed by all sectors;
- (2) total credit market debt owed by nonfinancial sectors;
- (3) total credit market debt owed by domestic nonfinancial sectors;
- (4) total credit market debt owed by private domestic non-financial sectors;²
- (5) currency, deposits, and credit market instruments held by private domestic nonfinancial sectors (the so-called "debt proxy"³).

1. Equity financing can occur through issuance of new shares and by the use of retained earnings or accumulated personal savings.

2. "Private" refers to the exclusion of the federal government; state and local government debt is included.

3. As termed by Henry Kaufman.

None of the aggregates includes equities. As noted above, the issue of equities is addressed in an appendix; it may be noted here, however, that the finding reported in that appendix is that if one adds the sort of measures of corporate equity financing that most commonly comes to mind, the behavior of a "credit" aggregate is not significantly altered. In part, this is because corporate equity finance is small compared to overall debt flows.

All of the measures listed above are particular combinations of items in the Federal Reserve's Flow of Funds Accounts. The FOF accounts are designed primarily to trace financial flows among sectors of the economy; the creation of meaningful broad credit aggregates has not been a basic objective, and the form of the accounts does not point toward some singularly significant combination. The accounts are intended to capture all sources and uses of funds for individual sectors of the economy and with the same data to measure all inflows and outflows in individual markets. The accounts thus provide a map of intersector and inter-market flows from which a great variety of aggregates could be assembled. How the credit aggregates examined here relate to the FOF account structure is indicated by Table 1.

The FOF totals for nonfinancial sectors include in concept, on the sources side, borrowing activity by U.S. households, businesses, and governmental units in the domestic market plus their borrowing abroad; borrowing by foreigners in the U.S. market also is included in the accounts, to reflect the lending activities of U.S. residents. In practice, available data impose some limitations; for example, coverage of borrowing by businesses from foreign sources includes only loans extended by foreign offices of U.S. banks and certain Eurobond offerings; all other foreign sources go unrecorded.¹ Such measurement problems,

1. The problem of data sources is not unique to foreign transactions. For example, the increased importance of seller financing of existing home sales has greatly increased the uncertainty of mortgage credit estimates, as the staff has had to create numbers from bits and pieces of indirect evidence. Deteriorating governmental statistical programs heighten uncertainties about future data quality.

TABLE 1
 SUMMARY OF FLOW OF FUNDS STRUCTURE
 (Figures in \$billions)

Uses of Funds	Year-end 1981
<u>Credit market debt owed by all sectors</u>	<u>5,200</u>
less debt owed by financial sectors	615
= <u>Credit market debt owed by nonfinancial sectors</u>	<u>4,585</u>
less debt owed by foreigners to U.S. residents	237
= <u>Credit market debt owed by domestic nonfinancial sectors</u>	<u>4,348</u>
less debt owed by U.S. government	830
= <u>Credit market debt owed by private domestic nonfinancial sectors</u>	<u>3,517</u>
of which debt of state and local governments	343
debt of households	1,589
debt of nonfinancial businesses	1,586
Sources of Funds	
Credit market debt owed by all sectors	5,200
less debt held by public agencies and foreigners	877
= Credit market debt held by domestic private sectors	4,323
of which private financial intermediaries hold	3,350
private domestic nonfinancial sectors hold	972
MEMORANDUM:	
<u>Total credit market instruments, deposits and currency held by private domestic nonfinancial sectors ("debt proxy")</u>	<u>3,110</u>
of which credit market claims	972
deposits and currency	2,138

of course, raise some questions about the usefulness of any of the aforementioned aggregates as gauges of borrowing as it relates to U.S. GNP.¹

Statistical Evidence

The remainder of the memorandum reports the results of statistical comparisons among the various credit measures, plus some simple graphical evidence. The first set of data, recorded in Table 2, deals with the behavior of credit velocity--that is, the contemporaneous relationship of movements in credit and GNP. The figures on velocity change have been calculated on a four-quarter basis, to smooth the series and to be consistent with the time dimension of the FOMC's annual targeting periods.

As may be seen in the table, the velocity behavior of five credit aggregates is rather similar, in terms of variability (measured by standard deviation, for example); this is true whether one considers the entire 1953-1982 period or the indicated subperiods. Private domestic nonfinancial debt stands out, however, as having the most variable trend rate of velocity change from decade to decade and the greatest variability in annual velocity. The table includes comparable data for the monetary aggregates and reveals that the standard deviation of 4-quarter changes in M1 velocity has been no greater than for any

1. It may be noted that, in practice, none of the credit aggregates mentioned jibes with a market defined to cover credit market transactions in the U.S. (since some foreign transactions are included) or defined to cover all credit transactions of U.S. residents (because, as noted, some foreign transactions are missed) or defined to cover dollar-denominated transactions (because some foreign-currency denominated transactions are covered and some dollar denominated are not); in this respect, the credit measures share some of the logical ambiguities of coverage that mark the money stock measures. It may also be noted that none of the credit aggregates conforms in coverage to the concept of the "bond" market, which in the traditional simple macro theory model encompasses the alternative asset to "money". Directly or indirectly, all of the credit aggregates overlap money, however defined; in any event, it is far from clear that all of the assets included in any of the credit aggregates can properly be lumped together rather than treated as having separate supply and demand schedules and separate yields.

