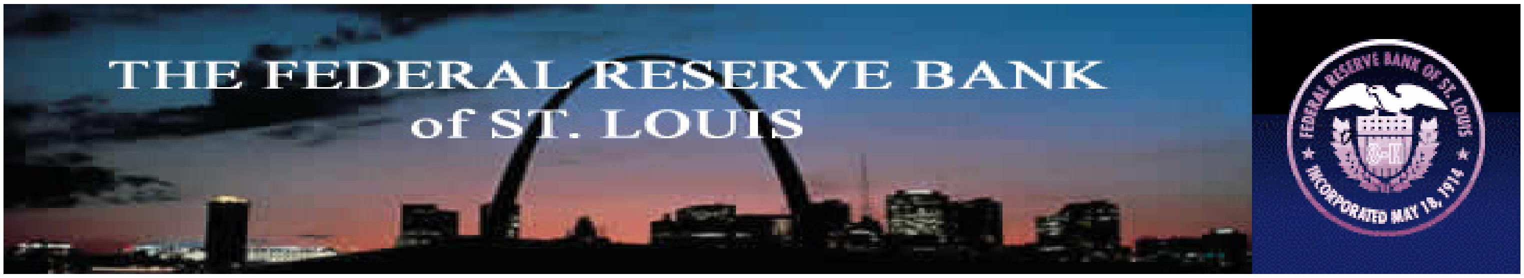

WORKING PAPER SERIES

Is There a Stable Relationship Between Debt Growth and the Money Stock?

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IS THERE A STABLE RELATIONSHIP BETWEEN DEBT GROWTH AND THE MONEY STOCK?

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IS THERE A STABLE RELATIONSHIP BETWEEN DEBT GROWTH AND THE MONEY STOCK?

I. INTRODUCTION

The impact of federal debt growth on interest rates, inflation and the money stock have recently been intensively examined.[1/] Much of this research has undoubtedly been inspired by the large current and projected future federal deficits. One general view of government deficits, commonly associated with Keynesian analysis, is that large federal deficits increase the demand for loanable funds, thus driving up interest rates and reducing private borrowing and expenditures. This logic forms the basis for the conventional "crowding out" hypothesis. In contrast, the so-called Ricardian equivalence hypothesis, espoused in particular by Barro (1974), argues that a bond-financed increase in government spending will lead to increases in saving sufficient to offset the expected future tax increase required to repay the bonds currently being issued. Government borrowing and private saving would both increase, and interest rates would remain unchanged.[2/] Given the competing theories, the impact of government borrowing and government debt on interest rates becomes an empirical question.

There is also concern that large federal deficits may lead to increased inflation. If a debt-financed increase in government spending prompts a net increase in aggregate demand, as predicted in Keynesian models, the increased demand would be expected to eventually generate higher inflation. Alternately stated, if government debt is perceived by economic agents as net wealth, then an increase in federal debt would increase consumption to the extent that consumption is determined by net wealth. Again, this effect assumes that the Ricardian equivalence hypothesis does not hold and that households view government bonds as net wealth. In contrast, Barro argues that the increase in government spending rather than the method of finance is responsible for any increase in aggregate demand and inflation.

An increase in government debt may also lead to additional inflation and changes in interest rates to the extent that it prompts the Federal Reserve to increase money growth. For example, assume the Federal Reserve were pursuing an interest rate target and the Treasury issued debt in an amount that led the Fed to expect interest rates to increase, ceteris paribus. To maintain its interest rate target, the Fed would have to increase the money supply. By increasing the money supply--"monetizing the debt"--the Federal Reserve would be allowing government deficits to increase inflation irrespective of wealth effects.

The above discussion indicates that two issues are central in examining the impact of government deficits on inflation and interest rates: (1) to what extent are government bonds net wealth, and (2) to what extent have debt increases led to money stock increases? The analysis below focuses solely on the second issue, the impacts of federal debt growth on monetary policy.[3/] Specifically, have increases in federal debt resulted in significant changes in the money stock? Section II presents the basic reaction function approach employed here, as well as alternate estimation results for the complete data sample. The stability of the effect of federal debt on monetary policy as well as the overall stability of the estimated reaction functions are considered in Section III. The last section summarizes the results and discusses some implications.

II. REACTION FUNCTIONS

The most common approach to examining whether federal deficits, or any other variable, has had any impact on monetary policy is by means of a reaction function. For example, following McMillin and Beard (1980), the Federal Reserve can be assumed to operate with a particular model of the economy and with a view toward optimizing some objective function. The reaction function is simply the reduced form solution to the optimizing problem faced by the Fed. As such, it relates the instrument(s) of monetary policy to the parameters and other variables in the model. Since the reaction function is a reduced form equation its estimated coefficients must be interpreted with care.

