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WEIGHTED MONETARY AGGREGATES AS INTERMEDIATE TARGETS

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Federal Reserve Bank of St. Louis

85-010

Recent financial innovation and diregulation has resulted in a number of weighted monetary aggregates being proposed for the conduct of monetary policy. This article argues that from a policy perspective one is not solely interested in a monetary aggregate that "correctly" measures the monetary services to society but, more importantly, the aggregate should be strongly related to the ultimate goal variables of policy but not subject to feedback from these variables. Empirical tests indicates that such an aggregate can be composed if the assets in M1 and that none of the alternatives proposed show any marked superiority over the simple-sum aggregate.

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1. INTRODUCTION

The past 10 years have been marked by financial innovation and deregulation that has obfuscated the distinction between transactions and savings deposits. A number of analysts believe that these financial developments have altered significantly the relationship between monetary aggregates, as currently defined (especially M1), and economic activity. Hence, it has been suggested that the currently defined monetary aggregates are less useful as intermediate targets for monetary policy.

In particular, it has been argued that financial innovation has illuminated the problems associated with simply adding up various financial assets (e.g., currency, demand deposits, NOW accounts, etc.) to obtain a "simple-sum" monetary aggregate. Instead, since various assets possess different degrees of "moneyness", the dollar amount of each asset should be weighted by its degree of moneyness to obtain a more suitable monetary aggregate. Such an aggregate presumably would have a closer and more predictable relationship with economic activity and may be affected less by financial innovation.

Along these lines, Barnett [1] and Spindt [20] have constructed weighted monetary aggregates using index numbers to aggregate assets by a particular, homogeneous characteristic.

Barnett employs the difference between the rate of return on a pure store-of-wealth asset (one that provides no monetary services) and the own rate of return on assets that provide some monetary services as a measure of the monetary services provided by each asset. Spindt's index, on the other hand, includes only transactions assets and the monetary services of each is measured by its turnover rate in purchasing final output.

Given the existence of these alternatives to usual simple-sum aggregates, the issue becomes: are they better intermediate targets of monetary policy? The purpose of this paper is to investigate this question. We begin by reviewing briefly the issues that have accompanied empirical definitions of money, in particular, those that pertain to the use of money as an intermediate policy target. In the process, we develop an alternative methodology for constructing a monetary aggregate. Finally, the relationship of this aggregate and those of Barnett and Spindt with nominal GNP is examined within a version of the St. Louis equation.

2. MEASURING MONEY

Monetary theory usually emphasizes two different, but not mutually exclusive, functions of money: as a medium of exchange and a store of wealth. The medium of exchange function was emphasized by Fisher [8], while the asset motive was emphasized in the work of Pigou [19], Marshall [17] and Keynes [16]. It was not until Friedman [10], Friedman and

Meiselman [11] and Friedman and Schwartz [12], who emphasized money's role as a "temporary abode of purchasing power," however, that it became acceptable and, indeed, common to define money to include non-medium-of-exchange assets. Once the medium-of-exchange line of demarcation between money and non-money assets was breached, it became difficult to isolate another single characteristic to differentiate between money and non-money assets. Some characteristics that have been used include liquidity, substitutability between non-medium-of-exchange and pure medium-of-exchange assets and the strength and stability of the relationship between a composite of various financial assets and nominal income.1/

The Divisia monetary aggregates of Barnett follow the approach of estimating the substitutability between non-medium-of-exchange assets and a pure medium-of-exchange asset employed by Chetty [6], Hamburger [13] and others, and follow directly a suggestion of Friedman and Schwartz [12]--see Barnett and Spindt [2]. Barnett, however, carried this approach further, using index number theory to construct an index of financial assets that approximates the solution to the utility maximization problem, so that the index reflects the total utility (relative to some base period) attributable to the monetary services of these assets.2/ That is, while the simple-sum aggregates assume implicitly that all of the components are perfect substitutes, the Divisia aggregates weight each asset according to its "moneyness" and, hence, are unaffected by pure relative price changes.

The MQ aggregate of Spindt marks a clear departure from the Divisia monetary aggregates because non-medium-of-exchange assets are excluded. Thus, Spindt's measure is based on a pure transactions approach to money demand. Furthermore, the Spindt measure weights each of its components by a measure of turnover in final output, with assets with the highest turnover rate receiving the largest weight.

It is clear from this discussion, that there are two distinct but related issues involved here. The first centers around the question whether the assets or transactions measure (approach) is preferable. The second is a question of the appropriate weighting scheme. Of course, these issues are related, for if the asset approach is preferred then, by implication, the Divisia weighting scheme is preferred as well. If the transactions approach is preferred, the question of the weighting scheme is open.

If one is concerned with constructing a monetary aggregate to use as an intermediate policy target, these issues give way to another. From a policy perspective, an intermediate monetary target need not be the "best" measure of monetary services. It is equally, if not more, important to be strongly related to the estimate goal of policy and to be controlled by the monetary authority, so that there is no feedback from the ultimate goal variable to the intermediate target. Therefore, a policymaker may wish to exclude certain financial assets from an intermediate target index, despite the fact that they yield some monetary services, simply because they are influenced strongly by the ultimate goal variable and/or they are not strongly related to it. Consequently, the set of assets that best represent the total demand for monetary services need not be identical to the set that represents the best intermediate target for monetary policy.[3/] If one's objective is to construct an intermediate monetary target, one would (a) choose assets that effect, but are unaffected by the goal variable, and (b) determine the weighting scheme that maximizes the relationship between a combination of these assets and the ultimate goal of policy.

3. CAUSALITY AND THE CONSTRUCTION OF A MONETARY AGGREGATE

Implementing this alternative approach for constructing a monetary aggregate target involves selecting assets for which there is no feedback from the ultimate goal variable. If we assume that the monetary authority's ultimate goal variable is nominal GNP, then an aggregate which satisfies this criterion must be composed of assets for which there is no feedback from nominal GNP. One way to test for this feedback is to perform tests of Granger causality between various components of monetary aggregates and nominal GNP.[4/] In this context, investigating whether nominal GNP Granger-causes a monetary asset can be viewed as an essential first step in constructing a monetary aggregate that satisfies the above condition.

Since tests of the Granger-causal ordering are extremely sensitive to the choice (usually arbitrary) of the order of the model, a large portion of the lag space is searched, following

Thornton and Batten [21]. In this particular investigation, bivariate Granger-causality tests were performed over the period II/1966-II/1984 between nominal GNP and each of the following assets: currency plus travelers checks, demand deposits, other checkable deposits, savings deposits, small time deposits and large time deposits.[5/] The data are annual growth rates of quarterly data and a time trend was included. A maximum lag length of 12 quarters was used. The same tests were performed with MMMFs and MMDAs over the period IV/1975-II/1984. Due to the shortness of the data period, the maximum lag length considered was shortened to 6 quarters. Furthermore, the test was performed on the sum of MMMFs and MMDAs on the assumption that they are nearly perfect substitutes.

The results of these tests are presented in Tables 1-7. These tables present the significance levels corresponding to the F-test that the coefficients of the proposed causal variable are jointly zero for every possible combination of lag specifications. The significance levels are presented rather than the corresponding F-statistics because the latter are not invariant to changes in degrees of freedom. (A significance level less than .05 is taken to imply the existence of a Granger causal ordering.) In general, the results imply the following set of causal orderings:

(a) Currency plus travelers checks and nominal GNP are independent series.