Table 2

Velocity Statistics for Various Credit and Monetary Aggregates
(velocity measured as four quarter changes)

Credit/ Monetary Aggregate	1953-1962			1963-1972			1973-1982			1953-1982		
	Mean Change	Mean Absolute Change	Standard Deviation	Mean Change	Mean Absolute Change	Standard Deviation	Mean Change	Mean Absolute Change	Standard Deviation	Mean Change	Mean Absolute Change	Standard Deviation
Total Debt	-1.3	2.5	2.8	-.2	1.1	1.4	-1.2	1.9	1.9	-.9	1.8	2.2
Non-financial	-1.0	2.4	2.9	.1	1.0	1.3	-.7	1.5	1.8	-.5	1.6	2.1
Domestic	-1.1	2.4	2.8	.2	1.0	1.2	-.6	1.5	1.9	-.5	1.6	2.1
Private	-3.9	4.2	2.9	-1.3	1.5	1.3	-.6	2.1	2.5	-1.9	2.6	2.7
Debt proxy	-.2	2.1	2.6	.1	.9	1.1	-.7	1.7	2.1	-.3	1.6	2.1
M1	3.2	3.7	2.9	2.5	2.5	1.3	3.4	3.6	1.9	3.0	3.3	2.1
M2	-.5	2.8	3.5	-.3	1.9	2.2	.4	2.2	2.8	-.1	2.3	2.9
M3	-.7	2.8	3.4	-1.0	2.6	2.9	-.6	1.5	2.0	-.8	2.3	2.8

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of the credit aggregates but that velocity variability for M2 and M3 is slightly greater than for any of the credit aggregates.

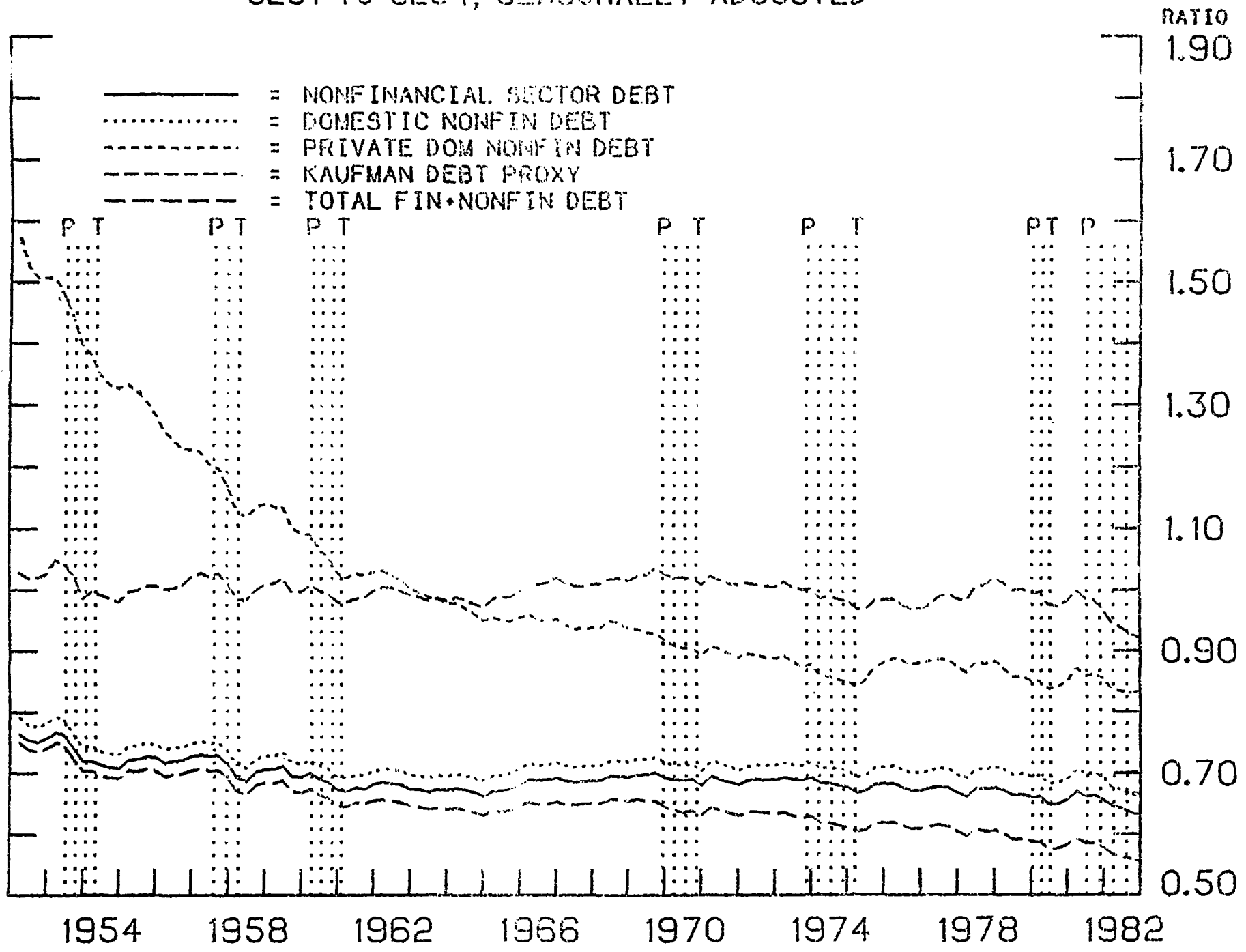
To give a visual impression of the behavior of the GNP-credit ratio, this quantity has been plotted in Chart 1; the picture reveals clearly not only the trends but also the cyclical tendencies. The cyclical tendencies are still more apparent--as is the noncyclical variability in the relationship --when one charts the 4-quarter percent changes in credit and GNP separately, as has been done for domestic nonfinancial debt in Chart 2 (other aggregates produce similar pictures). Growth in credit clearly is less variable cyclically than growth in nominal GNP. There is a discernible tendency for credit to decelerate less than GNP during economic recessions and to accelerate less sharply in early recovery.