Before specifying the reaction function employed here, it is necessary to consider the measurement and interpretation of both the money and debt variables. During the period examined here, 1954:1 to 1983:3, the Federal Reserve's operating procedures underwent substantial changes. Through the 1960s it has been argued that the Federal Reserve basically focused on controlling interest rates. Thus, actions that would tend to drive up interest rates would prompt the Fed to increase the money stock to maintain its interest rate target. If the Fed believed increases in federal debt would drive up interest rates, the "appropriate" action would be to increase the money stock in the face of increases in federal debt. In this scenario, debt growth would lead to money growth but should not change nominal interest rates.[4/] Since 1970 increased weight has been placed on monetary aggregates with formal ranges for money stock growth beginning in 1975 and money stock targeting (by focusing on nonborrowed reserves) beginning in October 1979. The emphasis on money growth, in particular M1 growth, was relaxed somewhat in October 1982.[5/]

A shift in monetary policy targets dramatically alters the theoretical impact of the debt. If the Federal Reserve has a monetary aggregate target, then federal debt growth may increase interest rates if the Ricardian equivalence hypothesis does not hold. In addition, money growth should not be altered.[6/] If the Ricardian equivalence hypothesis holds, then interest rates and money growth may both be unchanged.

This discussion of the impact of federal debt growth on money growth and on interest rates is predicated on the assumption that changes in federal debt are due to policy changes, that is, changes in the structural or active deficit. Cyclically induced changes in debt growth may be accompanied by very different responses. For example, a recession is generally accompanied by a rising cyclical deficit but lower interest rates. Any relationship based on cyclically induced debt growth, however, is not directly causal. Rather, cyclical factors influence both debt growth and interest rates.[7/]

Two basic reaction function specifications are presented and estimated below. Alternative specifications are employed in an attempt to insure that the money-debt results are not sensitive to equation specification. The first specification is similar to that used by McMillin and Beard:[8/]

$$(1)\quad M_t = \alpha_0 + \alpha_1 i_t + \alpha_2 d_t + \alpha_3 D_t + \alpha_4 Y_{t-1} + \alpha_5 POT_t + \alpha_6 \dot{P}_t^* + \varepsilon_t$$

where:

$M \equiv$ money stock (M1),

$i \equiv$ 3-month Treasury bill rate,

$d \equiv$ discount rate,

$D \equiv$ a measure of the federal deficit,

$Y \equiv$ nominal GNP,

$POT \equiv$ real potential GNP, and

$\dot{P}^* \equiv$ the desired rate of inflation.

The desired rate of inflation is based on the assumption that the Federal Reserve wishes to gradually slow inflation relative to a moving average of its past values.[9/] In this specification all variables are included in log form except the deficit (since it may assume positive or negative values).

The second specification is based on that used by Sheehan (1985):

$$(2)\quad \dot{m}_t = \beta_0 + \sum_{i=1}^{I} \beta_i \dot{m}_{t-i} + \sum_{j=0}^{J} \gamma_j \Delta D_{t-j} + \sum_{j=0}^{J} \psi_j \dot{ur}_{t-j} + \sum_{j=0}^{J} \eta_j \dot{p}_{t-j} + \sum_{j=0}^{J} \psi_j \dot{i}_{ff,t-j}$$

where $ur \equiv$ unemployment rate,

$p \equiv$ actual inflation rate,

$i_{ff} \equiv$ the federal funds rate,

and the notation $\dot{x}$ indicates the first difference of natural lags of the variable X.

With this specification, the lag lengths (I and J) are initially restricted to eight quarters. Akiake's FPE criterion used to determine the final estimated lag lengths.

