

NBER WORKING PAPER SERIES

DEBT AND ECONOMIC ACTIVITY  
IN THE UNITED STATES

Benjamin M. Friedman

Working Paper No. 704

NATIONAL BUREAU OF ECONOMIC RESEARCH  
1050 Massachusetts Avenue  
Cambridge MA 02138

June 1981

This paper was prepared for the National Bureau of Economic Research Conference on the Changing Roles of Debt and Equity in Financing U.S. Capital Formation, April 2-3, 1981, Williamsburg, Virginia. The research reported here is part of the NBER's research program in Financial Markets and Monetary Economics and project on the Changing Roles of Debt and Equity Finances in the United States, which is being financed by a grant from the American Council of Life Insurance. Any opinions expressed are those of the author and not those of the National Bureau of Economic Research.

NBER CONFERENCE PAPER SERIES

Papers Available from the Conference

THE CHANGING ROLES OF DEBT AND EQUITY  
IN FINANCING U.S. CAPITAL FORMATION

Williamsburg, Virginia

April 2 and 3, 1981

Conference  
Paper  
No.

- |        |                                                                                                              |
|--------|--------------------------------------------------------------------------------------------------------------|
| WP 699 | "Inflation, Resource Utilization, and Debt and Equity Returns,"<br>by Patric H. Hendershott                  |
| WP 700 | "Risk and Return: A New Look," by Burton G. Malkiel                                                          |
| WP 701 | "Investment Strategy in an Inflationary Environment," by Zvi Bodie                                           |
| WP 702 | "Changing Balance Sheet Relationships in the U.S. Manufacturing<br>Sector, 1926-77," by John H. Ciccolo, Jr. |
| WP 703 | "Private Pensions as Corporate Debt," by Martin Feldstein                                                    |
| WP 704 | "Debt and Economic Activity in the United States," by Benjamin<br>Friedman                                   |

These papers have been submitted to the University of Chicago Press to be considered for publication in a volume tentatively titled, The Changing Roles of Debt and Equity in Financing U.S. Capital Formation, edited by Benjamin Friedman.

Copies of these papers may be obtained by sending \$1.50 per copy to Conference Papers, NBER, 1050 Massachusetts Avenue, Cambridge, MA 02138. Please make checks payable to the National Bureau of Economic Research. Advance payment is required on orders totaling less than \$10.00

List of Participants

THE CHANGING ROLES OF DEBT AND EQUITY  
IN FINANCING U.S. CAPITAL FORMATION

Williamsburg, Virginia

April 2 and 3, 1981

<u>Name</u>	<u>Affiliation</u>
Zvi Bodie	Boston University
John H. Ciccolo, Jr.	Boston College
Martin Feldstein	Harvard University
Benjamin Friedman	Harvard University
Patric H. Hendershott	Purdue University
Burton Malkiel	Princeton University

Debt and Economic Activity in the United States

ABSTRACT

This paper documents a long-standing stability in the relationship between outstanding debt and economic activity in the United States, and explores the implications for capital formation of several hypotheses that could explain this observed phenomenon.

The aggregate of outstanding credit liabilities of all nonfinancial borrowers in the United States bears as close a relationship to U.S. non-financial economic activity as do the more familiar asset aggregates like the money stock (however measured) or the monetary base. This stability in the debt-to-income relationship reflects the net outcome of pronounced but offsetting movements of the public and private components of the total debt aggregate.

Three different hypotheses provide potential explanations for this phenomenon. Two of these, one emphasizing taxpayers' actions and one based on credit market borrowing constraints, carry the implication that increases in government debt outstanding associated with financing budget deficits crowd out private financing and hence private capital formation. The third hypothesis, which emphasizes the portfolio preferences of lenders, implies that increased government financing will not crowd out private capital formation but will cause the private sector to shift from debt to equity financing.

Benjamin M. Friedman  
Harvard University  
Littauer Center 127  
Cambridge, Massachusetts 02138  
(617) 495-4246

DEBT AND ECONOMIC ACTIVITY IN THE UNITED STATES

Benjamin M. Friedman\*

Businesses and individuals, in an economy like that of the United States, can finance their activities in a rich variety of ways. Businesses investing in new plant and equipment can rely on internally generated funds, or they can raise external funds from the financial markets. When they do turn to external sources of funds, they can issue either debt obligations or new equity shares in the enterprise. Individuals can likewise use their own or borrowed funds to make major purchases like automobiles, and many individuals can also borrow to finance ordinary consumer spending apart from major hardgoods. Even in arranging home purchases, transactions that are almost always partly debt financed, individuals usually can choose what fraction of the purchase price initially represents their own equity. In principle, businesses and individuals are continually making these and other financing choices on the basis of yield comparisons, credit availability, and other considerations, so that the total amount of debt financing does not necessarily have to bear any close relationship to the underlying economic activity.

In fact, however, the relationship between outstanding debt and economic activity in the United States is remarkably steady — indeed, just as steady as the more widely recognized and better understood relationship between economic activity and money. The aggregate outstanding indebtedness of all nonfinancial borrowers in the United States has been approximately \$1.40 for each \$1.00 of the economy's gross national product, ever since World War II. Throughout the postwar period the overall debt-to-income ratio has displayed neither trend nor cyclical variation.

Moreover, the stability of the U.S. economy's outstanding debt in relation

to its income has not merely represented the stability of a sum of stable parts, as is apparently the case (apart from trend) among the familiar monetary aggregates. Neither private-sector debt nor government debt has borne a stable relationship to economic activity, but their total has. In particular, the secular rise and procyclical fluctuation in the private sector's debt have approximately offset the corresponding secular decline (relative to income) and countercyclical fluctuation in the federal government's debt.

The stability of the debt-to-income relationship, if it is indeed a regularity that will persist, bears a number of important implications for the U.S. economy. The finding that debt is as reliably related to economic activity as is money has immediate implications for the choice of monetary policy target. It is also potentially relevant for fiscal policy, in that some hypotheses that may explain the observed debt-to-income stability bear strong implications for the "crowding out" of private investment by debt-financed government spending. Finally, it is especially important in the context of the current widespread concern over capital formation in the U.S. economy. The financing of an increased capital formation rate in the 1980s, as well as the aggregate-level risk to the economy associated with that financing, depends in large part on issues underlying the debt-to-income relationship.