(b) Demand deposits Granger-cause nominal GNP, but are not Granger-caused by nominal GNP.

(c) Other checkable deposits Granger-cause nominal GNP, but are not Granger-caused by nominal GNP.

(d) Savings deposits both Granger-cause and are Granger-caused by nominal GNP.

(e) Small time deposits and nominal GNP are independent series.

(f) Large time deposits and nominal GNP are independent series.

(g) Money market mutual funds, money market deposit accounts and nominal GNP are independent series.

These results indicate that the appropriate monetary aggregate should contain only demand deposits and other checkable deposits. Alternatively, because of the independence of currency and nominal GNP, the current definition of M1 will suffice. Consequently, in comparing the performances of various monetary aggregates, we employ M1 as representative of an aggregate composed of monetary assets unaffected by changes in nominal income.

4. THE EMPIRICAL LINK BETWEEN MONEY AND INCOME

In order for a monetary aggregate to be an appropriate intermediate target, there must be a predictable relationship between it and income. To investigate the relationship between each of these monetary aggregates and economic activity, we employ a version of the St. Louis equation. This investigation is carried out on MQ, Divisia L, M1 and Divisia M1. The comparison of the last two aggregates is extremely important because M1 and Divisia M1 represent a different weighting of the set of assets for which there is no feedback from nominal GNP. The comparison of these aggregates with MQ is also interesting since the growth of MQ is due primarily to the growth of assets that are also in M1. Thus, differences in the growth rates of M1, Divisia M1 and MQ are largely due to differences in the weights given to these assets.[6/]

In the St. Louis equation, economic activity (measured by the growth of nominal GNP) is related to monetary and fiscal actions as follows:

$$(1)\quad \dot{Y} = a + \sum_{i=0}^{J} b_i \dot{M}_{t-i} + \sum_{i=0}^{K} c_i \dot{G}_{t-i} + e_t,$$

where $\dot{Y}$, $\dot{M}$ and $\dot{G}$ are the compounded annual growth rates of nominal GNP, a monetary aggregate and cyclically-adjusted federal government expenditures, respectively. For this analysis, the lag lengths, J and K, are selected using Akaike's final prediction error (FPE) criterion, with the lag search constrained always to include the contemporaneous term.[7/]

Table 8 contains the estimates of equation 1 for the period II/1972-II/1984. (Data for the Divisia aggregates and MQ are only available from around 1970. The observations from 1970 to II/1972 are lost in the lag-length specification search.) Several interesting observations emerge. First, none of the equations explains much of the variance of nominal GNP growth, with the MQ equation having the highest explanatory power.[8/] Furthermore, the estimation of the Divisia L equation is not statistically significant at the 5 percent level. Second, except for the MQ equation, the FPE-selected lag lengths are substantially shorter than those in the standard St. Louis equation or those selected by the FPE and an alternative statistical criterion over a longer sample period.[9/] Third, the typical result that a one percentage-point increase in money growth leads ultimately to a one percentage-point increase in nominal GNP growth is supported by the M1 and Divisia M1 equations, but not by the MQ and Divisia L equations. Fourth, the sum of government spending growth is statistically significant at the 5 percent level in the MQ equation--an atypical result not supported by the other estimations or by the standard equation over a longer sample period.

The most interesting and significant aspect of this analysis is the comparison of the results for equations using M1, Divisia M1 and MQ. Because the growth rates of M1 and Divisia M1 differ in the weights applied, one can investigate the contribution of the alternative weighting of the monetary components to the money-GNP link. In this regard, the results in table 8 tend to favor Divisia M1 slightly since the adjusted R^2 is somewhat larger. Nevertheless, the specifications of the two equations are quite similar, with both aggregates indicating two lags on money and none on the expenditure variable.

The results of a further comparison of these two specifications with those of the equation with MQ are mixed. The adjusted R^2 of the MQ equation is considerably larger than that of the other two, suggesting perhaps that its weighting scheme or the inclusion of the additional transactions-type assets provides a stronger link than the others with nominal GNP. Unfortunately, however, the constant term in the MQ equation is extremely large, negative and statistically significant. This is counter-intuitive as it implies that if MQ and G are held constant over their lag distributions, nominal GNP would <u>decline</u> at a 24 percent annual rate.

5. MODEL SPECIFICATION TESTS

In an attempt to determine which of these monetary aggregates is most closely related to nominal GNP, tests of their relative performance in equation (1) were conducted. Unfortunately, the degree to which one of these aggregates fits the data relative to another cannot be tested using a conventional F-test, because the specification of equation (1) using one aggregate is <u>not</u> nested in the specification using another. Consequently, the J-test, developed by Davidson and MacKinnon [7], was used. This test enables a statistical comparison of such non-nested hypotheses. For example, assume that we want to test the model H_0: $y = f(x, z) + \varepsilon_1$

against the alternative model H_1:$y = g(w, z) + \varepsilon_2$. The J-test involves estimating

(2) $y = (1-\alpha) f(x,z) + \alpha\hat{g} + \varepsilon$,

where $\hat{g}$ is the estimated value of y based upon maximum likelihood estimates of w under H_1, and testing whether α equals zero using a conventional t-test. If f(x, z) is the true model, then α should not be statistically different from zero. Alternatively, if α is different from zero, then g(w, z) adds to the explanatory power of f(x, z). The null and alternative hypotheses are then reversed, i.e., making g(w, z) the model under the null hypothesis and f(x, z) the model under the alternative and the test is repeated. If both the null and the alternatives are rejected (or not rejected) when each is the maintained null hypothesis, the test is inconclusive.

The results of the 12 pairwise comparisons of these four monetary aggregates are presented in Table 9. The t-statistics reported are those necessary to test the hypothesis that α equals zero in the estimation of equation 2. Unfortunately, these results do not indicate the dominance of any one aggregate over the others. Only in the comparison of Divisia L and MQ is a dominant aggregate identified--in this case, MQ. For the other pairwise comparisons, the tests were inconclusive--the hypothesis that $\alpha = 0$ was not rejected for <u>both</u> tests in the comparison of M1 with Divisia M1, and could be rejected for any of the other comparisons. Except for the comparison between MQ and Divisia L, the J-test did not provide a basis for distinguishing between these aggregates based equation (1).

6. THE EFFECT OF RECENT FINANCIAL INNOVATIONS

Since most financial innovation and deregulation have occurred since 1980, one should compare the ability of M1 and these alternative aggregates in explaining economic activity from I/1981 to the present. This comparison is undertaken in two ways. First, equation 1 is estimated with each of the four aggregates over a sample period ending in IV/1980. The estimation period is then extended to see how the explanatory power of each equation is affected by the additional observations. Second, the estimation is stopped at IV/1980 and nominal GNP is forecasted out-of-sample from I/1981-II/1984 to compare the forecasting abilities of each aggregate. (Because of the results in the previous sections, the experiments using Divisia L are of little interest and, hence, are not reported here.)

The results of the first experiment are reported in Table 10. The first point of interest is that augmenting the sample to include the period during which nationwide NOW accounts were introduced had little impact on the explanatory power of M1 and Divisia M1 equations. In contrast, the explanatory power of the MQ equation declined by over 40 percent when 1981 was added to the sample. Furthermore, in contrast to the estimation over the II/1972-II/1984 or II/1972-IV/1980 period, the M1 equation had the highest explanatory power over the II/1972-IV/1981 period.