These two specifications represent divergent approaches to the Federal Reserve reaction function. The first approach uses a structural econometric model with constraints on the lag lengths of the included variables but with a wide range of variables allowed to enter the reaction function. In contrast, the second approach, following vector autoregressive analysis, restricts the included variables but expands the allowed lag length. Anderson, Johannes, and Rasche (1983) have demonstrated that both structural econometric models and time series methods involve substantial untested restrictions. The former generally restricts lag lengths, while the latter restricts the number of right-hand-side variables. It is not the point of this paper to compare the approaches or to test the validity of the alternate sets of assumptions. Instead, both specifications are employed to insure that the impact of debt on Fed policy and the stability (or instability) of Fed policy is not sensitive to assumptions underlying the estimated reaction function. In Leamer's (1983) terminology, the alternate specifications provide some evidence that the money-debt results are not "fragile."[10/]

Both the above equations are estimated over the interval 1958:1 to 1983:3.[11/] The reaction functions are alternately estimated with two debt measures, the net federal debt (NFD) and the high-employment budget deficit (HEBD). The former includes the effects of both structural and cyclical changes in the federal debt, while the latter includes only the impacts of structural debt changes. Estimated reaction functions corresponding to equation (1) are presented in table 1, while estimated reaction functions corresponding to equation (2) are presented in table 2.

While the focus of the paper is on the debt variable, we first briefly discuss some non-debt results. First, the estimated coefficients must be interpreted with care since they are derived from a reduced form model. With specification (1), the estimated coefficients generally appear plausible. An increase in interest rates or in potential GNP prompts an expansion of the money supply. The negative coefficient on the discount rate implies that the Fed would, when pursuing expansionary monetary policy, simultaneously increase the money supply and decrease the discount rate. The coefficient on lagged nominal income captures the influences of a number of cyclical variables and cannot be readily interpreted, although it may suggest pro-cyclic monetary policy. The desired inflation term is insignificant, indicating either that the Fed was not interested in lowering inflation during this period or that the variable $\dot{P}^*$ does not adequately measure the desired inflation rate. The summary statistics suggest a good overall fit.

Table 2 is not directly comparable with table 1 since the former is based on the first differences of logs, while the latter is in terms of the log-levels.[12/] In addition, all variables included in the former are based on a search of the lag space using Akiake's FPE criterion. To conserve space, only the sums of the estimated coefficients are presented. The corresponding t-statistic is based on the null hypothesis that the coefficient sum is not significantly different from zero.[13/] In addition, F statistics were calculated for the hypothesis that the coefficients were jointly not significantly different from zero. In the two cases where the sum is not significantly different from zero, the interest rate terms in the NFD and HEBD equations, the F statistic indicates the coefficients are jointly significant. This result is consistent with interest rate changes having only a temporary impact on money growth.

While the negative coefficient sum on the unemployment terms may appear counterintuitive, it is consistent with the positive coefficients on income in specification (1). Again, it should be noted that the equation is a reduced form. Perhaps the only surprise is the insignificance of the inflation terms. The null hypothesis that the coefficients are jointly equal to zero cannot be rejected at any conventional level. Thus, inflation terms are not included in the equations reported in table 2.

The remainder of the paper focuses on the question of debt's impact on monetary policy and the stability of that impact. The results in tables 1 and 2 suggest some uncertainty in debt's impact on money. In specification (1), the impact of debt depends on the measure used. NFD is significant while HEBD is insignificant. In contrast, in specification (2) both debt measures are significant--the NFD measure at the 95 percent level and HEBD at the 99 percent level. It should be noted, however, that the significance of HEBD is due exclusively to a significant lagged effect. Contemporaneous HEBD is also insignificant in specification (2). This result suggests that debt growth may have led to money growth in both specification (1) and (2) with $HEBD_{t-1}$ inappropriately excluded from specification (1).

III. STABILITY OF THE IMPACT OF DEBT

While the above results suggest that debt influences money, there is a substantial literature suggesting that the reaction function, including the money-debt relationship, may vary over time.[14/] Through the early 1960s relatively little attention was paid to the impact of debt on money. Federal debt was relatively stable and thus would have little impact on monetary policy. By the early 1970s there was some concern expressed about the possibility of a relationship, while by the early 1980s there was well-developed literature discussing the linkage. The increase in interest roughly parallels the increase in federal debt.

The results presented in tables 1 and 2 assume a stable relationship between Fed behavior and deficits over the entire period. The above discussion, however, suggests the possibility of a changing role for debt over the sample period. Here we focus on two alternate assumptions concerning how the impact of debt on money may change over time. First, it is possible that changing Presidential Administrations altered the role of debt. While the Administration has no direct control over monetary policy, it does have some indirect control both through its appointments to the Board of Governors as well as through its persuasive powers, sometimes referred to as "Fed-bashing." It has often been argued that the Fed has generally acceded to the wishes of the Administration when those desires were made clear.[15/] Also potentially important is the Administration's control over the federal deficit. Large deficits may force the Fed to react depending on its goals and objectives.