The object of this paper is to examine the debt-to-income stability phenomenon in the United States, with particular attention to implications for the financing of capital formation. Section I explains in what sense the economy's outstanding debt is stable in relation to its income. Section II reports on some empirical comparisons of relative stability for different liability and asset aggregates. Section III outlines three separate hypotheses that could plausibly account for the observed debt-to-income stability, emphasizing the economic implications of these hypotheses, and briefly reports

on some preliminary attempts to test them empirically. To anticipate, findings thus far along these lines are largely inconclusive, so that the debt-to-income stability phenomenon itself, while well documented, remains something of a puzzle. Section IV concludes the paper by briefly considering some implications of debt-to-income stability for the financing of U.S. capital formation.

I. Debt and Income in the Postwar Period

Table 1 presents data showing the yearend indebtedness of U.S. nonfinancial borrowers, as a percentage of fourth-quarter gross national product, for each year since 1945. The first column of the table shows the total credit market indebtedness of all U.S. nonfinancial borrowers. The next five columns present comparable data dividing this total into the respective indebtedness of each of five specific borrowing sectors. The table's final column shows, as a memorandum item, comparable data (not included in the total in the first column) for the debt issued in U.S. markets by foreign borrowers.<sup>1</sup> Figure 1 plots the total nonfinancial debt ratio and its five components by sector.

These data are "net" in the sense that they net out financial intermediation. In other words, the data include such items as a household's mortgage issued to a bank, or a corporation's bonds sold to an insurance company, but they exclude any liability issued in turn by the bank or the insurance company in order to finance that lending activity. The data also exclude debt issued by separate financial subsidiaries of nonfinancial corporations, as well as by federally sponsored credit agencies and mortgage pools. The data are "gross," however, in the sense that they include all of an individual household or firm's outstanding credit market liabilities, not just any excess of liabilities over either financial or total assets, and also in the sense that they include one household's borrowing from another or one firm's borrowing from another.

The strong stability of the total nonfinancial debt ratio, shown in the top line in Figure 1 and the first column of Table 1, stands out in stark contrast to the variation of the individual sector components. The non-financial economy's reliance on debt, scaled in relation to economic activity, has shown almost no trend and but little variation since World War II. During



TABLE 1  
OUTSTANDING DEBT OF U.S. NONFINANCIAL BORROWERS

	Total	Fed. Govt.	State & Local Govt.	Busi- ness Corps.	Other Busi- nesses	House- holds	Memorandum: Foreign
1946	155.6%	103.4%	7.0%	22.4%	7.0%	16.0%	3.6%
1947	145.5	90.5	6.9	23.3	7.0	18.0	5.0
1948	138.2	80.9	7.2	23.7	7.0	19.6	5.2
1949	149.3	84.8	8.4	25.2	7.6	23.5	5.4
1950	133.1	70.7	8.2	23.3	7.4	23.7	4.6
1951	126.6	63.7	8.1	23.5	7.4	24.1	4.3
1952	127.8	61.5	8.7	24.1	7.5	26.0	4.2
1953	134.5	62.9	9.7	25.1	7.5	29.3	4.5
1954	136.8	61.4	11.0	25.5	7.7	31.2	4.4
1955	133.8	56.0	11.3	25.4	7.8	33.3	4.0
1956	133.4	51.9	11.6	26.5	7.9	35.5	4.0
1957	135.8	50.0	12.3	28.0	8.2	37.4	4.2
1958	137.2	49.5	12.9	28.5	8.3	38.1	4.5
1959	140.9	48.2	13.5	28.9	8.7	40.6	4.3
1960	143.9	46.8	14.3	30.5	9.1	43.3	4.6
1961	141.9	44.8	14.2	30.3	9.2	43.3	4.7
1962	143.2	43.6	14.4	30.8	9.6	44.8	4.9
1963	143.5	41.6	14.6	30.9	10.2	46.3	5.1
1964	145.3	40.2	14.7	31.3	10.9	48.3	5.5
1965	141.0	36.6	14.3	31.1	11.0	47.9	5.3
1966	139.1	34.4	14.1	32.0	11.4	47.4	5.1
1967	140.3	33.9	14.2	33.4	11.6	47.2	5.3
1968	139.0	32.5	14.1	34.0	11.5	46.8	5.1
1969	140.2	30.0	14.4	35.5	11.9	47.4	5.1
1970	141.8	29.8	14.8	37.3	12.2	47.7	5.1
1971	141.9	29.4	15.1	37.0	12.6	47.7	5.0
1972	140.3	27.6	14.7	37.0	13.0	47.9	4.9
1973	139.5	25.4	14.1	37.9	13.3	48.8	4.9
1974	141.9	24.4	14.2	40.7	13.5	49.1	5.5
1975	140.6	27.5	13.8	38.8	12.9	47.6	5.9
1976	142.2	29.1	13.4	38.3	12.7	48.7	6.5
1977	143.0	28.8	13.0	38.0	12.7	50.5	6.5
1978	141.0	27.6	12.4	37.2	12.5	51.3	7.3
1979	143.1	26.6	11.9	38.3	13.1	53.3	7.4
1980	142.8	27.2	11.8	38.4	13.1	52.4	7.8

Notes: Data are yearend credit market debt totals as percentages of fourth-quarter gross national product, seasonally adjusted, at annual rate.

Detail may not add to totals because of rounding.

Source: Board of Governors of the Federal Reserve System.