While the addition of 1982 had little impact on any of the equations, the addition of 1983 (when Super NOW accounts were introduced) caused the explanatory power of the M1 equation to decline by nearly 45 percent. Alternatively, the MQ and Divisia M1 equations were little affected by the addition of 1983. In sum, the explanatory power of both the M1 and MQ equations appears to have been worsened by the financial innovations of the 1980s while that of the Divisia M1 equation remained relatively constant throughout the period. These results give some support to Barnett's weighting scheme.

The results of the out-of-sample forecast experiment are presented in Table 11, which contains the summary statistics of the forecasts, and in Chart 1, which presents the quarterly forecast errors. The first observation is that none of the monetary aggregates consistently outperforms all of the others.[10/] M1 appears to exhibit the poorest out-of-sample performance. The performance of MQ, however, is not much better than that of M1; its mean error is substantially lower than that of M1, but its MAE and RMSE are larger. Once again, the performance of Divisia M1 is somewhat better than that of M1 or MQ, with its RMSE and MAE being smaller than that of the other aggregates.

5. SUMMARY AND CONCLUSIONS

It is often argued that the introduction of new financial instruments and the financial deregulation of the 1980s have confused the traditionally well-defined distinction between money and near-money. One response to the occurrences of the 1980s has been the construction of alternatives to the currently used simple-sum monetary aggregates. These alternatives are the Divisia monetary aggregates and MQ. Both are indexes of financial assets that comprise the various measures of money as currently defined. The difference lies primarily in the weighting scheme. The Divisia aggregates use opportunity costs of holding these financial assets as weights while MQ employs the turnover rates of these assets.

From a policy-making point of view, the primary motivation for investigating various monetary aggregates is to have one that affects but is not affected by economic activity. Consequently, a third type of monetary aggregate is considered--an aggregate composed of financial assets that affect the goal variables of policy but are not subject to feedback from these variables. Thus, bivariate tests of Granger causality between a fairly broad spectrum of financial assets found in the simple-sum and alternative aggregates and GNP were performed. The results suggest an aggregate with no feedback from GNP could be composed of the assets in simple-sum M1.

We then conducted tests of the strength of the relationship between M1, Divisia M1, MQ and Divisia L and GNP within the context of the St. Louis equation. The findings were generally inconclusive. The relationship between economic activity and both M1 and MQ appears to have been adversely affected during some stage of the process of financial innovation and deregulation. In contrast, the relationship between GNP and Divisia M1 was not affected by the financial innovations of the 1980's, and it performed somewhat better in the out-of-sample forecasting experiments. Nevertheless, differences in the performance of these aggregates is small so that none stands out as clearly perferable.

FOOTNOTES

1/ Pesek and Saving [18] have argued, along lines similar to these, that an asset's moneyness could be determined by whether or not it is part of society's net wealth.

2/ Actually, it makes no difference if the objective function represents utilities alone or technological considerations in production. This change, however, would affect the aggregate's interpretation.

3/ This is, after all, the thrust of Friedman and Schwartz's [12] argument for an empirical choice of a monetary aggregate based on the stability of money demand.

4/ It should be noted that targets of economic policy should really satisfy the more stringent condition of statistical exogeneity; however, this is more difficult and requires some knowledge of the structure. Moreover, the lack of feedback is a necessary but not sufficient condition for statistical exogeneity. See Wu [22] and Jacobs, Leamer and Wand [15].

5/ Unfortunately, conducting such a search limits the number of variables that can be considered simultaneously. Consequently, simple bidirectional Grange-causality tests were conducted here.

6/ See Batten and Thornton [4] for details on the weights.

7/ See Hsiao [16] and Batten and Thornton [3] for a discussion of the FPE criterion.

8/ A comparison with table 10 shows that much of this marked decline in explanatory power is due to the 1981-83 period of financial innovations.

9/ See Carlson [5] and Batten and Thornton [3].

10/ Actually, the out-of-sample mean error and mean absolute error (MAE) of the Divisia L equation (not reported) are lower than those for the other aggregates and its root mean square error (RMSE) is second lowest despite the fact that the equation itself was not statistically significant at the 5 percent level. It should be noted, however, that this result is due in large measure to the fact that there was less variation in its forecast of nominal GNP growth so its summary statistics were effected less by missed turning points.

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Table 1

DEPVAR Y DATA ARE LOGS--II/1966 TO II/1984 8 30 FRIDAY, SEPTEMBER 7, 1984 19
ROWS AND COLUMNS ARE (FOR -1), 0, AND 1 THROUGH N.
THIS IS MOST CONVENIENT WHEN CONSIDERING CONTEMPORANEOUS AND N LAGS, AND OMISSION OF THE TERM ALTOGETHER.

Hyp: CTC causes income

F2 SIGNIFICANCE LEVEL

COLUMNS ARE Y1-Y12

C_TC1-C_TC12	F2SIG	F2SIG0	F2SIG1	F2SIG2	F2SIG3	F2SIG4	F2SIG5	F2SIG6	F2SIG7	F2SIG8	F2SIG9	F2SIG10	F2SIG11
-1	.	.	.	.	.	.	.	.	.	.	.	.	.
0	0.146670	0.259566	0.264804	0.251329	0.252653	0.235935	0.238232	0.243092	0.184894	0.198969	0.272412	0.364171	0.533355
1	0.068745	0.147867	0.163513	0.160922	0.154757	0.141672	0.146385	0.153349	0.134554	0.148864	0.202842	0.297986	0.279380
2	0.098067	0.221764	0.242733	0.227538	0.221035	0.189813	0.196157	0.203478	0.194718	0.212738	0.290145	0.399972	0.330793
3	0.151372	0.318475	0.342706	0.316088	0.296259	0.262023	0.268357	0.275561	0.250053	0.269424	0.340111	0.458301	0.373474
4	0.245646	0.453152	0.480986	0.453919	0.431365	0.387063	0.394778	0.401786	0.359457	0.384106	0.462930	0.582610	0.491580
5	0.350968	0.582030	0.610369	0.584571	0.564441	0.518360	0.526327	0.533753	0.475068	0.502886	0.591724	0.704949	0.617801
6	0.444860	0.679044	0.705135	0.686185	0.669813	0.637364	0.645801	0.654339	0.596870	0.623890	0.704702	0.797048	0.722536
7	0.516671	0.728574	0.752704	0.737458	0.717659	0.679965	0.682916	0.686813	0.573702	0.599842	0.700743	0.798334	0.698784
8	0.584228	0.789216	0.810538	0.798619	0.782534	0.740771	0.742305	0.738870	0.598586	0.626855	0.719330	0.830352	0.740344
9	0.681254	0.856364	0.873289	0.862876	0.850028	0.816125	0.818407	0.816305	0.694672	0.720506	0.802614	0.891213	0.818746
10	0.273783	0.404075	0.416657	0.385191	0.390181	0.341182	0.349467	0.343929	0.253604	0.270031	0.345312	0.485427	0.366369
11	0.322527	0.400810	0.412696	0.403773	0.415983	0.364477	0.376961	0.371772	0.284464	0.303761	0.372658	0.518957	0.410630

DEPVAR C_TC DATA ARE LOGS--II/1966 TO II/1984 8 30 FRIDAY, SEPTEMBER 7, 1984 23
ROWS AND COLUMNS ARE (FOR -1), 0, AND 1 THROUGH N.
THIS IS MOST CONVENIENT WHEN CONSIDERING CONTEMPORANEOUS AND N LAGS, AND OMISSION OF THE TERM ALTOGETHER.