Alternately, changing the targeting procedures of the Federal Reserve may alter the impact of debt on money. As explained above, if the Federal Reserve is targeting on interest rates, then an increase in debt would have no impact on interest rates although it could have a substantial impact on money growth. Any possible effect on interest rates would be offset by Federal Reserve intervention. In contrast, if the Federal Reserve is targeting on a monetary aggregate, in particular M1, debt growth would have no effect on money but could influence interest rates.[16/]

The above discussion suggests that the relationship between debt and money may have changed a number of times during the 1958:1 to 1983:3 interval. To test this possibility we use the "stabilogram" procedure suggested by Ashley (1983). A stabilogram is based on estimating an equation with the variable(s) of interest partitioned by means of dummy variables. Each of the partitioned variables is defined over a sub-interval of the entire period. Using the Presidential Administration's decomposition as an example, when focusing on debt, one variable would assume the actual values of the debt variable in, say, 1958:1 to 1960:4 and would otherwise assume a value of zero, another would take actual values from 1961:1 to 1964:4 and zero otherwise, and so on. Algebraically, in terms of specification (2) the debt terms $\sum_{j=0}^{J} \gamma_j \Delta D_{t-j}$ in equation (2) are replaced with debt terms $\sum_{s=1}^{S} \sum_{j=0}^{J} \gamma_{js} X_s \Delta D_{t-j}$ where X_s is a dummy variable taking the value of 1 in the subperiod s and zero otherwise. The value of s depends on the number of subperiods. Ashley suggests using a value of s between 5 and 11. This procedure allows the examination of the impact of an independent variable during a particular subperiod but still use the information contained in the complete sample when estimating the equation.[17/]

Two decompositions of the sample period are used for both specifications of the reaction function. The first, presented in the top half of tables 3 and 4, is based on a priori expectations about when the Federal Reserve was most likely to have changed its policies, while the bottom half uses a decomposition based on Presidential Administrations.

The individual debt coefficients in table 3 suggest relatively little change in the impact of debt on money over time in the two regressions of money on NFD using specification (1). Because the standard errors associated with those estimates are so small, however, a F test indicates that the hypothesis of a constant impact of debt on money can be rejected for both decompositions of money on NFD using specification (1). Individual t-tests for pairwise differences between the alternate coefficients are presented in table 4 and give more insight into the differences between debt's impact from one period to the next.[18/] For example, with the first decomposition there are significant breaks (at the 10 percent level) in moving from the 1958:1 - 1970:4 period to the 1971:1 - 1974:4 period as well as from the 1979:4 - 1982:3 period to the 1982:4 - 1983:3 period.

While the F and t statistics indicate statistically significant breaks between the alternate periods, the economic significance of the breaks is questionable. For example, in the first decomposition, an increase in NFD of $1 billion would increase the money stock by $130 million before 1971 and by $164 million in 1971 to 1974. While there is a statistical break, this difference does not appear to be economically significant.[19/] Thus, the impact of NFD on money has apparently not changed in any economically meaningful way.

For the other equations in table 3 the null hypothesis that the coefficients are all equal cannot be rejected with either decomposition. There is, however, some weak evidence in all the HEBD equations, suggesting that HEBD may recently have had a greater impact on money. For example, in the first decomposition using specification (1), individual t-tests indicate the last period is different from the others, even though the F-test indicates that overall there are no significant differences among the periods.[20/]

The resolution of the question whether debt has had a changing role in influencing money is still in doubt. One might argue that any variation in the role of debt in altering money suggested in table 3 is due to the overall instability of the reaction function rather than due to a changing role of debt. Three procedures were used to examine this possibility. First, a Quandt (1960) test was employed to find where a change in regimes was most likely. Given this break point, a Chow test was used to determine if the null hypothesis of no change in regimes can be rejected. The summary results both for specification (1) and (2) are presented in table 5. For both specifications the Chow test indicates a significant break in the money relationship. The Quandt test suggests the break occurred in 1980:1 when using specification (1) and in 1979:3 when using specification (2). Both occur around the time of the change in Federal Reserve operating procedures in October 1979. Furthermore, the likelihood function for the Quandt test is relatively flat in the neighborhood of October 1979. Thus, all results are consistent with the hypothesis that the change in operating procedures in October 1979 significantly altered the role debt played in influencing money. Table 5 also presents the sum of the coefficients on the debt terms pre- and post-break. While there is a significant difference in one case (M1 regressed on NFD using specification (1)), in general the debt variable appears incapable of explaining the apparent shift in regimes in the M1 equations.