Because there may be some systematic cyclicity to the relative movements of credit and GNP, credit velocity calculations were performed for the first year of business recoveries; 1983 presumably will be such a period. Table 3 shows the results, and as may be seen from the standard deviations, there has been an appreciable variation in credit velocity behavior from cycle to cycle during the postwar period. Private domestic nonfinancial credit has exhibited the least regular behavior by a considerable margin; all of the other aggregates are tightly bunched.

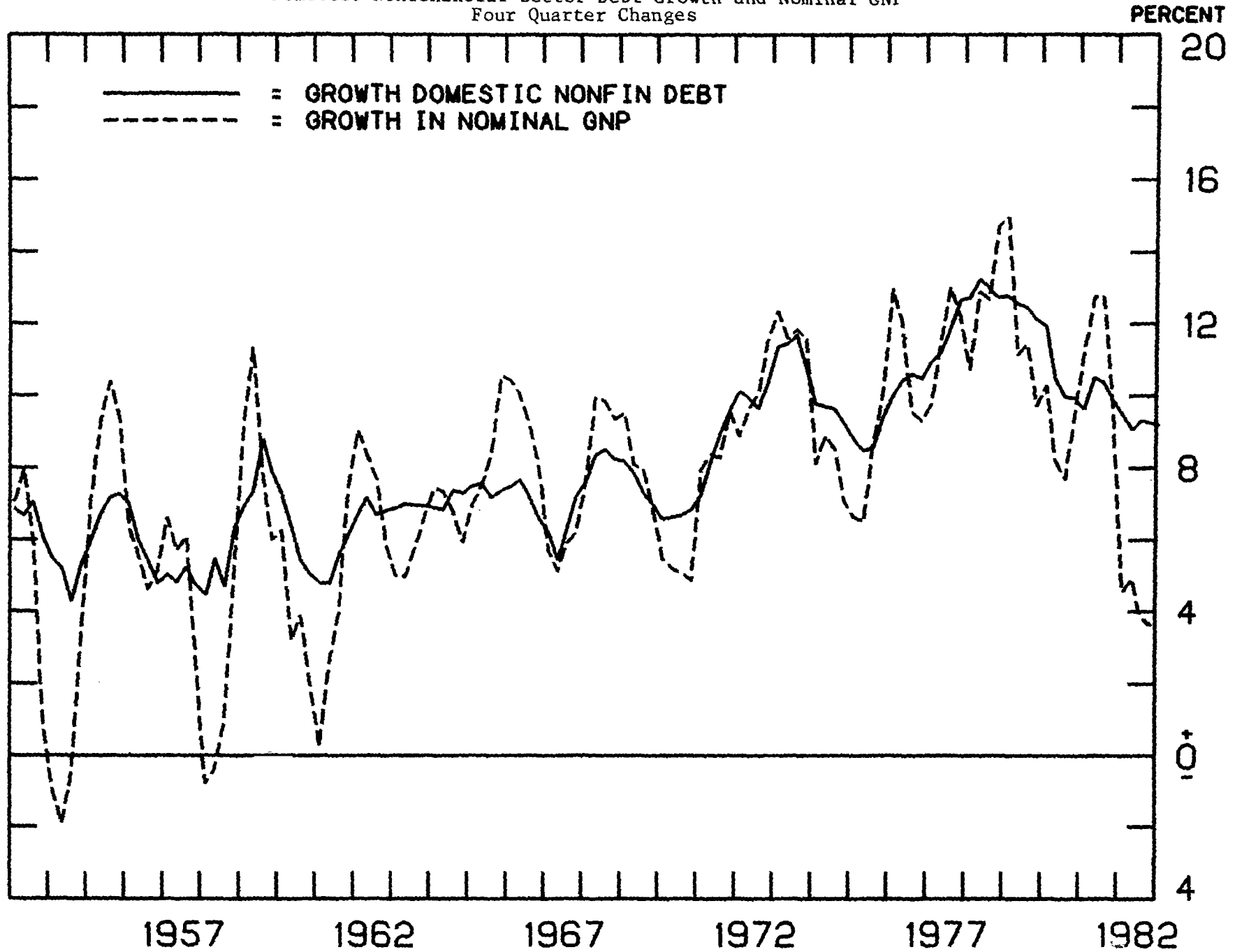
Because the FOMC will be adopting money stock targets, it was thought of potential interest to look as well at the credit-money relationship as an aid in assessing which credit and money measures have the most regular relative movements. This has been done in terms of simple 4-quarter changes in the ratio of credit to money, the behavior of which is summarized in Table 4.

CREDIT AGGREGATES: GNP VELOCITIES

5201 TO 8204, SEASONALLY ADJUSTED



Domestic Nonfinancial Sector Debt Growth and Nominal GNP
Four Quarter Changes



SOURCE: NATIONAL INCOME AND FLOW OF FUNDS ACCOUNTS

CHART 2

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TABLE 3

Changes in the Ratio of GNP to Credit
in the First Year of Economic Recovery

(all figures in percent)

<u>Credit Aggregate*</u>	<u>Mean</u>	<u>Standard Deviation</u>
Total debt	2.1	1.4
Nonfinancial sector debt	2.2	1.3
Domestic sector debt	2.3	1.3
Private sector debt	1.5	2.6
"Debt Proxy"	2.1	1.6
Memoranda:**		
M1	5.3 (6.0)	1.8 (2.4)
M2	0.1	2.8
M3	0.1	1.8

*Based on six postwar cycles.