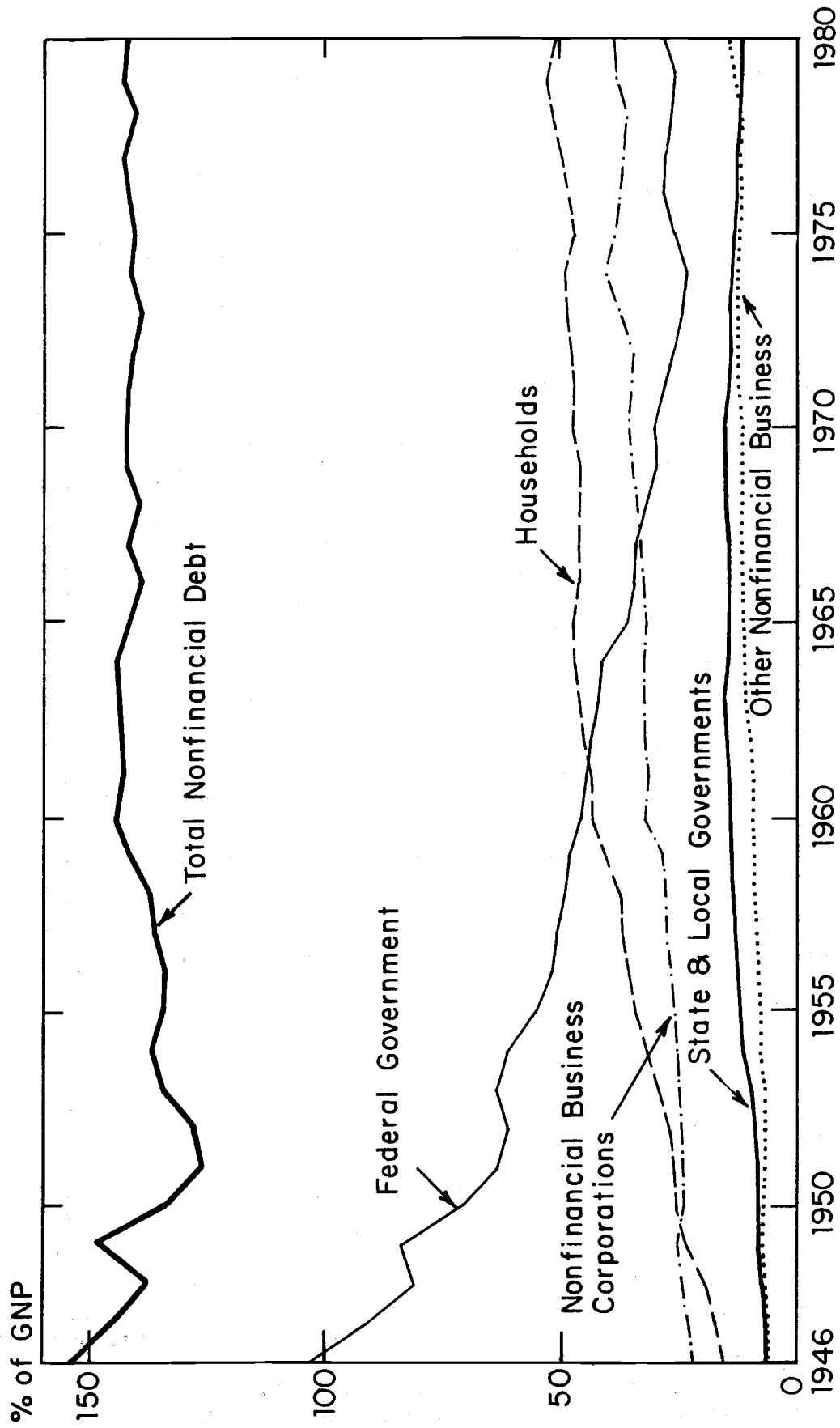


FIGURE 1  
 OUTSTANDING DEBT OF U.S. NONFINANCIAL BORROWERS

this period the total nonfinancial debt ratio has trended slightly upward, apart from a dip in the first few postwar years, and has also exhibited a slight cyclicality, typically rising a point or two in recession years (when gross national product, in the denominator, is weak).

The individual components of this total, however, have varied in sharply different directions both secularly and cyclically. In brief, the secular postwar rise in private debt has largely mirrored a substantial decline (relative to economic activity) in federal government debt, while cyclical bulges in federal debt issuance have mostly had their counterpart in the abatement of private borrowing. Households have almost continually increased their reliance on debt in relation to their nonfinancial activity throughout this period. Both corporations and unincorporated businesses have also issued steadily more debt, on a relative basis, except for temporary retrenchments during recession years. State and local governments steadily increased their relative debt issuing activity during the 1950s and 1960s, but just as steadily reduced it during the 1970s. Except only for 1975-76 and 1980, the federal government has reduced its debt ratio in every year since 1953, although this relative debt reduction has been slower in years when recession has temporarily inflated its deficit (and, again, depressed gross national product in the denominator).

Although the principal focus of this paper is on the postwar experience shown in Table 1 and Figure 1, it is also useful to consider briefly the history of the economy's debt ratio in a longer time frame. Figure 2 shows the size and composition of the U.S. nonfinancial debt ratio (with corporations and unincorporated businesses aggregated) for 1918-78.<sup>2</sup> Apart from a one-time adjustment associated with the fall of prices after World War I, the U.S. nonfinancial economy's reliance on debt relative to economic activity showed