The Quandt test assumes that there is but one change in regimes over the sample period. The discussion above suggests that, in fact, there may have been a number of switches. Thus, another test procedure would involve using _a priori_ break points and asking if there were jointly significant switches at these break points. This test is Dufour's (1982) generalization of the Chow test for multiple break points. The results of this test for the two alternative decompositions discussed above are presented in table 6. The results unanimously reject the null hypothesis of stability, regardless of the decomposition, the measure of debt and the equation specification. The results from this test do not permit identification of the source of the instability. However, given the clear rejection of the hypothesis of stability in table 6 and the tentative support of stability based on debt alone in table 3, it seems clear that debt is not a major reason for instability in the money reaction function.

The last test of stability--Brown, Durbin and Evan's (1980) cusum of squares test--allows more general forms of variation including, for example, changes over time in the functional form. A representative plot of the cusum of squares is presented in figure (1). All cusum of squares tests indicate instability.

IV. CONCLUSIONS

The results presented above suggest that the reaction function has not been stable over the 1958:1 - 1983:3 period. The Quandt/Chow tests, Dufour's Chow test and the cusum of squares test all imply instability for both specifications of the money equation.

The source of this instability, however, cannot be attributed solely or even primarily to changes in the impact of debt on money. There is evidence indicating that debt growth during some limited periods may have had differential impacts. Nevertheless, the overall hypothesis that debt has not had a changing impact on money usually cannot be rejected. The results further imply that debt growth had had only a relatively small impact on money.

At each stage alternate specifications were examined as a limited test of the fragility of the results. In general, the results were not sensitive to the choice of specification. As noted elsewhere, it is unlikely that a complete analysis of the fragility of the results with respect to functional form, included variables, lag lengths, etc., can ever be undertaken given data limitations.[21/] The results presented here represent a systematic but necessarily limited effort to examine the fragility of the money-debt relationship.

Finally, there are two limitations to using the evidence presented here to forecast the future impact of debt on money. First, evidence presented above suggests the reaction function may have shifted a number of times. Future shifts in the reaction function may change the role of debt in influencing money although the evidence does not suggest this has been the situation in the past. And second, debt is moving out of the range of peacetime U.S. experience. If nonlinearities exist in the debt-money relationship, simply extrapolating from the evidence presented here would be misleading.

FOOTNOTES

1/ For example, see Canto and Rapp (1982), McMillin and Beard (1980), Sheehan (1985) and the sources cited there.

2/ Of course, the term structure of interest rates may change in this analysis depending on the elasticities of supply and demand in alternate financial markets and depending on the maturity structure of the government issued bonds.

3/ For discussions of the former issue, see Barro (1974) and Esposito (1978).

4/ Empirical evidence that federal deficits have not influenced interest rates should not by itself deter the Fed from continuing to follow this regime. The lack of influence would be attributed to Fed policy rather than to the Ricardian equivalence proposition. Debt growth would not be expected to influence nominal interest rates irrespective of the direct impact of debt on interest rates as long as the Fed is pegging interest rates. Of course, the higher expected inflation eventually accompanying increased money growth will lead to a reduction in real interest rates if the Fed is, in fact, pegging the nominal interest rates. Finally, it should be noted that this discussion assumes the Federal Reserve can, if it chooses, control the nominal interest rate, rational expectations and efficient markets notwithstanding.

5/ See Wallich and Keir (1979), Wallich (1985) and Gilbert (1985) for more detailed discussions of the alternate operating procedures.

6/ See Sheehan (1985) for a more detailed discussion. If the Federal Reserve were targeting on M1, it is possible that other monetary aggregates could be influenced by debt growth. For example, if debt growth altered interest rates (or the term structure of interest rates) and if, say, some of the components of M2 had different interest elasticities than those of M1, then M2 growth may vary even as M1 growth was fixed. Given that operating procedures, at least prior to October 1982, were generally based on M1, only M1 is employed below as a dependent variable for the monetary aggregate.

7/ The differential effects of the structural vs. cyclical deficits have been described in detail elsewhere. For example, see Morrell (1982), Tatom (1984) and Sheehan (1985).