Hyp: income causes CTC

F2 SIGNIFICANCE LEVEL

COLUMNS ARE C_TC1-C_TC12

Y1-Y12	F2SIG	F2SIG0	F2SIG1	F2SIG2	F2SIG3	F2SIG4	F2SIG5	F2SIG6	F2SIG7	F2SIG8	F2SIG9	F2SIG10	F2SIG11
-1	.	.	.	.	.	.	.	.	.	.	.	.	.
0	0.769165	0.985789	0.792653	0.653888	0.693864	0.602491	0.630353	0.631054	0.598014	0.589014	0.492309	0.501802	0.691864
1	0.605359	0.639516	0.791400	0.794658	0.770840	0.760985	0.808814	0.810720	0.798806	0.789322	0.762871	0.783804	0.909476
2	0.798921	0.828293	0.926609	0.921559	0.912751	0.878295	0.899129	0.901565	0.893076	0.888823	0.890930	0.897900	0.973060
3	0.898258	0.918588	0.976785	0.974639	0.967986	0.954627	0.961653	0.962960	0.960874	0.958859	0.960135	0.963984	0.994074
4	0.943381	0.950416	0.981719	0.972557	0.967407	0.917034	0.899932	0.900894	0.909984	0.904787	0.901170	0.902885	0.940980
5	0.976173	0.979226	0.994085	0.990330	0.987982	0.962428	0.950838	0.951024	0.958504	0.955441	0.950758	0.951726	0.974489
6	0.964666	0.965731	0.977325	0.976534	0.969943	0.963657	0.956333	0.958273	0.957609	0.958832	0.960233	0.962877	0.979646
7	0.974216	0.978631	0.984173	0.981756	0.975394	0.976549	0.976291	0.977511	0.973312	0.974846	0.980766	0.982115	0.990838
8	0.878369	0.910357	0.943779	0.937559	0.932952	0.949680	0.958855	0.960965	0.957649	0.960917	0.978975	0.982317	0.989260
9	0.785744	0.856427	0.907265	0.910609	0.909888	0.924466	0.943763	0.946223	0.930443	0.935490	0.975061	0.979343	0.984692
10	0.776668	0.824014	0.847262	0.847256	0.852641	0.872922	0.898366	0.903987	0.893225	0.900034	0.949417	0.952503	0.957155
11	0.781473	0.846256	0.845865	0.831070	0.839828	0.856122	0.880818	0.887675	0.884897	0.892450	0.928805	0.932373	0.941417

Table 2

ROWS AND COLUMNS ARE (FOR -1), 0, AND 1 THROUGH N.
THIS IS MOST CONVENIENT WHEN CONSIDERING CONTEMPORANEOUS AND N LAGS, AND OMISSION OF THE TERM ALTOGETHER.

Hyp: demand deposits cause income F2 SIGNIFICANCE LEVEL

COLUMNS ARE Y1-Y12

DD1-DD12	F2SIG	F2SIG0	F2SIG1	F2SIG2	F2SIG3	F2SIG4	F2SIG5
-1	.	.	.	.	.	.	.
0	0.0012158	0.0018492	0.001258	0.0014314	0.001554	0.0012145	0.0013253
1	0.0011198	0.0034457	0.002621	0.0029615	0.003279	0.0026757	0.0029324
2	0.0006800	0.0026354	0.002881	0.0033042	0.003707	0.0033682	0.0037152
3	0.0005331	0.0022829	0.002715	0.0029101	0.003320	0.0039996	0.0044497
4	0.0011900	0.0048084	0.005694	0.0058089	0.006515	0.0076506	0.0085001
5	0.0012908	0.0050155	0.005671	0.0049087	0.005084	0.0039369	0.0044566
6	0.0028136	0.0100263	0.011229	0.0100978	0.010472	0.0079945	0.0088807
7	0.0057318	0.0188218	0.021010	0.0189738	0.019767	0.0150588	0.0164625
8	0.0090474	0.0278055	0.030654	0.0292421	0.029956	0.0255434	0.0281364
9	0.0161260	0.0458571	0.050166	0.0478017	0.049285	0.0419810	0.0461799
10	0.0229498	0.0612960	0.068060	0.0658661	0.068730	0.0554479	0.0610728
11	0.0372502	0.0922121	0.101570	0.0976373	0.101322	0.0820745	0.0898979

DD1-DD12	F2SIG6	F2SIG7	F2SIG8	F2SIG9	F2SIG10	F2SIG11
-1	.	.	.	.	.	.
0	0.0012310	0.0002792	0.0002941	0.0002292	0.0002154	0.001228
1	0.0028798	0.0012793	0.0014206	0.0010910	0.0008859	0.004364
2	0.0039578	0.0015449	0.0012916	0.0016830	0.0011368	0.005395
3	0.0049666	0.0016512	0.0016319	0.0009954	0.0012853	0.005568
4	0.0094325	0.0025958	0.0027232	0.0020720	0.0014236	0.005350
5	0.0047372	0.0017801	0.0021474	0.0017220	0.0017255	0.006662
6	0.0094840	0.0038250	0.0045568	0.0037286	0.0036347	0.012908
7	0.0179002	0.0074805	0.0088053	0.0070140	0.0074018	0.024107
8	0.0298158	0.0136816	0.0159950	0.0127333	0.0125688	0.036716
9	0.0478854	0.0240881	0.0279765	0.0226612	0.0224367	0.060363
10	0.0655364	0.0233948	0.0277098	0.0322970	0.0341460	0.086207
11	0.0965767	0.0384424	0.0450102	0.0517311	0.0462631	0.111436

ROWS AND COLUMNS ARE (FOR -1), 0, AND 1 THROUGH N.
THIS IS MOST CONVENIENT WHEN CONSIDERING CONTEMPORANEOUS AND N LAGS, AND OMISSION OF THE TERM ALTOGETHER.