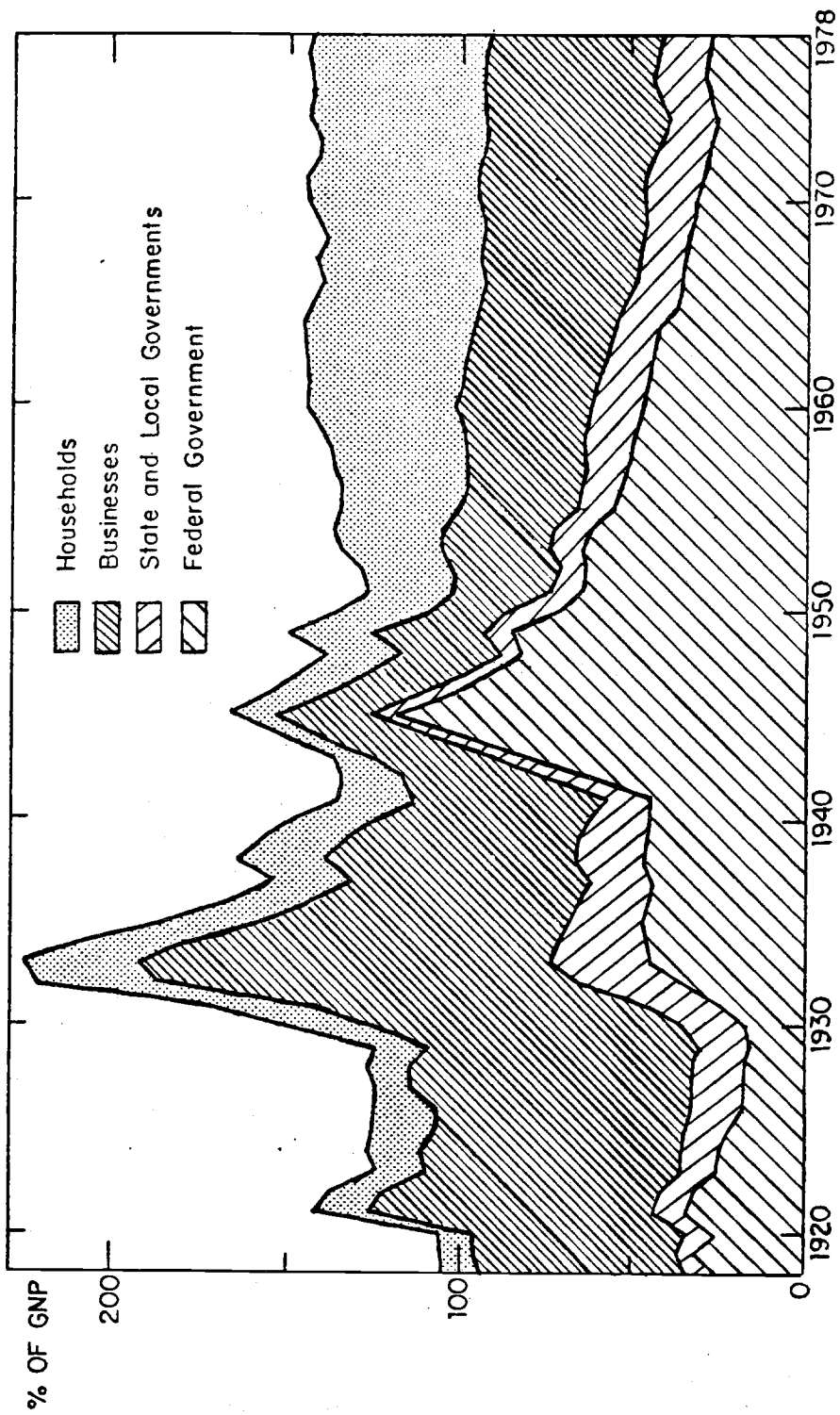


FIGURE 2

OUTSTANDING DEBT OF U.S. NONFINANCIAL BORROWERS

essentially no trend over these sixty years. At 143% as of yearend 1978, the debt ratio was virtually unchanged from 142% in 1921. Nonfinancial borrowers' outstanding debt rose significantly in relation to gross national product only during the depression years 1930-33, when gross national product itself not only was well below trend but also was falling too rapidly for the pay-down of debt to keep pace.<sup>3</sup> Otherwise the economy's total nonfinancial debt ratio remained roughly steady throughout this period, and the postwar stability therefore appears to be in large part a continuation of a pattern that dates back at least to the 1920s.

## II. Comparative Stability Analysis

In order to determine that a relationship is stable, it is important to have at hand some benchmark for comparative purposes. In other words, if the debt-to-income relationship is to be judged "stable," then stable in comparison to what? Table 2 indicates five liability aggregates (including total nonfinancial debt, as shown in ratio form in Table 1 and Figure 1) and five asset aggregates used for such comparative purposes in a series of tests of the stability of each of these aggregates in relation to U.S. economic activity during 1953-78.<sup>4</sup> In brief, the results of these tests are as follows:<sup>5</sup>

Comparison of Ratios. Table 1 shows the ratio of the U.S. economy's total nonfinancial debt to gross national product. One form of relative stability test is simply to compare the variability of this ratio over time, as measured by its coefficient of variation (standard deviation divided by the mean), with that of analogous ratios for other liability or asset aggregates. As the first and third columns of Table 3 show, this comparison for data including time trends indicates that total net assets and total nonfinancial debt are (in that order) the most stable, while the M1 money stock and the monetary base (in that order) are the least stable, among the ten aggregates. The corresponding comparison for detrended data, shown in the adjacent columns of Table 3, again indicates that total net assets is the most stable aggregate in relation to gross national product, with total debt and total nonfinancial debt, respectively, a close second and third. The monetary base exhibits the least stability on a detrended basis, with private nonfinancial liabilities and the M1 money stock close behind. Orderings based on annual data are essentially the same as those based on quarterly data.

Nominal Income Regressions. Simple ratios of precisely contemporaneous observations may well fail to capture the relevant concept of "stability" in

TABLE 2

LIABILITY AND ASSET AGGREGATES USED FOR RELATIVE STABILITY TESTS

<u>Liability Aggregates</u>	<u>Definition</u>
Total Nonfinancial Debt	Total credit market liabilities of all U.S. nonfinancial sectors.
Non-Federal Debt	Total nonfinancial debt <u>less</u> credit market liabilities of the federal government.
Private Nonfinancial Debt	Non-federal debt <u>less</u> credit market liabilities of state and local governments.
Total Debt	Total nonfinancial debt <u>plus</u> credit market debt of U.S. financial intermediaries.
Bank Credit	Commercial bank loans and investments.
<u>Asset Aggregates</u>	
Monetary Base	Bank reserves <u>plus</u> currency outside banks.
Money (M1)	Currency outside banks <u>plus</u> demand deposits.
Money (M2)	Money (M1) <u>plus</u> savings and small time deposits at commercial banks.
Money (M3)	Money (M2) <u>plus</u> savings and small time deposits at thrift institutions.
Total Net Assets	Total holdings of credit market instruments by U.S. nonfinancial holders.

TABLE 3

RESULTS OF COMPARATIVE STABILITY TESTS

<u>Liability Aggregates</u>	<u>Coefficient of Variation, 1953-78</u>				<u>Regression Standard Error</u>	
	<u>Annual Data</u>		<u>Quarterly Data</u>		<u>Quarterly Data</u>	
	<u>Raw</u>	<u>Detrended</u>	<u>Raw</u>	<u>Detrended</u>	<u>1953-78</u>	<u>1970-78</u>
Total Nonfinancial Debt	2.5%	1.8%	2.0%	1.9%	.91%	.90%
Non-Federal Debt	11.9	4.1	12.3	4.1	.92	.89
Private Nonfinancial Debt	12.4	3.5	12.6	3.5	.90	.91
Total Debt	5.2	1.6	5.4	1.8	.89	.83
Bank Credit	6.8	3.2	6.8	3.2	.97	.91
<u>Asset Aggregates</u>						
Monetary Base	16.5%	5.1%	16.8%	5.2%	.95%	.99%
Money (M1)	22.3	3.6	22.0	3.6	.88	.90
Money (M2)	4.3	2.9	4.4	2.8	.91	.96
Money (M3)	3.4*	1.9*	3.5*	1.8*	.77*	.95
Total Net Assets	1.5	1.4	1.6	1.5	.85	.84

Note: M3 statistics indicated by \* are based on data for 1960-78.



the relationship among variables that move over time with some general lead or lag pattern between them. A second relative stability test therefore involves estimating ten regression equations, in each case relating the growth of nominal gross national product to a moving average of the growth of one of the ten financial aggregates listed in Table 3, plus a moving average of a fiscal policy measure, along the lines made familiar by the Federal Reserve Bank of St. Louis. As the fifth column of Table 3 shows, total net assets performs best in this test based on quarterly data for 1953-78, with a standard error of 0.85% per quarter in "explaining" the historical growth of gross national product, while bank credit (standard error 0.97%) performs worst.<sup>6</sup> Total nonfinancial debt is about in the middle. Because the evidence indicates at least some significant break in each of the underlying regressions at around 1970, the last column of Table 4 also shows the respective standard errors for analogous regression equations based on data for 1970-78 only. For this shorter period the relative performance of total nonfinancial debt is somewhat better, equalling that of the M1 money stock.