8/ McMillin and Beard estimated separate equations for the money stock (M) and nonborrowed reserves (NBR) as part of a small macro model, using three-stage least squares for the period 1953:1 to 1976:4. Their M and NBR equations can be effectively combined to yield (1). There are four basic differences between equation (1) and the equations reported by McMillin and Beard. First, their NBR equation included dummy variables for the periods of wage-price guideposts and price controls. Since those dummy variables were insignificant they are excluded here. Second, terms for different Presidential Administrations are also dropped. The stability of estimated equations is examined below using a more complete set of statistical tests. Third, government spending and tax terms, included separately by McMillin and Beard, are combined here since the focus is on federal debt. In preliminary estimation, the hypothesis that the coefficients on government spending and taxes were equal in magnitude and opposite in sign could not be rejected. And fourth, the interest rate term is included without a lag rather than with McMillin and Beard's one quarter lag. On *a priori* grounds we believe monetary policymakers react to interest rate developments with a lag of less than one quarter. This assumption is consistent with the money stock announcement literature. For example, see Cornell (1983).

9/ Following McMillin and Beard, it is assumed that the Fed desires to reduce a moving average of inflation over eight quarters. Thus:

$$\dot{P}_t^* \equiv \dot{P}_t^{MA} - (\dot{P}_t^{MA}/8) \text{ where } \dot{P}_t^{MA} \equiv (\dot{P}_{t-1} + \dot{P}_{t-2} + \dot{P}_{t-3} + \dot{P}_{t-4})/4.$$

10/ As a further check on the fragility of the results, in specification (1) each non-debt term was sequentially deleted and the equation re-estimated. The debt coefficients were virtually unchanged. In specification (2), alternate lag lengths examined in intermediate steps using Akiake's FPE also implied little difference in debt's impact.

11/ A complete set of data was available beginning in 1956:1, but lags and differencing preclude using information before 1958:1. The estimation period was ended in 1983:3 since data on potential GNP was unavailable after that date.

12/ The change from log-levels to log-differences is largely responsible for the drop in the $\bar{R}^2$'s.

13/ The estimated lag lengths in the money equations are: in the NFD equation--nine lags of money, two of the federal funds rate, one of debt, and only contemporaneous unemployment; in the "none" equation--the same only omitting the debt terms; and in the HEBD equation--five lags of money, one of the federal funds rate, and one of debt, and only contemporaneous unemployment. To minimize possible simultaneity problems associated with estimating a single equation where unemployment, etc., may also be endogenous, two stage least squares was used throughout. In the first stage a variable was regressed on ten lags of itself and four lags of the other variables in the model. The second stage is reported in table 2 and uses the estimates obtained from the first stage equations rather than the contemporaneous values of the independent variables.

14/ For studies allowing the reaction function to vary over time, see Froyen (1974), Havrilesky, Sapp and Schweitzer (1975), DeRosa and Stern (1977), Potts and Luckett (1978) and Abrams, Froyen and Waud (1980).

15/ Potts and Luckett (1978), for example, argue that the Fed generally accedes to Administration wishes. In its most extreme form, this argument can be interpreted as stating that the Fed must accede to political pressures in order to maintain its independence.

20/ The t statistic for a significant difference between the coefficients in the fourth and fifth periods is 1.93 which is significant at the .0568 percent level.

21/ See Leamer (1983) and McAleer, Pagan and Volcker (1985).