**Based on only four most recent cycles, owing to data availability.
M1 figures in parenthesis are based on shift-adjusted data for 1981.

TABLE 4

1/19/83

Statistics on the Ratio of Credit to Monetary Aggregates
(four quarter percentage changes in the ratio)

Credit/ Monetary Aggregate	1953-1962			1963-1972			1973-1982			1953-1982		
	Mean Change	Mean Absolute Change	Standard Deviation	Mean Change	Mean Absolute Change	Standard Deviation	Mean Change	Mean Absolute Change	Standard Deviation	Mean Change	Mean Absolute Change	Standard Deviation
Total Debt/ M1	4.6	4.6	1.6	2.8	2.8	1.5	4.6	4.6	1.4	4.0	4.0	1.7
Non-finan- cial/M1	4.3	4.3	1.4	2.4	2.4	1.2	4.1	4.1	1.1	3.6	3.6	1.5
Domestic/M1	4.3	4.3	1.4	2.4	2.4	1.2	3.9	3.9	1.1	3.5	3.5	1.5
Private/M1	7.5	7.5	2.1	3.9	3.9	1.7	4.1	4.1	1.9	5.1	5.1	2.5
Proxy/M1	3.4	3.4	1.4	2.4	2.4	1.0	4.1	4.1	1.3	3.3	3.3	1.5
Total Debt/ M2	.7	1.6	2.0	-.1	1.7	2.3	1.7	2.9	3.0	.8	2.1	2.6
Non-finan- cial/M2	.5	1.4	1.8	-.5	1.6	1.9	1.1	2.4	2.5	.4	1.8	2.2
Domestic/M2	.5	1.5	1.9	-.5	1.6	1.9	1.0	2.3	2.5	.3	1.8	2.2
Private/M2	3.6	3.6	2.7	1.0	2.1	2.4	1.1	3.2	3.6	1.9	3.0	3.1
Proxy/M2	-.3	1.6	2.0	-.5	1.3	1.6	1.2	2.3	2.3	.1	1.7	2.1
Total Debt/ M3	.6	1.7	2.1	-.8	2.5	3.2	.6	1.4	1.6	.1	1.8	2.5
Non-finan- cial/M3	.4	1.5	1.9	-1.1	2.4	2.8	.1	1.2	1.5	-.2	1.7	2.2
Domestic/M3	.4	1.5	1.9	-1.2	2.4	2.8	0.0	1.1	1.3	-.3	1.7	2.2
Private/M3	3.4	3.6	2.8	.3	2.3	3.3	.1	1.8	2.1	1.2	2.5	3.1
Proxy/M3	-.5	1.7	2.0	-1.1	2.1	2.4	.1	1.0	1.2	-.5	1.6	2.0

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With money as with GNP, the private sector credit measure stands out as having the most variable relationship, with the others again closely bunched.

The M1-credit relationships show the strongest trends, but with the least variability around them.

The simple, contemporaneous relations examined thus far have obvious shortcomings. A further effort to shed light on how credit movements relate to those of GNP and a few other variables was undertaken utilizing the technique of vector autoregression (VAR).¹ With the VAR method, each of a set of variables is simultaneously regressed on lagged values of all the other variables; in this case, the model was fit to quarterly data.

Several experiments were conducted with the VAR model. Table 5 indicates the results of using a four-variable model to predict the annual percent changes for credit and money in the years 1972 to 1982 (first three quarters only in the last year). The four variables in the model are credit or money (M1 or M3), GNP, M2, and the 3-month Treasury bill rate. The model was initially fit to data for 1952 to 1971 and then used to predict 1972; for 1973 and each subsequent year, the sample period was expanded by one year and the model was refit before making the prediction. The first three columns of the table represent the outcomes when the financial aggregate is predicted "unconditionally," that is, taking only past values of the variables as known; the results reported in the

1. Ben Friedman's major empirical work on credit aggregates ("Monetary Policy with a Credit Aggregate Target") employs the VAR technique to examine the dynamic inter-relationships between credit or money and GNP. He fitted only two-variable models in that paper, however, thereby omitting some potentially important influences. A paper by Board staff (Offenbacher, Porter, McKelvey, "Empirical Comparisons of Credit and Monetary Aggregates Using Vector Autoregression Methods," presented at System Committee on Financial Analysis meeting, October 1982) criticizes and extends Friedman's work; it demonstrates the importance of admitting other variables, particularly interest rates.

TABLE 5

One-Year Ahead Forecast Errors for Annual
Growth of Credit/Monetary Aggregates,
Using a Four-Variable VAR Model
(1972-1982, actual minus predicted percentage growth)

Credit/Monetary Aggregate	UNCONDITIONAL			CONDITIONAL		
	Mean Error	Mean Absolute Error	RMSE	Mean Error	Mean Absolute Error	RMSE
Total Debt	.1	.9	1.1	.1	.9	1.1
Non-financial debt	0.0	.8	.9	.1	1.0	1.2
Domestic debt	.1	.6	.7	.2	.8	1.0
Private debt	0.0	1.0	1.4	0.0	.8	1.3
Debt Proxy	.2	1.0	1.2	.4	1.0	1.2
M1	-1.5	1.8	2.2	-1.3	1.8	2.1
M3	.6	1.7	2.4	-.4	2.2	2.7

NOTE: The four-variable VAR system includes a monetary (M1 or M3) or credit aggregate, M2, three-month Treasury bill rate and nominal GNP. Forecast of any aggregate for year t is computed by estimating model on data up to time t-1. In the case of unconditional forecasts, the model is used to predict year t values for all variables. In the case of conditional forecasts, actual year t values for the other variables are plugged into the model and then the financial aggregate is predicted.

