Monetary Aggregates as a Target Variable: Reply

One of the implications of our earlier paper [4] was that, in a three-variable vector autoregressive system in the spirit of the St. Louis equation, *M2* was substantially free of feedback from nominal GNP (*Y*) and high-employment federal expenditures (*EHE*) and that *M2* had substantial effects on *Y*.

Chowdhury [2] contends that, when a long-term interest rate (*AAA*) is added to the system, there is substantial feedback from *AAA* and *Y* to *M2*. He employs variance decompositions (VDCs) as a measure of the strength of Granger-causal relations for our three-variable system and his four-variable system. He finds that for the three-variable system, regardless of ordering, shocks to *M2* explain all or virtually all of its own forecast error variance and that *M2* shocks explain approximately 50% of the variation in *Y*. However, for the four-variable system, he reports "substantial" feedback from *AAA* and *Y* to *M2*; he notes that *Y* explains 5% (first ordering) and 3% (second ordering) of the variation in *M2* in the four-variable system. He then concludes that this feedback from *Y* suggests that *M2* is not exogenous to income. Although in general one might argue that it is difficult to define precisely how much feedback constitutes "significant" feedback, it would seem that feedback in the range of 3–5% constitutes trivial feedback. Thus we regard Chowdhury's conclusion about *Y* and *M2* as unsupported by his evidence. We interpret his results as providing evidence that adding an interest rate does not alter the conclusion from the three-variable system that *M2* is essentially free of direct feedback from income.

There remains, however, the question of feedback from *AAA* to *M2*. We have attempted to replicate Chowdhury's results using the same data he used and the micro version of RATS. One potential problem with this is that Chowdhury estimated his system with FIML and FIML is not available on RATS. Using seemingly unrelated regression (SUR) and the Choleski decomposition, we were able to closely approximate Chowdhury's results for the three-variable system (see Table I.A). This example as well as other macro data sets we've dealt with have led us to the general conclusion that there are only minor differences in estimating reduced forms with alternative techniques such as FIML and SUR. We were much less successful in replicating the four-variable system results (see Table I.B). We found for the ordering *EHE*, *Y*, *AAA*, and *M2* that *AAA* explains about 33% of the variation in *M2* while Chowdhury found that *AAA* explained about 40% of the variation in *M2*. Our results differ markedly for the ordering *M2*, *Y*, *AAA*, and *EHE* from Chowdhury's. We found that *AAA* explains only 6% of the variation in *M2* while Chowdhury found *AAA* explains 34% of the variation in *M2*.

In the ordering in which *M2* precedes *AAA*, we found little feedback from *AAA* to *M2* while in the ordering in which *AAA* precedes *M2* we found substantial feedback from *AAA* to *M2*. These differences are not too surprising given a substantial negative contemporaneous correlation (−.46) between the residuals for *M2* and *AAA*.[1] In the ordering with *M2*

1. One interpretation of the negative correlation between *M2* and *AAA* is the existence of a liquidity effect following a change in *M2*. Federal Reserve reaction to a shock to *AAA* would not seem to be an appropriate interpreta-

Table I. Variance Decompositions (VDC's): 20 Quarter Horizon

A. VDCs for Three-Variable System: Chowdhury Orderings 1 and 2

Relative Variation in	Explained by Innovations in		
	M2	*Y*	*EHE*
M2	100.0	0.0	0.0
Y	54.2	37.5	8.2
EHE	2.5	10.7	86.8
	EHE	*Y*	*M2*
EHE	100.0	0.0	0.0
Y	14.9	32.3	52.7
M2	2.5	0.4	97.1

B. VDCs for Four-Variable System: Chowdhury Orderings 1 and 2

Relative Variation in	Explained by Innovations in			
	M2	*Y*	*AAA*	*EHE*
M2	90.4	3.3	6.1	0.2
Y	41.7	44.5	2.7	11.0
AAA	39.8	20.9	35.4	3.9
EHE	5.6	8.5	9.5	76.4
	EHE	*Y*	*AAA*	*M2*
EHE	90.9	2.2	3.9	2.9
Y	20.0	37.0	15.2	27.9
AAA	6.6	21.9	35.9	35.6
M2	3.9	3.3	32.7	60.0