Hyp: income causes demand deposits F2 SIGNIFICANCE LEVEL

COLUMNS ARE DD1-DD12

Y1-Y12	F2SIG	F2SIG0	F2SIG1	F2SIG2	F2SIG3	F2SIG4	F2SIG5	F2SIG6	F2SIG7	F2SIG8	F2SIG9	F2SIG10	F2SIG11
-1	.	.	.	.	.	.	.	.	.	.	.	.	.
0	0.235153	0.145936	0.210275	0.081509	0.108608	0.028629	0.038956	0.055545	0.056535	0.059051	0.052587	0.056291	0.060325
1	0.429800	0.347081	0.455840	0.143916	0.193448	0.034814	0.082918	0.109464	0.113584	0.118837	0.106812	0.120817	0.128723
2	0.640703	0.550347	0.668373	0.277697	0.353256	0.071116	0.173547	0.222434	0.229393	0.238150	0.217618	0.241329	0.253984
3	0.727698	0.644020	0.747412	0.269350	0.330715	0.135275	0.254154	0.286168	0.289359	0.298764	0.262227	0.280451	0.295991
4	0.842278	0.762968	0.845306	0.396075	0.463875	0.214276	0.373987	0.397000	0.394086	0.406939	0.372214	0.400060	0.419060
5	0.386206	0.304905	0.368834	0.113845	0.138674	0.112104	0.223466	0.298375	0.309607	0.312221	0.318982	0.354217	0.373618
6	0.364017	0.154535	0.192411	0.077024	0.088916	0.062454	0.152509	0.199926	0.191409	0.202639	0.177887	0.213248	0.225902
7	0.449685	0.172578	0.204165	0.076422	0.090273	0.042773	0.079492	0.105219	0.105748	0.102356	0.106803	0.118229	0.121407
8	0.551435	0.243713	0.284440	0.099876	0.111932	0.062308	0.085476	0.113937	0.116527	0.115456	0.102719	0.120940	0.132026
9	0.542597	0.317314	0.364465	0.142855	0.148600	0.066963	0.092579	0.129795	0.130475	0.131507	0.121057	0.124150	0.134156
10	0.082625	0.013847	0.014807	0.003842	0.005435	0.009933	0.022862	0.034483	0.037769	0.041532	0.036674	0.033217	0.024169
11	0.096200	0.021834	0.022751	0.004644	0.006528	0.014235	0.036196	0.053074	0.058043	0.064208	[illegible]	[illegible]	[illegible]

Table 3

ROWS AND COLUMNS ARE (FOR -1), 0, AND 1 THROUGH N.
THIS IS MOST CONVENIENT WHEN CONSIDERING CONTEMPORANEOUS AND N LAGS, AND OMISSION OF THE TERM ALTOGETHER.

Hyp: OCD cause income

F2 SIGNIFICANCE LEVEL

COLUMNS ARE Y1-Y12

OCD1-OCD12	F2SIG	F2SIG0	F2SIG1	F2SIG2	F2SIG3	F2SIG4	F2SIG5	F2SIG6	F2SIG7	F2SIG8	F2SIG9	F2SIG10	F2SIG11
-1	.	.	.	.	.	.	.	.	.	.	.	.	.
0	0.338020	0.110456	0.111807	0.117553	0.117211	0.123759	0.126938	0.133760	0.142081	0.119357	0.081220	0.104468	0.170446
1	0.438830	0.135846	0.150982	0.157939	0.155824	0.170607	0.175454	0.184662	0.164711	0.139090	0.132275	0.199304	0.307252
2	0.169268	0.028983	0.030726	0.028872	0.029676	0.035983	0.037746	0.040808	0.020988	0.013822	0.015725	0.013852	0.032631
3	0.274006	0.061652	0.064046	0.059034	0.057171	0.067970	0.070873	0.075837	0.041351	0.024539	0.030396	0.025781	0.048468
4	0.199313	0.056456	0.052940	0.039935	0.033559	0.046422	0.049233	0.053118	0.021206	0.012788	0.022754	0.014772	0.022723
5	0.069852	0.030052	0.028399	0.026644	0.027268	0.036813	0.038148	0.041614	0.016725	0.012663	0.021701	0.022090	0.036890
6	0.115318	0.046791	0.045260	0.042444	0.044619	0.057244	0.057332	0.062901	0.027136	0.020452	0.031391	0.031415	0.058145
7	0.060006	0.023620	0.026760	0.024213	0.026181	0.035539	0.038878	0.042246	0.003788	0.002954	0.003914	0.001193	0.002477
8	0.084631	0.040046	0.045021	0.039358	0.042592	0.056557	0.061256	0.066873	0.007185	0.004704	0.006416	0.002429	0.004080
9	0.123437	0.064328	0.071351	0.062904	0.068216	0.088510	0.095240	0.102956	0.011437	0.006292	0.010430	0.003654	0.006615
10	0.159606	0.092222	0.100707	0.093133	0.100628	0.128199	0.136898	0.146911	0.019853	0.010730	0.018221	0.005041	0.007944
11	0.220200	0.131764	0.143437	0.131704	0.142332	0.177347	0.189345	0.202459	0.030470	0.018352	0.029740	0.007311	0.007661

ROWS AND COLUMNS ARE (FOR -1), 0, AND 1 THROUGH N.
THIS IS MOST CONVENIENT WHEN CONSIDERING CONTEMPORANEOUS AND N LAGS, AND OMISSION OF THE TERM ALTOGETHER.

Hyp: Income causes OCD

F2 SIGNIFICANCE LEVEL

COLUMNS ARE OCD1-OCD12

Y1-Y12	F2SIG	F2SIG0	F2SIG1	F2SIG2	F2SIG3	F2SIG4	F2SIG5	F2SIG6	F2SIG7	F2SIG8	F2SIG9	F2SIG10	F2SIG11
-1	.	.	.	.	.	.	.	.	.	.	.	.	.
0	0.569373	0.678361	0.731759	0.646387	0.551369	0.601036	0.669282	0.747282	0.768708	0.725195	0.671700	0.654540	0.586055
1	0.736339	0.796973	0.719370	0.758215	0.764092	0.843800	0.883654	0.923962	0.770570	0.764163	0.666999	0.640032	0.561495
2	0.844955	0.877896	0.831826	0.899220	0.909758	0.950401	0.969943	0.984227	0.913671	0.911486	0.848495	0.828542	0.759237
3	0.932522	0.949758	0.921747	0.958695	0.969790	0.984944	0.993158	0.996950	0.971563	0.970468	0.928382	0.914999	0.881839
4	0.901850	0.915495	0.883101	0.926201	0.937164	0.984135	0.983793	0.991687	0.985869	0.985307	0.960041	0.941580	0.914688
5	0.879242	0.885278	0.853828	0.900237	0.914856	0.961681	0.910043	0.932049	0.970060	0.973202	0.951165	0.940505	0.944613
6	0.930514	0.936432	0.917418	0.947627	0.955876	0.982516	0.952695	0.965774	0.979488	0.979791	0.970704	0.964665	0.970284
7	0.904837	0.913956	0.886061	0.926837	0.936430	0.971323	0.939369	0.953318	0.987975	0.989325	0.980745	0.979205	0.984039
8	0.868845	0.890573	0.869415	0.900756	0.889791	0.935328	0.917064	0.933169	0.975834	0.965652	0.969104	0.960944	0.976354
9	0.917915	0.932874	0.919446	0.941137	0.932015	0.959456	0.947153	0.958265	0.987252	0.980597	0.984734	0.978532	0.988191
10	0.731456	0.748390	0.680854	0.696602	0.670141	0.704418	0.741384	0.769480	0.745080	0.754793	0.791678	0.664288	0.731729
11	0.799082	0.809565	0.746728	0.768304	0.734916	0.760591	0.797091	0.819844	0.802138	0.800245	0.826266	0.693433	0.732459

Table 4

DEPVAR Y DATA ARE LOGS--II/1966 TO II/1984 8 30 FRIDAY, SEPTEMBER 7, 1984 43

ROWS AND COLUMNS ARE (FOR -1), 0, AND 1 THROUGH N.

THIS IS MOST CONVENIENT WHEN CONSIDERING CONTEMPORANEOUS AND N LAGS, AND OMISSION OF THE TERM ALTOGETHER.