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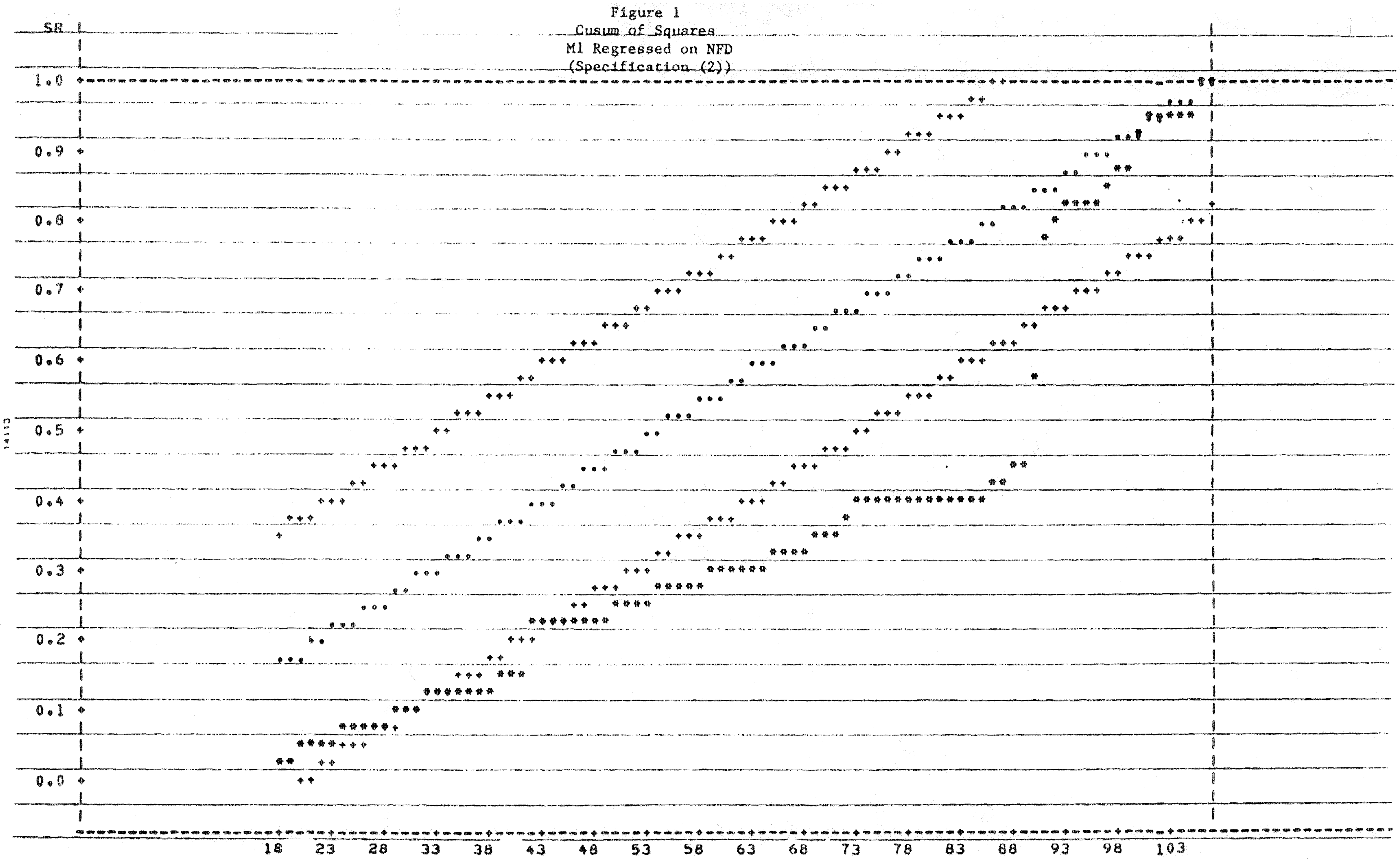

Figure 1
Cusum of Squares
M1 Regressed on NFD
(Specification (2))
SR
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
18
23
28
33
38
43
48
53
58
63
68
73
78
83
88
93
98
103

Table 1
Reaction Functions: 1958:1 - 1983:3

Specification (1)

Debt Variable	NFD	HEBD	None
Independent Variables			
Constant	-20.3 (-1.61)	34.4 (3.16)	32.3 (2.83)
Debt	.153 (7.02)	.031 (1.11)	
Y_{t-1}	.042 (3.84)	.112 (20.76)	.112 (19.98)
i	1.51 (4.94)	1.81 (4.64)	1.75 (4.57)
d	-3.42 (-4.42)	-5.72 (-6.46)	-5.81 (-6.65)
POT	.141 (8.68)	.082 (5.41)	.085 (5.36)
$\dot{P}^*$	229.0 (1.15)	-327.3 (-1.47)	-336.7 (-1.51)
$\bar{R}^2$	.99	.99	.99
RMSE	2.18	2.73	2.72
ρ	.84 (15.88)	.79 (12.89)	.80 (13.65)
Q (20)	21.12	27.87	27.76

Table 2
Reaction Functions: 1958:1 - 1983:3

Specification (2)

Debt Variable	NFD	HEBD	None
Independent Variables			
Constant	.003	.007	.003
	(1.96)	(3.74)	(1.53)
ΣΔ Debt	.128	.00026	
	(2.15)	(3.72)	
$\Sigma\dot{ur}$	-.050	-.027	-.052
	(-2.98)	(-1.94)	(-3.05)
$\Sigma\dot{i}$	-.013	-.001	-.025
	(-1.14)	(-.08)	(-2.57)
$\Sigma\dot{m}$	.692	.414	.919
	(4.13)	(2.22)	(6.95)
$\bar{R}^2$	.43	.45	.41
RMSE	.0064	.0063	.0065
Q (20)	7.56	14.47	7.90