C. VDCs for Four-Variable System: Theoretically Based Orderings

Relative Variation in	Explained by Innovations in			
	M2	*EHE*	*Y*	*AAA*
M2	90.4	0.4	3.0	6.2
EHE	5.6	86.6	2.1	5.7
Y	41.7	19.7	36.0	2.5
AAA	39.8	5.3	19.2	35.7
	EHE	*M2*	*Y*	*AAA*
EHE	90.9	1.3	2.1	5.7
M2	3.9	86.8	3.0	6.2
Y	20.0	41.5	36.0	2.5
AAA	6.6	38.5	19.2	35.7

before *AAA*, the Choleski decomposition assigns credit for the correlation between *M2* and *AAA* to *M2* while the opposite is done when *AAA* precedes *M2* in the ordering. The relatively small change in the feedback found by Chowdhury when the ordering is changed is thus puzzling given the substantial contemporaneous correlation between *M2* and *AAA* and our results for the different orderings.

The appropriate choice of ordering is also an issue that requires discussion. We contend that theoretical considerations should guide the choice of orderings; for a similar argument but with a different approach to the orthogonalization of the variance-covariance matrix to

tion since one would typically expect the Fed to increase money following a positive shock to the interest rate. However, the negative correlation may reflect an interest rate effect on the demand for *M2*, although most money demand studies focus upon the effects of changes in short-term interest rates on money demand.

the Choleski method see Bernanke [1]. Following Gordon and Veitch [3], it is noted that the efficient markets hypothesis suggests that the interest rate responds contemporaneously to shocks to other variables in the system and, as a consequence, *AAA* should be placed last in the ordering. Based upon lags in the receipt of information about nominal GNP, we placed the policy variables before *Y*. The appropriate ordering of the policy variables seems more difficult to determine, and we considered the orderings *M2*, *EHE*, *Y*, *AAA* and *EHE*, *M2*, *Y*, *AAA*.[2] From Table I.C, we see that *AAA* explains only 6% of the variation in *M2*, *Y* explains only 3%, and *EHE* explains at most 4% of the variation in *M2*. *M2* explains about 40% of the variation in both *Y* and *AAA*. Thus we find no evidence of substantial feedback from the other system variables to *M2*.

Our conclusions are quite different from Chowdhury's. We find no evidence of substantial feedback from *Y* to *M2* in either the three- or four-variable systems and we argue that Chowdhury's results support this conclusion. The extent of the feedback from *AAA* to *M2* is sensitive to the ordering of the variables for the VDCs, but in orderings which we feel are theoretically more defensible than are Chowdhury's, the feedback from *AAA* to *M2* is quite weak. Although we are hesitant to generalize these results to larger systems, it does appear that over our sample period *M2* is substantially free of feedback from other variables in a "St. Louis" type system augmented with a long-term interest rate.

W. Douglas McMillin
Louisiana State University
Baton Rouge, Louisiana

James S. Fackler
University of Kentucky
Lexington, Kentucky

2. Other defensible orderings place *M2* and *EHE* prior to *AAA* which is placed before *Y*. This allows *AAA* to respond contemporaneously to shocks to the policy variables and allows *Y* to respond contemporaneously to shocks to *AAA* as well as to *M2* and *EHE*. VDCs based upon the orderings *M2*, *EHE*, *AAA*, *Y* and *EHE*, *M2*, *AAA*, *Y* generated similar results to those reported in Table I.C.

References

1. Bernanke, Ben S. "Alternative Explanations of the Money-Income Correlation." National Bureau of Economic Research Working Paper No. 1842, Feb. 1986.

2. Chowdhury, Abdur R., "Monetary Aggregates as a Target Variable: Comment." *Southern Economic Journal*, July 1987.

3. Gordon, Robert J. and John M. Veitch. "Fixed Investment in the American Business Cycle, 1919–83." National Bureau of Economic Research Working Paper No. 1426, August 1984.

4. McMillin, W. Douglas and James S. Fackler, "Monetary vs. Credit Aggregates: An Evaluation of Monetary Policy Targets." *Southern Economic Journal*, January 1984, 711–23.