Richer Dynamic Representations. 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, debt-to-income) relationship have increasingly turned to 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.<sup>7</sup> 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. The aggregate-to-income ratio of course rises at first after a positive innovation, but it will then fall back toward a normal

position if the rise in the aggregate induces a subsequent rise in income (or a reversal in the aggregate itself). Both the timing and the magnitude of the ratio's return to normal provide important information about the stability of the dynamic aggregate-to-income relationship.

Experimentation along these indicates that, on the whole, there is little ground for distinguishing the stability of any one of the five asset aggregates listed in Table 2 from that of any other. The same is not true for the five liability aggregates, however. Here only the total nonfinancial debt ratio (again, the series shown in Table 1), and to a lesser extent the bank credit ratio, return to their initial values rapidly and without overshooting after a shock to the relevant aggregate. What is especially interesting in these results is the contrast between the performance of the ratio for total nonfinancial debt and the ratios for non-federal debt and private debt (both of which are just components of the total) as well as the broader total debt measure. Both the private debt ratio and the non-federal debt ratio continue to move further away from their initial values for two years in response to an innovation in the relevant aggregate, and neither shows any significant return to its initial value within five years — hardly a demonstration of stability. Once federal government debt is included, however, the total nonfinancial debt ratio exhibits just as much stability in this context as does any of the five asset ratios. Moreover, proceeding to broaden the liability aggregate further by including financial intermediaries' credit market liabilities only results in lessened apparent stability.

Among the various liability measures considered, therefore, these results suggest that there is indeed something unique about total nonfinancial debt: It is as if the M1 money stock ratio were sharply unstable, but adding commercial bank time and saving deposits to form the M2 money stock ratio yielded stability,

and further adding thrift institution deposits to form the M3 money stock ratio destroyed that stability — none of which appears to happen. Hence not only does the total nonfinancial debt ratio exhibit just as much stability as any of the five asset ratios in these dynamic tests, it does so uniquely among the various liability aggregates tested.<sup>8</sup>

Overview. In sum, the evidence provided by these three different kinds of tests shows that at least one aggregate measure of outstanding debt liabilities — total nonfinancial debt — consistently exhibits just as much stability in relation to economic activity as do the more familiar asset aggregates including the money stock (however measured). Indeed, some of these tests suggest that the debt-to-income relationship, measured in this way, is more stable than any of the various money-to-income relationships. Regardless of whether the U.S. debt-to-income relationship is "as stable as" or "more stable than" that for money, however, like the money-to-income relationship it is potentially important for understanding the economy. By contrast, although the money-to-income relationship has long been the focus of attention, the debt-to-income relationship has to date received little notice.

### III. Three Possible Explanations

What accounts for this phenomenon? Unlike the case of income and money, for which well accepted models of the role of money in the economic process do suggest a close relationship on a priori grounds, what little study the role of debt has received in the literature thus far has not appeared to indicate any necessarily close or stable relationship to income. Explaining the observed stability of the debt-to-income relationship therefore presents a major research challenge.

A useful starting place for thinking about the underlying economic behavior that could plausibly explain the observed stability of the relationship between the nonfinancial economy's total liabilities and its income is the familiar proposition that, because people hold wealth for the stream of services (positive for assets, negative for liabilities) it provides, they therefore maintain some approximately fixed target for overall wealth in relation to their incomes. Each person's wealth-to-income target is age-specific, of course, but if the age structure of the population is roughly stable over time the economy's aggregate wealth-to-income ratio will be approximately stable as well.<sup>9</sup>

Work to date suggests three potential explanations for a stable debt-to-income ratio, each of which proceeds from the assumption of a stable wealth-to-income ratio for the economy as a whole:

An Ultrarationality Hypothesis. One such potential explanation is an "ultrarationality" hypothesis that in part recasts into stock-flow form work by David and Scadding [2] intended to explain the stability of the U.S. gross private saving rate as noted earlier on by Denison [3]. If the streams of services (again, positive for assets and negative for liabilities) provided by specific components of overall wealth are imperfect substitutes for one another, then the same analysis that implies a stable target wealth in relation

to income also implies a stable "sub-target" for each component — including indebtedness. If, in addition, individuals "see through the shell" of government and corporations, as David and Scadding argued, then they will regard debt obligations issued by the government (for the case of taxpayers) and by corporations (for shareholders) as equivalent to their own liabilities.

Under the ultrarationality hypothesis, therefore, the observed stability of the aggregate debt-to-income relationship has primarily reflected the response of the private sector to movements in the government's indebtedness. Given any variation in the government's liabilities, for whatever purposes may be indicated by public policy, the private sector consisting of households and the corporations that the households own will simply adjust by issuing enough debt to offset the government's action. Yet a further elaboration of the same basic idea that changes nothing fundamental is to view corporations as also responding to independent objectives or influences (for example, tax laws), and households as then adjusting their debt positions to offset the given actions of both the government and the corporations. In either case, the nonfinancial economy will seek (and achieve) a stable ratio of its aggregate liabilities to income, regardless of the composition of that aggregate.

The ultrarationality hypothesis is interesting for several reasons that go beyond its potential ability to explain the debt-to-income stability phenomenon. From a purely behavioral standpoint it carries strong implications about individuals' perceptions and about familiar aspects of wealth holding. In addition, as David and Scadding have pointed out, it implies that people regard as close substitutes personal saving and corporate saving, as well as personal consumption and taxes. Hence "crowding out ex ante" renders fiscal policy impotent in both the short and the long run.