Hyp: savings deposits cause income F2 SIGNIFICANCE LEVEL

COLUMNS ARE Y1-Y12

SVG1-SVG12	F2SIG	F2SIG0	F2SIG1	F2SIG2	F2SIG3	F2SIG4	F2SIG5	F2SIG6	F2SIG7	F2SIG8	F2SIG9	F2SIG10	F2SIG11
-1	.	.	.	.	.	.	.	.	.	.	.	.	.
0	0.005925	0.007184	0.005424	0.005694	0.006249	0.005887	0.006300	0.006305	0.003819	0.002670	0.0021195	0.0009252	0.002191
1	0.001841	0.005477	0.004806	0.005445	0.006006	0.006565	0.007083	0.007703	0.009618	0.008499	0.0041372	0.0011446	0.003097
2	0.005737	0.014065	0.010392	0.011702	0.012494	0.013973	0.014957	0.015888	0.021072	0.020735	0.0077009	0.0036481	0.008441
3	0.012297	0.028051	0.024006	0.026785	0.028367	0.032206	0.034262	0.036221	0.046186	0.046031	0.0149806	0.0093036	0.020414
4	0.025355	0.054629	0.047374	0.052049	0.053287	0.059011	0.062986	0.066422	0.082223	0.082903	0.0316543	0.0161159	0.026715
5	0.030524	0.066445	0.064040	0.070269	0.060034	0.045225	0.048528	0.043405	0.063472	0.064011	0.0152833	0.0063995	0.019727
6	0.054360	0.108323	0.105042	0.114541	0.097938	0.077736	0.081983	0.075419	0.104079	0.104908	0.0249815	0.0118657	0.033992
7	0.084601	0.156377	0.155056	0.167803	0.137102	0.116036	0.118536	0.118080	0.145176	0.137959	0.0371240	0.0213351	0.056741
8	0.128052	0.223706	0.221867	0.237837	0.199918	0.164604	0.169013	0.174057	0.165775	0.174308	0.0369033	0.0233742	0.052076
9	0.185581	0.303980	0.301862	0.320827	0.275244	0.232498	0.237410	0.243026	0.187126	0.206496	0.0590759	0.0396119	0.081913
10	0.046377	0.077399	0.074181	0.082430	0.070844	0.041300	0.045344	0.050963	0.045851	0.037260	0.0405544	0.0525540	0.106688
11	0.061592	0.111234	0.107676	0.118873	0.101478	0.061580	0.066702	0.074328	0.065548	0.055006	0.0637638	0.0724162	0.150965

DEPVAR SVG DATA ARE LOGS--II/1966 TO II/1984 8 30 FRIDAY, SEPTEMBER 7, 1984 47

ROWS AND COLUMNS ARE (FOR -1), 0, AND 1 THROUGH N.

THIS IS MOST CONVENIENT WHEN CONSIDERING CONTEMPORANEOUS AND N LAGS, AND OMISSION OF THE TERM ALTOGETHER.

Hyp: income causes savings deposits F2 SIGNIFICANCE LEVEL

COLUMNS ARE SVG1-SVG12

Y1-Y12	F2SIG	F2SIG0	F2SIG1	F2SIG2	F2SIG3	F2SIG4	F2SIG5	F2SIG6	F2SIG7	F2SIG8	F2SIG9	F2SIG10	F2SIG11
-1	.	.	.	.	.	.	.	.	.	.	.	.	.
0	0.233119	0.122952	0.036871	0.005822	0.006164	0.005109	0.004696	0.006833	0.007595	0.009302	0.008126	0.009101	0.012432
1	0.491204	0.227658	0.093656	0.022535	0.024169	0.020451	0.018773	0.026214	0.028183	0.033571	0.030182	0.033761	0.044407
2	0.588188	0.305253	0.178442	0.049517	0.055390	0.037096	0.034874	0.052316	0.056954	0.070647	0.061930	0.068043	0.087810
3	0.741980	0.411854	0.274767	0.066194	0.072912	0.065975	0.069001	0.101051	0.112831	0.136693	0.116647	0.125819	0.157819
4	0.852618	0.559518	0.400048	0.119693	0.130791	0.119861	0.122849	0.174280	0.191212	0.219665	0.195185	0.210784	0.255918
5	0.481466	0.180362	0.099674	0.031075	0.035482	0.043288	0.043309	0.067295	0.041720	0.043034	0.072536	0.086471	0.103002
6	0.576210	0.127499	0.088638	0.036046	0.041030	0.050087	0.041372	0.067159	0.063192	0.046986	0.086316	0.110163	0.125827
7	0.416490	0.046635	0.055338	0.015949	0.018835	0.023198	0.022161	0.035451	0.020861	0.029395	0.084021	0.112433	0.125642
8	0.520624	0.065048	0.083534	0.018330	0.021241	0.026711	0.025433	0.039924	0.016212	0.016135	0.018268	0.029592	0.032399
9	0.600568	0.096026	0.125587	0.025166	0.027269	0.032373	0.033111	0.051940	0.021554	0.018246	0.029820	0.047875	0.048860
10	0.537154	0.100131	0.137297	0.041181	0.044751	0.052149	0.053205	0.080625	0.035842	0.030953	0.046616	0.072041	0.061561
11	0.626728	0.128325	0.166943	0.038808	0.045204	0.056938	0.042567	0.064462	0.025506	0.014610	0.017121	0.027088	0.034486

Table 5

ROWS AND COLUMNS ARE (FOR -1), 0, AND 1 THROUGH N.
THIS IS MOST CONVENIENT WHEN CONSIDERING CONTEMPORANEOUS AND N LAGS, AND OMISSION OF THE TERM ALTOGETHER.

Hyp: small time deposits cause income

F2 SIGNIFICANCE LEVEL

COLUMNS ARE Y1-Y12

STD1-STD12	F2SIG	F2SIG0	F2SIG1	F2SIG2	F2SIG3	F2SIG4	F2SIG5	F2SIG6	F2SIG7	F2SIG8	F2SIG9	F2SIG10	F2SIG11
-1	.	.	.	.	.	.	.	.	.	.	.	.	.
0	0.673538	0.646958	0.581789	0.607517	0.628238	0.694064	0.684747	0.690374	0.608093	0.648461	0.745978	0.629106	0.877613
1	0.880579	0.895486	0.859030	0.877248	0.890181	0.925590	0.921238	0.922470	0.859684	0.883147	0.897934	0.757543	0.884573
2	0.960704	0.970132	0.956767	0.963241	0.970007	0.984109	0.982499	0.983320	0.941614	0.955859	0.967710	0.895939	0.968215
3	0.756350	0.792438	0.793448	0.794343	0.793353	0.855425	0.851449	0.861036	0.877722	0.863058	0.804999	0.668615	0.687837
4	0.690845	0.610191	0.621018	0.632121	0.643120	0.722746	0.730242	0.740712	0.735448	0.732373	0.760967	0.701191	0.635973
5	0.769892	0.723102	0.727482	0.736968	0.748156	0.818705	0.824403	0.831789	0.833303	0.830650	0.846200	0.805840	0.732579
6	0.823253	0.798310	0.807693	0.818926	0.827387	0.883847	0.887797	0.894594	0.883144	0.878778	0.890989	0.852277	0.748694
7	0.889972	0.868222	0.874770	0.884534	0.889869	0.930894	0.933774	0.938052	0.922940	0.916889	0.929029	0.898746	0.807011
8	0.856398	0.836635	0.833019	0.845636	0.856250	0.890999	0.893675	0.898497	0.848420	0.858447	0.837587	0.773966	0.764906
9	0.753276	0.784652	0.784210	0.800409	0.813085	0.863702	0.870582	0.879045	0.803355	0.821641	0.845213	0.750183	0.756893
10	0.694240	0.773876	0.782164	0.798524	0.809107	0.857900	0.861949	0.866962	0.824139	0.842559	0.871564	0.813783	0.829793
11	0.626268	0.746548	0.762357	0.779223	0.789964	0.843031	0.846802	0.857654	0.760924	0.780722	0.827882	0.782145	0.766123

ROWS AND COLUMNS ARE (FOR -1), 0, AND 1 THROUGH N.
THIS IS MOST CONVENIENT WHEN CONSIDERING CONTEMPORANEOUS AND N LAGS, AND OMISSION OF THE TERM ALTOGETHER.