Table 3
Stabilograms

	Specification (1)		Specification (2)	
Debt Variable	NFD	HEBD	NFD	HEBD
Debt 58:1 - 70:4	.130 (2.25)	-.088 (-.86)	.310 (1.96)	.00041 (3.07)
Debt 71:1 - 74:4	.164 (3.12)	.013 (.12)	.254 (1.73)	.00025 (1.39)
Debt 75:1 - 79:3	.136 (3.72)	.020 (.46)	.113 (1.72)	.00013 (1.31)
Debt 79:4 - 82:3	.130 (4.22)	-.025 (-.38)	.181 (1.89)	.00022 (1.40)
Debt 82:4 - 83:3	.149 (5.99)	.102 (2.10)	.274 (2.28)	.00029 (3.58)
F (equal coefficients)	3.63**	1.12	.74	.65
d.f.	(4, 92)	(4, 92)	(8, 79)	(8, 84)
$\bar{R}^2$	.99	.99	.42	.43
RMSE	2.05	2.70	.0065	.0064
Q (20)	13.15	20.74	7.90	10.66
Debt 58:1 - 60:4	.152 (2.25)	-.211 (-.90)	.271 (1.10)	.00088 (2.81)
Debt 61:1 - 64:4	.091 (1.72)	-.032 (-.11)	.051 (.14)	.00100 (1.45)
Debt 65:1 - 68:4	.088 (1.97)	-.103 (-.63)	.286 (1.30)	.00024 (1.28)
Debt 69:1 - 72:4	.111 (2.74)	-.001 (-.01)	.225 (1.47)	.00045 (1.99)
Debt 73:1 - 76:4	.115 (3.54)	.035 (.72)	.045 (.63)	.00004 (.36)
Debt 77:1 - 80:4	.150 (5.44)	-.014 (-.16)	.287 (3.04)	.00033 (2.62)
Debt 81:1 - 83:3	.152 (6.53)	.060 (1.43)	.167 (2.04)	.00029 (3.73)
F (equal coefficients)	2.89*	.45	1.27	1.22
d.f.	(6, 90)	(6, 90)	(12, 75)	(12, 80)
$\bar{R}^2$	.99	.99	.44	.47
RMSE	2.04	2.75	.0063	.0062
Q (20)	14.63	23.34	11.41	14.92

** significant at 99% level

* significant at 95% level

Table 4
Pairwise Differences

M1 regressed on NFD: Specification (1)
Significance Levels

	58:1 - 70:4	71:1 - 74:4	75:1 - 79:3	79:4 - 82:3
71:1 - 74:4	.07			
75:1 - 79:3	.85	.22		
79:4 - 82:3	.99	.27	.57	
82:4 - 83:3	.68	.68	.46	.06

M1 regressed on NFD: Specification (1)

	58:1 - 60:4	61:1 - 64:4	65:1 - 68:4	69:1 - 72:4	73:1 - 76:4	77:1 - 80:4
61:1 - 64:4	.03					
65:1 - 68:4	.13	.88				
69:1 - 72:4	.47	.60	.31			
73:1 - 76:4	.57	.63	.40	.86		
77:1 - 80:4	.98	.26	.10	.14	.01	
81:1 - 83:3	.99	.25	.11	.18	.04	.86

Table 5
Quandt Test Results

Specification (1)

Debt Variable	NFD	HEBD	None
Break at Date	1980:1	1980:1	1980:1
F	10.28	16.11	17.50
d.f.	(7, 89)	(7, 89)	(6, 91)
Pre-break debt coefficient	.024 (1.62)	.014 (.61)	
Post-break debt coefficient	.170 (4.39)	.015 (.52)	

Specification (2)

Debt Variable	NFD	HEBD	None
Break at Date	1979:3	1979:3	1979:3
F	4.87	4.89	6.06
d.f.	(16, 71)	(11, 81)	(14, 75)
Pre-break debt coefficient sum	0.71 (1.38)	.00016 (2.23)	
Post-break debt coefficient sum	.017 (.06)	.00028 (2.13)	

Table 6
Dufour's Chow Test

Specification (1)

Debt Variable	NFD	HEBD	None
Presidential Administration	5.17**	3.27**	3.70**
d.f.	(32, 63)	(32, 63)	(28, 68)
Money Targets	4.03**	1.90*	2.27**
d.f.	(48, 47)	(48, 47)	(42, 54)

Specification (2)

Debt Variable	NFD	HEBD	None
Presidential Administration	2.42**	3.05**	3.15**
d.f.	(48, 39)	(37, 55)	(44, 45)
Money Targets	N.A.	9.28**	3.88**
d.f.		(66, 26)	(79, 10)

** significant at the 99% level

* significant at the 95% level

N.A. not applicable; cannot be calculated