A Capital Leveraging Hypothesis. A second potential explanation is a

"capital leveraging" hypothesis that emphasizes credit market imperfections and the need of most would-be borrowers to provide some kind of collateral, explicit or implicit, in order to obtain credit. To the extent that people do not see through the shell of government, or that the distribution of tax liabilities and the distribution of bond holdings overlap only weakly, the private sector's assets (after netting out inside debt) consist of tangible assets — including not only corporate assets like plant and equipment but also residential real estate and consumer durables — plus government bonds. If people have not only a stable target for net wealth but also a stable sub-target for total assets in relation to income, then they will vary their holdings of tangible assets so as to offset variations in the government's outstanding indebtedness. Variations in the private sector's holdings of tangible assets also typically affect its borrowing capacity, however. When collateral constraints are binding, the increase in tangible asset holdings that follows as a consequence of a reduction in the government's indebtedness therefore facilitates a corresponding increase in the private sector's outstanding liabilities.

The importance of credit market constraints is most readily apparent in the household sector's debt arrangements. In fact, borrowing against tangible assets in the form of home mortgage and consumer installment credit has constituted the overwhelming majority of the household sector's credit market indebtedness at least since World War II (89% as of yearend 1980). Similarly, the borrowing of many corporations consists primarily of explicitly secured long-term market debt, in the form of mortgages or "first mortgage" bonds, and implicitly secured short-term bank debt matched by inventory holdings.

If credit market collateral constraints restrict the private sector's ability to substitute its own liabilities in place of the government's declining

indebtedness, the private sector can increase its outstanding liabilities only to the extent that it is also accumulating more tangible assets with which to back them. Under the capital leveraging hypothesis, therefore, the stability of the U.S. nonfinancial debt ratio has reflected in the first instance an increase in tangible assets in approximately the proportion necessary to hold the private sector's net worth fixed in relation to income, as its ownership of government liabilities has declined relative to income. By easing the effective credit market constraints, this relative increase in tangible assets facilitates the increase in private-sector liabilities. If private liabilities increase fully in step with tangible asset holdings, while tangible assets increase in step with the reduction in government debt, then total nonfinancial debt (private plus government) will remain stable in relation to income.

The capital leveraging hypothesis also bears a number of potentially interesting implications apart from any connection to the stable debt-to-income relationship. Probably the most important of these is the picture it provides of the importance of collateral constraints in the everyday working of the credit markets. In addition, it implies that the government's deficit is a major determinant of the economy's physical investment. Unlike the case of the ultrarationality hypothesis, however, there is no necessary connection between consumption and taxes, so that fiscal policy can affect not just the composition of income but also its total.

An Asset Demand Hypothesis. Finally — at least with respect to work done thus far — a third potential explanation is that the appearance of stability in the economy's liability issuing behavior is merely a consequence of balance-sheet identities and market-clearing conditions imposed on stable asset holding behavior. If the separate streams of services provided by tangible assets and financial assets are imperfect substitutes, then people

will have stable sub-targets in relation to income for the two asset classes separately. In other words, the demand for financial assets, given income, will be relatively interest inelastic. Since total financial assets held must equal total financial assets issued, however, the combination of inelastic demand and an at least partly elastic supply will also result in a stable relationship between income and total financial assets issued.<sup>10</sup>

The most interesting implications of the resulting "asset demand" hypothesis concern the role of equities in asset holders' portfolios, and the nature of financial intermediation. Because what is stable in relation to income is outstanding debt liabilities of nonfinancial borrowers, a stable demand for total financial assets is, in the end, not a sufficient explanation after all. In addition, it is necessary to posit not only that investors treat debt and equity securities as only weakly substitutable — an assumption that in turn bears importantly on the debate about the "ex post crowding out" of private spending by debt-financed fiscal policy — but also that, in holding debt obligations issued by an intermediary, investors look through the shell of the intermediary too.<sup>11</sup>

Test Results. Efforts thus far to test these three potential explanations for the stable debt-to-income relationship, using data for the U.S. household and nonfinancial corporate business sectors, have not produced conclusive results.

Perhaps the strongest statement possible on the basis of these results is that the capital leveraging hypothesis is clearly not the entire answer. As Figure 3 shows, neither individuals nor nonfinancial business corporations have on balance increased their indebtedness merely in pace with their ownership of tangible assets. During 1947-66 for individuals, and during 1957-73 for corporations, the rapid increase in private-sector indebtedness also represented