Hyp: income causes small time deposits

F2 SIGNIFICANCE LEVEL

COLUMNS ARE STD1-STD12

Y1-Y12	F2SIG	F2SIG0	F2SIG1	F2SIG2	F2SIG3	F2SIG4	F2SIG5	F2SIG6	F2SIG7	F2SIG8	F2SIG9	F2SIG10	F2SIG11
-1	.	.	.	.	.	.	.	.	.	.	.	.	.
0	0.058561	0.038672	0.053211	0.051927	0.056837	0.060008	0.035632	0.036760	0.020195	0.019936	0.021632	0.035336	0.050823
1	0.102671	0.118203	0.156469	0.153349	0.165327	0.172922	0.106990	0.110468	0.067982	0.065596	0.070485	0.103592	0.135609
2	0.128815	0.196661	0.201805	0.185552	0.206494	0.214761	0.135994	0.140912	0.053638	0.054263	0.058405	0.082238	0.116085
3	0.150942	0.284268	0.272510	0.272900	0.307677	0.316862	0.226609	0.234115	0.107646	0.107219	0.114431	0.156348	0.210130
4	0.150466	0.333126	0.304758	0.313863	0.328630	0.332766	0.279335	0.287689	0.131984	0.120224	0.123074	0.162289	0.192809
5	0.234302	0.424455	0.407348	0.412813	0.434644	0.434583	0.351448	0.362195	0.173390	0.152214	0.149492	0.213518	0.252633
6	0.300033	0.476153	0.502252	0.501071	0.530255	0.529294	0.455805	0.467959	0.229069	0.207938	0.208159	0.271633	0.331548
7	0.287428	0.475735	0.525109	0.490083	0.531748	0.530412	0.438427	0.450128	0.171876	0.167991	0.164440	0.232931	0.256343
8	0.326398	0.572730	0.619713	0.579114	0.627882	0.625769	0.532681	0.545343	0.245385	0.240463	0.236535	0.320345	0.348277
9	0.392008	0.563435	0.632694	0.602701	0.639042	0.648677	0.579245	0.592412	0.298797	0.301812	0.305459	0.402630	0.437575
10	0.082727	0.144432	0.210505	0.195051	0.205292	0.219667	0.149743	0.159193	0.038769	0.041943	0.039293	0.068410	0.083871
11	0.095090	0.194306	0.268546	0.254198	0.264913	0.281647	0.206067	0.217223	0.058035	0.059470	0.056914	0.096648	0.114302

Table 6

DEPVAR Y DATA ARE LOGS--II/1966 TO II/1984 8 30 FRIDAY, SEPTEMBER 7, 1984 59

ROWS AND COLUMNS ARE (FOR -1), 0, AND 1 THROUGH N.

THIS IS MOST CONVENIENT WHEN CONSIDERING CONTEMPORANEOUS AND N LAGS, AND OMISSION OF THE TERM ALTOGETHER.

Hyp: large time deposits cause income F2 SIGNIFICANCE LEVEL

COLUMNS ARE Y1-Y12

LTD1-LTD12	F2SIG	F2SIG0	F2SIG1	F2SIG2	F2SIG3	F2SIG4	F2SIG5	F2SIG6	F2SIG7	F2SIG8	F2SIG9	F2SIG10	F2SIG11
-1	.	.	.	.	.	.	.	.	.	.	.	.	.
0	0.986999	0.979396	0.975771	0.967280	0.950675	0.944649	0.940463	0.941113	0.800537	0.778059	0.702341	0.579869	0.722215
1	0.545071	0.519869	0.527798	0.523829	0.524680	0.575468	0.574972	0.561264	0.441237	0.386207	0.415349	0.423230	0.413261
2	0.719792	0.630573	0.643033	0.639899	0.643271	0.695809	0.698930	0.677869	0.597805	0.509849	0.596673	0.590711	0.594705
3	0.714628	0.663817	0.654656	0.648650	0.651842	0.698053	0.699913	0.675492	0.524328	0.438342	0.391075	0.510328	0.548336
4	0.733868	0.638278	0.631117	0.603664	0.613499	0.654016	0.658602	0.633686	0.552331	0.443801	0.425407	0.606645	0.678740
5	0.776003	0.648311	0.654575	0.629479	0.645065	0.672937	0.678957	0.658015	0.600560	0.519602	0.536312	0.709509	0.793718
6	0.848918	0.723042	0.734563	0.719099	0.733483	0.742088	0.746812	0.729525	0.680174	0.610879	0.608109	0.719917	0.787105
7	0.904926	0.800024	0.812217	0.803301	0.815080	0.820812	0.822276	0.806046	0.762390	0.700471	0.692573	0.803767	0.832135
8	0.892353	0.784439	0.800553	0.801931	0.812279	0.826319	0.827440	0.796615	0.779270	0.728701	0.724615	0.832599	0.873192
9	0.808735	0.744061	0.759262	0.756111	0.770240	0.768619	0.766943	0.743599	0.632855	0.558055	0.556173	0.652644	0.674637
10	0.774888	0.625924	0.636299	0.629591	0.646992	0.618084	0.603274	0.565293	0.430699	0.288464	0.329023	0.412580	0.388484
11	0.803112	0.695352	0.697280	0.695466	0.712176	0.691885	0.682797	0.652680	0.509412	0.365866	0.382621	0.474705	0.451713

DEPVAR LTD DATA ARE LOGS--II/1966 TO II/1984 8 30 FRIDAY, SEPTEMBER 7, 1984 63

ROWS AND COLUMNS ARE (FOR -1), 0, AND 1 THROUGH N.

THIS IS MOST CONVENIENT WHEN CONSIDERING CONTEMPORANEOUS AND N LAGS, AND OMISSION OF THE TERM ALTOGETHER.