Each variable in the VAR model is regressed on an intercept, time trend, and four lagged values for each variable in the system; i.e., there are $2 + (4 \times 4) = 18$ regressors in each of the four equations in the system.

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second three columns reflect the outcome when the financial aggregate is predicted with the actual values of the other variables for the current year plugged into the model. Obviously, the current-year values would not be known in practice when a prediction must be made, but such results may be of interest since the FOMC will be specifying in advance its expectations for the behavior of at least some of the variables involved.

The results of the two experiments were quite similar with respect to the relative predictability of various credit aggregates. Private domestic debt a shade less accurately predicted, and domestic nonfinancial debt a shade more accurately predicted, than the other credit aggregates. Knowing the actual current-period values of the values other than credit resulted in a little worse prediction in some cases. Experiments with longer lag structures indicate that the short distributed (4-quarter) lags in VAR system reported in Table 4 yield the best results for the credit aggregates and M3; for M1, however, longer distributed lags (on the order of 8 quarters) yielded slightly lower RMSEs.

M2 was included in the initial VAR systems because of its present relative importance in target setting. VAR systems including M1 instead of M2 were estimated, though, and there were only very small changes in the RMSEs for the various credit aggregates. Domestic nonfinancial sector debt continued to show marginally smaller RMSEs than the other credit measures. Table 6 shows the results for a four-variable system with M1 among the explanatory variables.

(It is worth re-emphasizing that the results on monetary aggregate predictions have been shown only to satisfy natural curiosity about the comparative results. Although the money measures are not predicted as accurately with these particular VAR models as are the credit measures, other models--

TABLE 6

One-Year Ahead Forecast Errors for Annual
Growth of Credit/Monetary Aggregates,
Using a Four-Variable VAR Model
(1972-1982, actual minus predicted percentage growth)

Credit/Monetary Aggregate	UNCONDITIONAL			CONDITIONAL		
	Mean Error	Mean Absolute Error	RMSE	Mean Error	Mean Absolute Error	RMSE
Total Debt	.4	1.1	1.2	.6	1.2	1.4
Non-financial debt	.2	.8	1.0	.5	1.0	1.3
Domestic debt	.4	.7	.8	.6	.9	1.2
Private debt	.5	1.1	1.5	.6	1.2	1.4
Debt Proxy	.5	1.0	1.2	1.0	1.3	1.5
M2	-1.0	2.1	2.5	.4	1.2	1.6
M3	-1.4	2.1	2.4	.4	1.4	1.8

NOTE: The four-variable VAR system includes a monetary (M2 or M3) or credit aggregate, M1, three-month Treasury bill rate and nominal GNP. Forecast of any aggregate for year t is computed by estimating model on data up to time t-1. In the case of unconditional forecasts, the model is used to predict year t values for all variables. In the case of conditional forecasts, actual year t values for the other variables are plugged into the model and then the financial aggregate is predicted.

Each variable in the VAR model is regressed on an intercept, time trend, and four lagged values for each variable in the system; i.e., there are $2 + (4 \times 4) = 18$ regressors in each of the four equations in the system.

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possibly more relevant to decisions regarding policy targets--that capture the individual behavioral characteristics of the aggregates and cause-effect relationships might suggest advantages for monetary aggregates.)

Because the FOMC presumably will be taking a public view only on the outlook for M2 and GNP and might in any event have less conviction about prospects for interest rates, a few other VAR forecasting experiments were run without the interest variable. Table 7 indicates the results for domestic nonfinancial credit, the aggregate that was predicted best by the four-variable model. The results suggest that the interest rate is in practice important in predicting this credit aggregate, at least in unconditional forecasts. Whether a three-variable model is used, including both M2 and GNP along with credit, or a two-variable model, adding just M2 or GNP, doesn't appear to make much difference in the outcome in conditional forecasting; however, in unconditional forecasts, the two-variable model that includes just GNP does much worse than the other models.

The final set of exercises deals more with the indicator properties of the credit aggregates than with their predictability. The approach taken was to estimate "reduced form" equations relating GNP growth to growth in credit and a fiscal policy variable; the equations were similar to the so-called "St. Louis" equations relating nominal GNP to money, and for purposes of comparison regressions were run here inserting money instead of credit.¹

Table 8 reports the results of the reduced form model. Adjusted R²s are shown for the full 1959-Q3 to 1982-Q3 sample period. These show little difference in explanatory power for the various credit aggregates, although

1. The fiscal variable, the annualized percentage change in the ratio of the high employment deficit to GNP, was in all cases assigned a 10-quarter distributed lag; for credit and money variables, lag lengths were chosen to minimize the standard error of regression over the full sample period, with a maximum lag length of 16 quarters.