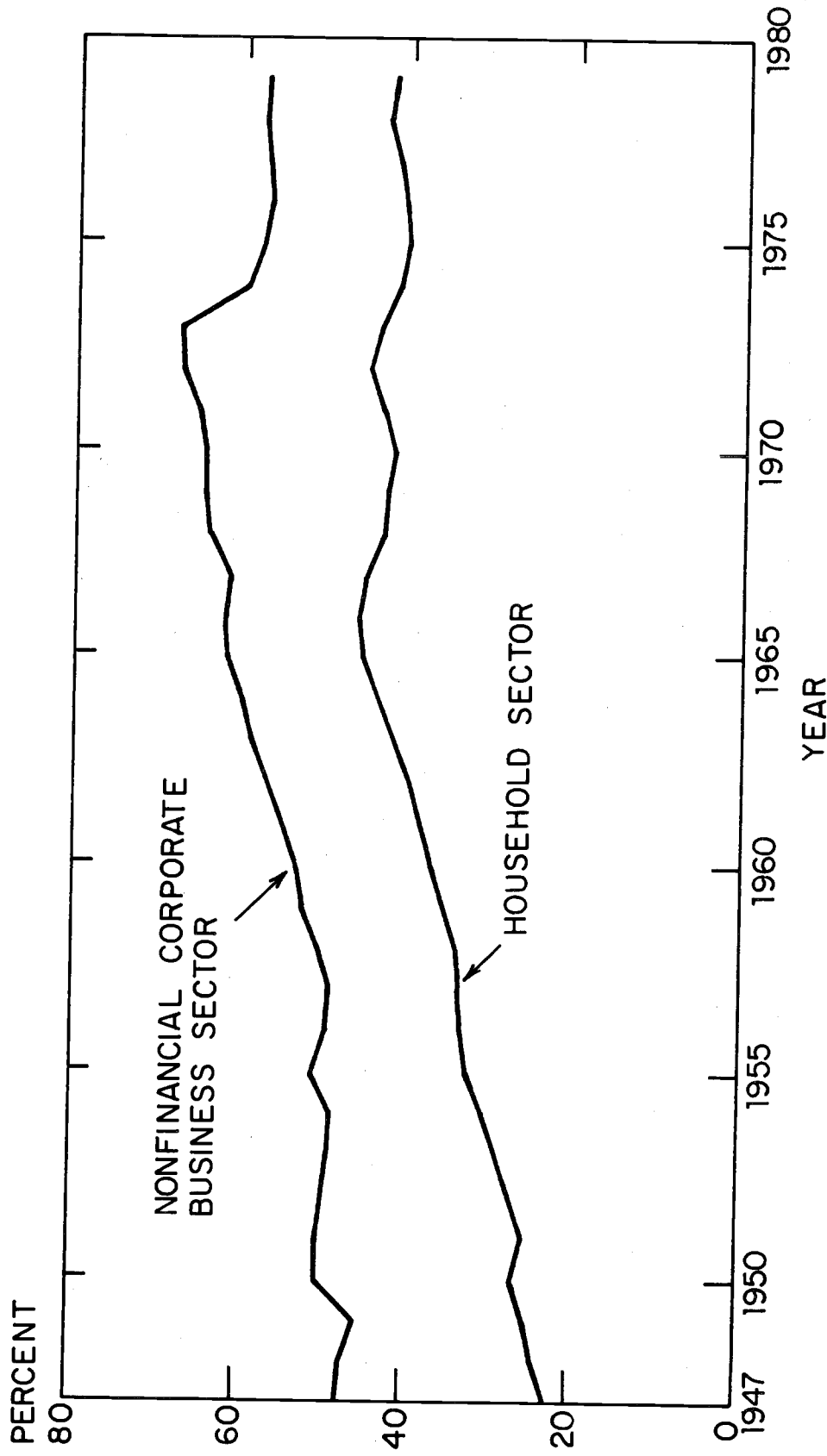


FIGURE 3  
 LIABILITIES AS A PERCENTAGE OF TANGIBLE ASSET HOLDINGS

increasing leverage.

Tests do, however, reveal at least some positive evidence consistent with each of the three hypotheses.<sup>12</sup> For example, the dynamic relationship between the federal and non-federal components of the total nonfinancial debt-to-income ratio shows a distinct tendency for the non-federal debt ratio to fall in relation to a positive innovation (in the sense described in Section II) in the federal debt ratio, after a delay of about one year. Conversely, a positive innovation in the non-federal debt ratio causes the federal debt ratio to fall, essentially without delay. In a study of the three-way interaction among federal debt, corporate debt and corporate tangible asset holdings, a positive innovation in the federal debt ratio immediately reduces corporate tangible assets and corporate indebtedness relative to income, thereby lending support to the capital leveraging hypothesis. In an analogous study for the household sector, a positive innovation in the federal debt ratio immediately reduces household tangible assets relative to income, but the associated reduction of household indebtedness follows only after a puzzling delay of two years.

Overall, although (at least) three different explanations are available for the observed stability of the debt-to-income relationship in the United States, the evidence now at hand is insufficient to choose among them. The debt-to-income phenomenon remains for the present a major puzzle. In light of its potential importance, finding the right explanation is an objective that clearly warrants further research.

IV. Implications for Debt and Equity Financing of Capital Formation

An increased rate of capital formation has emerged as a nearly undisputed objective of U.S. economic policy for the 1980s. Dissatisfaction with the U.S. economy's poor productivity performance in the 1970s, as well as with the erosion of international competitiveness that began much earlier but also became more evident in the 1970s as the international exchange value of the dollar declined dramatically, has elevated what was once largely a business interest into a much more widely shared goal. In today's environment groups representing labor and consumers also recognize the need for capital investment to create jobs and to raise productivity and hence the population's overall standard of living. On the whole, public discussion has moved from whether more capital formation is desirable to what policies can best achieve it.

An important aspect of capital formation that this discussion has often overlooked, however, is its explicitly financial side. In an economy like that of the United States, each decision to create more physical capital necessarily has a financial counterpart. Moreover, the financial transactions associated with capital formation are not merely a reflection of real resource allocations that would necessarily come about in any case. The setting in which the financing of capital formation takes place can also be a key determinant of real resource allocations, including not only the total amount of capital formation undertaken but also its composition. The financial and the nonfinancial elements of the process jointly determine one another, and public policy can affect the ultimate outcome by influencing either.

It is also important to recognize that businesses and individuals in the U.S. economy have in fact been undertaking more capital formation rather than less, at least in the usual sense of investment in plant and equipment. As the first column of Table 4 shows, over the past quarter-century gross U.S.



expenditures on plant and equipment actually increased as a share of the nation's gross national product. More importantly, however, while gross capital formation has represented a progressively larger share of total output, the corresponding net capital formation underwent a sharp reversal within this period. As the second column of the table shows, net U.S. investment in plant and equipment (that is, net of the true economic depreciation) rose rapidly as a share of total output between the late 1950s and the late 1960s, but then fell back almost as rapidly by the late 1970s.

Still, it is gross capital outlays that the businesses and individuals investing in plant and equipment need to finance. Corporations engaged in nonfinancial lines of business have consistently accounted for nearly three-fourths of all U.S. investment in plant and equipment since World War II. As the next two columns of Table 4 show, over the last quarter-century the U.S. nonfinancial corporate business sector has increasingly relied on external as opposed to internal funds (including depreciation allowances) in financing its capital outlays.<sup>13</sup> Moreover, as the table's final columns show, corporations have consistently raised almost all of these external funds by issuing debt, and in doing so they have increasingly relied on short-term instruments.<sup>14</sup>

How has the economy absorbed this enormous expansion in the corporate sector's reliance on debt? As the discussion in Section I of the U.S. economy's stable overall debt-to-income ratio notes, the chief counterpart of the increasing corporate (and household) indebtedness relative to income over much of this period has been the federal government's declining indebtedness relative to income.

Recognition of this stable overall debt-to-income relationship raises two important questions about the financing of an increased rate of U.S. capital formation in the 1980s: First, if business corporations undertake sharply

increased capital outlays, will they be able to continue their reliance on debt financing if the federal government's indebtedness relative to gross national product declines only slowly (or not at all) as in the 1970s, in contrast to the rapid decline in the 1950s and 1960s? The historical experience represented by the data shown in Table 1 and Figure 1 suggests otherwise. If the stability of the economy's aggregate nonfinancial debt-to-income ratio is indeed a regularity likely to persist, then the corporate sector will be able to undertake more investment in plant and equipment only if the government's relative indebtedness falls, or if corporations turn increasingly to equity finance through retention of internally generated funds or issues of new shares.