Hyp: income causes large time deposits F2 SIGNIFICANCE LEVEL

COLUMNS ARE LTD1-LTD12

Y1-Y12	F2SIG	F2SIG0	F2SIG1	F2SIG2	F2SIG3	F2SIG4	F2SIG5	F2SIG6	F2SIG7	F2SIG8	F2SIG9	F2SIG10	F2SIG11
-1	.	.	.	.	.	.	.	.	.	.	.	.	.
0	0.797312	0.864152	0.888740	0.793648	0.827764	0.771377	0.728724	0.732710	0.682375	0.675288	0.673102	0.658245	0.720779
1	0.924883	0.891276	0.904676	0.869525	0.934463	0.919564	0.885169	0.887502	0.811996	0.789601	0.789035	0.789434	0.859520
2	0.860926	0.855639	0.890045	0.869583	0.889072	0.830701	0.810353	0.813692	0.829421	0.840552	0.843243	0.843034	0.894282
3	0.945459	0.893358	0.896236	0.879105	0.896721	0.842529	0.791906	0.797007	0.843914	0.866232	0.869971	0.867841	0.908448
4	0.958911	0.894796	0.934679	0.918628	0.928692	0.890850	0.860190	0.862681	0.900806	0.911692	0.914529	0.915752	0.939632
5	0.983921	0.919447	0.917710	0.893936	0.913252	0.879322	0.852362	0.854443	0.920799	0.931405	0.933569	0.936541	0.948801
6	0.959983	0.833399	0.886301	0.840502	0.844440	0.797261	0.770570	0.775086	0.824417	0.803478	0.808581	0.812607	0.848504
7	0.971325	0.716897	0.650976	0.569764	0.621087	0.528074	0.490028	0.500746	0.548083	0.497002	0.484098	0.497158	0.548122
8	0.981671	0.803693	0.724112	0.667714	0.717708	0.634976	0.596177	0.607074	0.653091	0.602948	0.588761	0.602883	0.651781
9	0.985976	0.864335	0.783480	0.750893	0.783513	0.717061	0.690319	0.700980	0.740626	0.696228	0.683023	0.696721	0.738465
10	0.979624	0.892355	0.799436	0.763951	0.814534	0.780874	0.757809	0.768682	0.811068	0.775455	0.764456	0.776629	0.812656
11	0.984416	0.792104	0.692465	0.668477	0.732904	0.732492	0.739268	0.751506	0.742770	0.728154	0.722248	0.735434	0.773862

Table 7

ROWS AND COLUMNS ARE (FOR -1), 0, AND 1 THROUGH N.
THIS IS MOST CONVENIENT WHEN CONSIDERING CONTEMPORANEOUS AND N LAGS, AND OMISSION OF THE TERM ALTOGETHER.

F2 SIGNIFICANCE LEVEL

Hyp: MMMF+MMDA causes GNP

COLUMNS ARE Y1-Y6

MF MDA1-MF MDA6	F2SIG	F2SIG0	F2SIG1	F2SIG2	F2SIG3	F2SIG4	F2SIG5
-1	.	.	.	.	.	.	.
0	0.675917	0.674741	0.665059	0.707780	0.688109	0.669638	0.684857
1	0.917491	0.907963	0.902461	0.912535	0.900166	0.886399	0.889163
2	0.982231	0.977459	0.974054	0.972366	0.964476	0.960250	0.963024
3	0.946088	0.962476	0.960044	0.975934	0.976578	0.972804	0.976293
4	0.948206	0.931205	0.938950	0.876086	0.873916	0.880544	0.885318
5	0.977913	0.970920	0.974635	0.938262	0.925793	0.933016	0.934922

ROWS AND COLUMNS ARE (FOR -1), 0, AND 1 THROUGH N.
THIS IS MOST CONVENIENT WHEN CONSIDERING CONTEMPORANEOUS AND N LAGS, AND OMISSION OF THE TERM ALTOGETHER.

F2 SIGNIFICANCE LEVEL

Hyp: GNP causes MMMF+MMDA

COLUMNS ARE MF MDA1-MF MDA6

Y1-Y6	F2SIG	F2SIG0	F2SIG1	F2SIG2	F2SIG3	F2SIG4	F2SIG5
-1	.	.	.	.	.	.	.
0	0.629603	0.634343	0.659797	0.687130	0.733402	0.723080	0.718283
1	0.814758	0.824460	0.841251	0.871799	0.888806	0.891592	0.896201
2	0.925831	0.929647	0.940172	0.957965	0.969607	0.968759	0.970950
3	0.830195	0.832124	0.843428	0.850450	0.847778	0.856667	0.820543
4	0.889854	0.897581	0.908597	0.911926	0.904130	0.911883	0.873670
5	0.668266	0.675747	0.706338	0.698356	0.722596	0.735260	0.724961

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Table 8
Estimation of the St. Louis Equation Using Various Monetary Aggregates: II/1972-II/1984

Monetary aggregate	Constant	ΣM	Lag	ΣG	Lag	SE	$\bar{R}^2$	DW
M1	1.35 (0.51)	1.05 (3.36)	2	0.11 (1.37)	0	4.55	0.15	1.56
Divisia M1	-2.26 (0.69)	1.51 (3.75)	2	0.08 (1.02)	0	4.44	0.20	1.58
MQ 1/	-24.00 (3.35)	3.14 (5.15)	6	1.15 (3.51)	7	4.11	0.31	2.11
Divisia L	5.98 (3.10)	0.43 (2.17)	1	0.08 (0.95)	0	4.78	0.07	1.69

Absolute value of t-statistics in parenthesis

1/ Coefficients of each distributed lag constrained to lie on a fourth degree polynomial

Table 9
Results of J-Tests: t-Statistics

Monetary aggregate under the null hypothesis	Monetary aggregate under the alternative hypothesis			
	M1	Divisia M1	MQ	Divisia L
M1	---	1.665	4.462*	2.389*
Divisia M1	0.664	---	4.627*	2.129*
MQ	2.061*	2.646*	---	1.864
Divisia L	3.302*	3.497*	5.434*	---

* Statistically significant at 5 percent level

Table 10
Estimation of the St. Louis Equation Over Various Sample Periods

Monetary aggregate		Period			
		II/1972-IV/1980	II/1972-IV/1981	II/1972-IV/1982	II/1972-IV/1983
M1:	ΣM	1.54 (3.90)	1.77 (4.86)	1.78 (4.36)	1.06 (3.37)
	ΣG	0.03 (0.43)	0.06 (0.89)	0.07 (0.90)	0.11 (1.46)
	SE	3.69	3.89	4.40	4.57
	$\bar{R}^2$	0.32	0.36	0.29	0.16
Divisia M1:	ΣM	1.70 (3.87)	1.78 (4.58)	1.73 (3.95)	1.61 (4.01)
	ΣG	0.03 (0.42)	0.06 (0.80)	0.07 (0.85)	0.09 (1.20)
	SE	3.84	4.01	4.53	4.37
	$\bar{R}^2$	0.26	0.32	0.25	0.24
MQ: 1/	ΣM	3.12 (3.39)	2.10 (2.05)	3.18 (4.69)	3.05 (4.79)
	ΣG	0.83 (2.52)	0.89 (2.15)	1.20 (3.31)	1.19 (3.46)
	SE	3.32	4.20	4.40	4.23
	$\bar{R}^2$	0.44	0.25	0.29	0.28

Absolute value of t-statistics in parenthesis

1/ Coefficients of each distributed lag constrained to lie on a fourth degree polynomial

Table 11
Out-of-Sample Forecast Experiment: I/1981-II/1984

Monetary aggregate	Mean error	MAE	RMSE
M1	4.07%	6.45%	7.17%
Divisia M1	2.78	5.15	5.86
MQ	-0.72	6.64	8.27

Chart 1 : Forecast Errors

ESTIMATION: II/72 - IV/80
FORECASTS I/81-II/84

RESIDUALS: ACTUAL - PREDICTED.

PLOT OF R_MIEQ*PLOTDATE SYMBOL USED IS M
PLOT OF R_DMIEQ*PLOTDATE SYMBOL USED IS D
PLOT OF R_MQEQ*PLOTDATE SYMBOL USED IS Q
PLOT OF R_DLEQ*PLOTDATE SYMBOL USED IS L