TABLE 7

One-year Ahead Forecast Errors for
 Annual Growth in Domestic Nonfinancial Sector
 Debt, Using Alternative VAR Models
 (1972-1982, Actual minus Predicted Percentage Growth)

VAR Model	UNCONDITIONAL			CONDITIONAL		
	Mean Error	Mean Absolute Error	RMSE	Mean Error	Mean Absolute Error	RMSE
4-variable: M2, GNP, bill rate, debt	.1	.6	.7	.2	.8	1.0
3-variable: M2, GNP, debt	-.4	.8	1.0	0	.8	1.0
2-variable: M2 and debt	-.1	.8	1.0	0	.9	1.0
2-variable: GNP and debt	-.4	1.4	1.7	0	.8	.9

TABLE 8

"Reduced Form" Equations for Nominal GNP
 (Error statistics in percent at annual rate--actual minus predicted)

Credit/Monetary Aggregate	Out-of-sample simulation statistics ^a						
	\bar{R}^2 59:3-82:3	\bar{R}^2 59:3-74:2	Chow F- Statistic ^b	Quarterly Mean Error	Quarterly RMSE	Annual Mean Error	Annual RMSE
Total debt	.34	.22	0.8	0.0	4.1	-0.1	1.8
Nonfinancial	.29	.21	1.3	-0.9	4.5	-1.0	1.9
Domestic	.27	.21	1.0	-0.8	4.6	-0.9	2.2
Private	.27	.18	2.0	1.8	4.7	1.7	2.7
Debt Proxy	.26	.26	1.4	0.0	4.8	-0.2	2.7
M1	.33	.35	2.0	0.6	4.5	0.4	2.4
M2	.26	.28	1.6	-0.4	4.6	-0.6	2.7
M3	.21	.24	3.0	0.6	4.9	0.6	2.7

a. Estimation period: 1959:3-1974:2. Simulation period: 1974:3-1982:3.

b. Degrees of freedom: 7,79. The hypothesis that the equation coefficients are equal over the 1959:3-1974:2 and 1974:3-1982:3 sample periods is rejected at the 5% significance level if F is greater than 2.13.

the broader the aggregate, the higher was the R^2 . In terms of comparisons with money measures, M1 performs as well as the best of the credit measures; M2 about as well as most; and M3 less well. All of the equations leave the quarterly movements of GNP largely unexplained (i.e., the R^2 s are all relatively low). If one divides the sample period at 1974-Q2--the point at which a substantial shift in M1 demand appears to have commenced--one finds that the monetary aggregates perform relatively better in the first subperiod and the credit aggregates relatively worse (except for the debt proxy, which yields the same R^2). Only for M3, however, does a statistical test reject the hypothesis that the regression coefficients for the two subperiods were identical.

The other set of results from the reduced form equations is the outcome of predictions "out of sample." Using the equations fit only to data for the first part of the sample period (1959-1974), GNP was projected for the second part of the period (1974-1982). On a quarterly basis, the root-mean-squared errors (RMSEs) of the predictions using various credit aggregates were very close. For annual periods, total debt, total nonfinancial sector debt and domestic nonfinancial debt yielded smaller RMSEs than the other credit measures (or for that matter, than the monetary aggregates).

Looking at all of the evidence, the performance of the various credit aggregates cannot be said to differ greatly. If anything stands out, it is that the narrowest debt measure--private domestic nonfinancial sector credit--seems to work least well. This perhaps should not be surprising. There is no obviously compelling case for excluding federal government borrowing on a priori grounds, and that exclusion would seem at odds with a view that federal borrowing tends to crowd out private borrowing or with an alternative view (suggested, for

example, by Friedman) that private borrowing may in effect fill in when federal debt issuance is weak.

Among the remaining aggregates, there is relatively little to choose. As a practical matter, the items added to domestic nonfinancial credit to obtain the broader debt aggregates are not large enough to affect substantially the behavior of the broader measures unless they exhibit markedly different behavior. Thus, the domestic nonfinancial total performs a shade better in some of the exercises than the broader measures, while in others it does a shade worse--but never do the differences appear statistically significant.

The domestic nonfinancial debt aggregate does have the attraction of having some visible outside sponsorship, namely, Ben Friedman; it is familiar to many members of Congress as a result of hearings at which Friedman has testified and to others in the professional and journalistic community. The exclusion of foreign sector borrowing is attractive because such borrowing seems related more to factors like conditions in exchange markets and the financing of a shifting current account balance than to U.S. GNP. There is also some appeal to focusing on an aggregate that reflects the borrowing of U.S. units and thereby avoids the impression that foreigners might squeeze out Americans within some targeted amount of credit growth. The exclusion of financial sector borrowing also is appealing, for it involves in a sense a good deal of double-counting and does not seem directly linked to the financing of GNP.¹

The debt proxy is conceptually another animal entirely, since it really is a special asset total not directly related to any of the debt

1. In this regard, for example, it may be noted that the total debt aggregate has a stronger growth trend relative to GNP in recent years (or a faster declining GNP velocity) largely because of the rising importance of government mortgage programs; many mortgages are effectively counted twice in total debt, once in the financial sector and once in the nonfinancial sector. While such programs may in fact tend to facilitate housing activity, the macroeconomic effects of the enhanced intermediation are presumably second order.

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aggregates examined. It performs about as well as any of the credit aggregates in the various statistical tests, but there seems little reason to choose a so-called "proxy" when adequate measures of total debt are available--if, indeed, a debt is what it is desired to measure.

A1

APPENDIX

Adding Equities to a Debt Aggregate

As was noted in the earlier discussion, it isn't apparent that an interesting financial aggregate would exclude equity positions. Equity interests represent a substantial portion of the public's portfolio and an important vehicle for financing the acquisition of real capital. The first thing that comes to mind in this regard is corporate stock, but this is only the tip of an iceberg that includes equity positions in unincorporated businesses, in owner-occupied homes, and in many other assets.