Second, even if declining federal government indebtedness relative to income does enable the corporate sector to finance increased capital outlays by further increasing its own indebtedness relative to income, what effect will this renewed change in the U.S. economy's government/private debt mix have on the economy's overall level of financial risk? In an economy with highly developed financial markets, potential hazards to the stability of the economy as a whole arise not just from the disruptions that from time to time may disturb the economy's nonfinancial activity directly but also from fragility of the financial superstructure built around it. Although a detailed consideration of the level of aggregate financial risk associated with any given further change in the government/private debt mix lies beyond the scope of this paper, it is clear that, without a base of presumably default-free government debt (or private debt rendered default-free through effective monetization), each market participant's financial assets consist simply of other market participants' liabilities.<sup>15</sup> Even if it is not necessary for the corporate sector to turn to equity finance because of an inability to increase its relative indebtedness, therefore, in the context of a sharply increased U.S. capital formation rate

greater reliance on equity finance may have an important role to play in this process anyway.

### Footnotes

\*Professor of Economics, Harvard University. This paper, prepared for the National Bureau of Economic Research conference on "The Changing Roles of Debt and Equity in Financing U.S. Capital Formation," is a part of the National Bureau's research project on this subject sponsored by the American Council of Life Insurance. The paper draws in large part on my earlier research done within this project. I am grateful to the National Bureau and the Alfred P. Sloan Foundation for research support.

1. In part because of the capital export controls that were in force during 1964-74, foreign obligors accounted for only a small fraction of borrowing in the U.S. markets throughout this period.
2. Figure 2 is from my earlier paper [ 5 ].
3. The debt ratio peak during 1918-78 occurred in 1933, the trough year of the depression. In addition, much of the household and business debt nominally outstanding during the depression was of questionable value.
4. It is important to exclude the pre-1953 data because of the behavior of the monetary aggregates while the Federal Reserve System stabilized government bond prices before the Treasury-Federal Reserve Accord.
5. The full sets of test results are reported in my earlier paper [ 6 ].
6. An equation with standard error of 0.85% would be expected to predict the GNP growth rate to within  $\pm 0.85\%$  two-thirds of the time. This ranking ignores the superior result for M3 based on a shorter sample period.
7. Among the most important criticisms of the St. Louis approach have been those of Goldfeld and Blinder [ 8 ], Sargent [13], and Modigliani and Ando [12]. The methodology underlying the tests described below is due largely to Granger and Sims; see especially Sims [14].
8. Similar tests that distinguish the reaction of nominal income between effects on real income and effects on prices (not described in the text) show essentially identical results.
9. Modigliani [11] provided a clear discussion of these propositions, showing how they are derivable from more fundamental principles.
10. At the most fully aggregated level — that is, with the government and the private sector consolidated — there would be no meaningful distinction between the demand and supply side of the asset markets for purposes of measurement. This problem is merely an example of the fundamental identification problem emphasized by Brainard and Tobin [ 1 ] and Smith [15].
11. My earlier paper [ 4 ] showed why the substitutability of debt and equity securities is so important for the "crowding out" issue.
12. My earlier paper [ 6 ] included a more detailed discussion of these tests and their implications.



13. The appearance of a reversal in the latest half-decade is largely due to the aftermath of the unusually severe 1973-75 recession as well as the 1980 recession.
14. My earlier paper [7] discussed these patterns of corporate financing, and their implications for capital formation, in greater detail.
15. Minsky's work has typically emphasized this issue; see, for example, Minsky [9, 10]. My earlier paper [7] discussed the resulting aspect of financial stability as a "public good."

### References

1. Brainard, William C., and Tobin, James. "Pitfalls in Financial Model-Building." American Economic Review, LVII (May, 1968), 99-122.
2. David, Paul A., and Scadding, John L. "Private Savings, Ultrarationality, Aggregation, and 'Denison's Law'." Journal of Political Economy, LXXXII (March/April, 1974), 225-49.
3. Denison, Edward F. "A Note on Private Saving." Review of Economics and Statistics, XL (August, 1958), 261-267.
4. Friedman, Benjamin M. "Crowding Out or Crowding In? Economic Consequences of Financing Government Deficits." Brookings Papers on Economic Activity (No. 3, 1978), 593-654.
5. Friedman, Benjamin M. "Postwar Changes in the American Financial Markets." Martin Feldstein (ed.), The American Economy in Transition. Chicago: University of Chicago Press, 1980.
6. Friedman, Benjamin M. "The Relative Stability of Money and Credit 'Velocities' in the United States: Evidence and Some Speculations." Mimeo, National Bureau of Economic Research, 1981.
7. Friedman, Benjamin M. "Financing Capital Formation in the 1980s: Issues for Public Policy." Michael L. Wachter and Susan M. Wachter (eds.), A New U.S. Industrial Policy. Philadelphia: University of Pennsylvania Press, forthcoming.
8. Goldfeld, Stephen M., and Blinder, Alan S. "Some Implications of Endogenous Stabilization Policy." Brookings Papers on Economic Activity (No. 3, 1972), 585-640.
9. Minsky, Hyman P. "Financial Stability Revisited: The Economics of Disaster." Reappraisal of the Federal Reserve Discount Mechanism. Washington: Board of Governors of the Federal Reserve System, 1972.
10. Minsky, Hyman P. "A Theory of Systematic Fragility." Altman and Sametz (eds.), Financial Crises: Institutions and Markets in a Fragile Environment. New York: Wiley-International, 1977.
11. Modigliani, Franco. "The Life Cycle Hypothesis of Saving, the Demand for Wealth and the Supply of Capital." Social Research, XXX (Summer, 1966), 160-217.
12. Modigliani, Franco, and Ando, Albert. "Impacts of Fiscal Actions on Aggregate Income and the Monetarist Controversy: Theory and Evidence." Jerome Stein (ed.), Monetarism. Amsterdam: North-Holland Publishing Company, 1976.
13. Sargent, Thomas J. "The Observational Equivalence of Natural and Unnatural Rate Theories of Macroeconomics." Journal of Political Economy, LXXXIV (June, 1976), 631-640.

14. Sims, Christopher A. "Macroeconomics and Reality." Econometrica, XLVIII (January, 1980), 1-48.
15. Smith, Gary, "Pitfalls in Financial Model Building: A Clarification." American Economic Review, LXV (June, 1975), 510-16.