The Board staff has developed comprehensive balance sheet estimates of equity positions, in association with the Flow of Funds Accounts. Such broad concepts, however, would seem too far afield from the sorts of financial aggregates that people seem to have in mind when they advocate the use of a credit aggregate for policy purposes. Consequently, the staff has examined some narrower equity concepts that might be combined with the debt aggregates to produce a somewhat broader financial aggregate. In particular, the focus has been placed on corporate equities.

The standard annual FOF data on the outstanding volume of financial assets and liabilities have measured corporate stock at market value. The standard quarterly FOF data on flows have included net stock issuance at issue and redemption value, thus reflecting current fund-raising activity. Both formulations would seem to have potential analytical advantages, and were considered in the work reported here. Indeed, three equity variables were defined:

NONFINANCIAL SECTOR EQUITIES AND RETAINED EARNINGS 1952.01 TO 1982.03

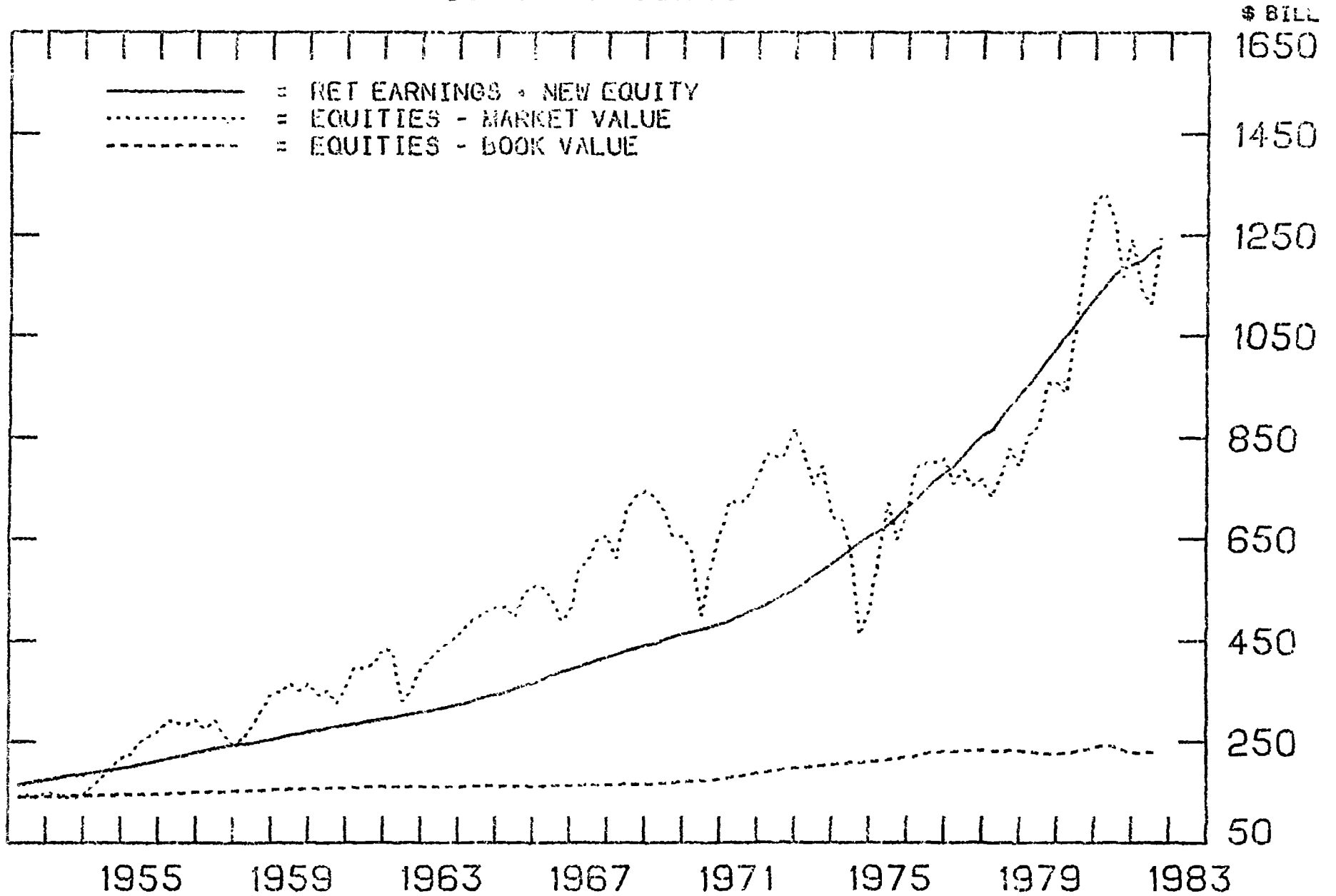


CHART A1

A2

(1) Outstanding corporate stock at current market value

As indicated above, this is already included in the annual FOF data on year-end outstandings. For the present study, quarterly estimates of market value were calculated for corporate shares.

(2) Outstanding corporate stock at "book" value

Although quarterly data on net stock issuance flows are available in the existing FOF accounts, there is no corresponding series for outstandings. Construction of such a series presented some considerable conceptual issues. It was decided to construct a "book" value series by cumulating the net flow data for stock, starting from some base period. Obviously, the particular base period selected could have a considerable impact on the level of the series, but this is an unavoidable problem once one moves away from the market value concept.

The base period was taken to be year-end 1951. The base quantity was taken to be the net worth of corporations with their assets valued at historical rather than replacement cost. It should be emphasized that the term "book" is being used somewhat eccentrically here and is simply intended to indicate a contrast to market value.

(3) Outstanding corporate stock at "book" value plus retained earnings

Corporations can, to finance capital outlays, pay out in dividends less than their total earnings and use the resultant retained earnings. Using retained earnings or selling new stock are alternative forms of equity finance. In recognition of that fact, a third equity aggregate was created, adding to the "book" value of stock variable described above a cumulative total of retained earnings starting from the year-end 1951 base.

Chart A1 shows the resultant series, for the nonfinancial sector of the economy. The cumulative total of net stock issues is comparatively small: retained earnings are a much greater source of equity funds. As might be expected, the market value of equities is much more volatile, but there is a similar long range trend to market values and net stock issues plus retained earnings.

Adding the debt aggregates to the various equities totals produced new, broader financial aggregates. Table A1 reports the income-velocity behavior of these augmented aggregates, along with the corresponding debt-only results. Market value equity figures clearly make the velocities far more variable; the other two "book" value series have little impact on the variability of the aggregates. The only noteworthy effect was on the private domestic nonfinancial sector total, for which the two "book-value" series yielded slight reductions in the standard deviation of four-quarter velocity changes.

It is not surprising that the "book" versions of the equity figures do not cause the behavior of the augmented aggregates to differ greatly from that of the debt-only measures. Even when retained earnings are included, the equity totals do not bulk all that large in the broader financial aggregates; in 1982, for example, "book" stock plus retained earnings was roughly one-fourth the size of outstanding domestic nonfinancial debt. When retained earnings are excluded, the relative importance of equities is minute. Moreover, the growth in equities--aside from the market value series--is positively correlated with the growth of debt.

Since the addition of equities, at least as defined here on a "book-value" basis, does not alter significantly the behavior of the aggregates, there is no particular argument empirically for their inclusion or exclusion. But including them would present some practical problems. The series created for research purposes here are somewhat arbitrary in their construction, and not available currently to the public. Furthermore, inclusion of retained earnings in an aggregate that is being "targeted" might seem a bit odd.

1/24/83

Table A1

Velocity Statistics for Aggregates Including Equities
(velocity measured as four quarter changes)

Credit Aggregate	1953-1962			1963-1972			1973-1982			1953-1982		
	Mean Change	Mean Absolute Change	Standard Deviation	Mean Change	Mean Absolute Change	Standard Deviation	Mean Change	Mean Absolute Change	Standard Deviation	Mean Change	Mean Absolute Change	Standard Deviation
Total Debt	-1.3	2.5	2.8	-.2	1.1	1.4	-1.2	1.9	1.9	-.9	1.8	2.2
Plus Mkt. Stock	-2.6	4.9	5.4	-.5	3.6	4.7	1.3	4.0	5.1	-.6	4.2	5.2
Plus "Book" Stock	-.3	2.3	2.9	.5	1.2	1.4	-1.2	1.7	1.7	-.1	1.7	2.2
Plus "Book" Stock & RE	-1.3	2.5	2.9	.2	1.1	1.3	-.5	1.6	1.9	-.5	1.7	2.2
Non-Finan- cial Debt	-1.0	2.4	2.9	.1	1.0	1.3	-.7	1.5	1.8	-.5	1.6	2.1
Plus Mkt. Stock	-2.2	4.0	4.3	.1	3.2	3.9	1.1	3.4	4.0	-.3	3.5	4.3
Plus "Book" Stock	-.2	2.3	2.9	.9	1.2	1.3	-.1	1.4	1.7	.2	1.6	2.1
Plus "Book" Stock & RE	-.8	2.4	2.9	.6	1.1	1.2	-.3	1.5	1.8	-.1	1.7	2.1
Domestic Debt	-1.1	2.4	2.8	.2	1.0	1.2	-.6	1.5	1.9	-.5	1.6	2.1
Plus Mkt. Stock	-2.2	4.1	4.4	.1	3.2	4.0	1.2	3.5	4.1	-.3	3.6	4.4
Plus "Book" Stock	-.1	2.3	2.9	.9	1.2	1.3	.1	1.4	1.8	.3	1.7	2.2
Plus "Book" Stock & RE	-.8	2.4	2.9	.7	1.1	1.2	-.1	1.6	1.9	-.1	1.7	2.2
Private Debt	-3.9	4.2	2.9	-1.3	1.5	1.3	-.6	2.1	2.5	-1.9	2.6	2.7
Plus Mkt. Stock	-4.3	5.9	5.9	-.8	3.7	4.6	1.5	3.7	4.3	-1.2	4.4	5.4
Plus "Book" Stock	-1.8	2.8	2.9	-.1	1.1	1.3	.1	1.9	2.3	-.6	1.9	2.4
Plus "Book" Stock & RE	-2.5	3.2	2.9	-.2	1.2	1.3	-.1	1.8	2.3	-.9	2.1	2.5

A4

An alternative approach to including equities in an aggregate would be to add the net flow of new stock issues to the increase in debt in computing the change of the aggregate, and using only the outstanding debt as the denominator. For example, if \$5 trillion of debt were outstanding at year-end 1982, and debt rose by \$485 billion and net new stock issues were \$15 billion, then the growth of the combined aggregate would be stated as 10 percent $((485 + 15)/5,000)$.¹ But again, this seems somewhat odd, and if the FOMC wished to use this measure of equity financing a more straightforward approach would be simply to express the credit range in dollar-flow terms rather than as a percentage growth of outstandings.

1. These, incidentally, are not unrealistic orders of magnitude for the quantities involved and are suggestive of the relative unimportance of equities when measured in this fashion.