

## **James L. Swofford**

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# Commentary

**D**OUG FISHER AND ADRIAN FLEISSIG develop and estimate a Dynamic Fourier Expenditure System in an attempt to meet some criticisms that have been raised against the literature on expenditure systems. First, I will discuss Fisher and Fleissig's model in terms of their own criteria set forth in their introduction. Then I will discuss their specification in terms of some criteria for an ideal model that Carl F. Christ proposed in his paper at last year's Federal Reserve Bank of St. Louis Economic Policy Conference. Finally, I will make some general comments about research on money stock measurement.

### **FISHER AND FLEISSIG'S CRITERIA**

In their introduction, Fisher and Fleissig mention five of what they feel are the most telling shortcomings of the expenditure system literature. The first they mention is a failure to link theory and application. On one level they have met this criticism admirably. They chose to use the Fourier form as a flexible form specification that is able to approximate any unknown indirect utility function. They have also modeled the dynamics in a way that makes economic sense with their dynamic utility function specification. On another level they have not linked theory and application. Their discussion of the elasticities of substitution that they have estimated is fairly terse. While they show that the elasticity of substitution between two assets is more stable with one dynamic specification,

they do not discuss the sign, magnitude or economic interpretation of their estimated elasticities more than in passing. They say that their elasticities are typical for this literature, but is that good or bad? They do not cite specific previous studies nor do they mention the size or sign of elasticities from other studies. Are we surprised that old consumer M1 and other checkable deposits (OCD) and savings accounts are substitutes but old consumer M1 and OCD and small time deposits are complements? These results make sense to me but their implications should be explained in the paper. What about the size of these elasticities? What is their meaning? My view is that other economists may miss the importance of the expenditure system literature, if those of us doing research using such systems continue to omit a thorough discussion of the elasticities that these systems produce and a comparison of these elasticities with those produced by previous research.

The second shortcoming of the expenditure system literature that Fisher and Fleissig address is improper aggregation over goods. In my view they have handled this problem in a very nice way. Expenditure systems like the Fourier system are very parameter-intensive, and aggregation over goods is required to make them tractable. Fisher and Fleissig have used both revealed preference results and good judgment about which goods to aggregate. I feel that in estimating systems such as these both are needed. However, I feel I must point out that Fisher and Fleissig have used a revealed preference test for a direct utility function to

back up the specification of an indirect utility function. Direct utility function results may be suggestive of the structure of the indirect utility function, but they are not necessarily more than suggestive.

Fisher and Fleissig's third and fourth problems with the expenditure system literature are imprecise estimations of partial derivatives and use of locally integrable models, for which the first- and second-order conditions do not obtain at some data points. The Fourier System was developed to handle these criticisms of other specifications, such as the translog, so Fisher and Fleissig have admirably handled these criticisms as they set out to do.

The last problem Fisher and Fleissig set before themselves to solve is misspecification, often nonspecification, of dynamics in expenditure systems. They model the dynamics with two very general specifications. One, the time series model, is statistical in nature. Another, the dynamic utility function model, is consistent with economic theory. My view is that they are correct to model the dynamics in very general ways. Gerald Whitney and I (1994) have found that data in similar categories to those that Fisher and Fleissig have used can only be rationalized by a well-behaved direct utility function with some incomplete category adjustment within some quarters. But since Fisher and Fleissig are unable to choose between their two dynamic specifications, we cannot yet say that they have correctly specified the dynamics. They have, however, certainly done a better job modeling the dynamics than other researchers in this area. In a sense they have begun the debate on how to correctly model the dynamics within flexible consumer expenditure systems.

In summary, with a couple of reservations, Fisher and Fleissig have done a good job in meeting the criteria they set forth for their model. Next, I turn to the question of how their models compare with someone else's criteria for an ideal econometric specification.

#### CARL CHRIST'S CRITERIA FOR AN ECONOMETRIC MODEL

At last year's St. Louis Fed conference, Carl F. Christ suggested seven characteristics of an ideal econometric model. I will next examine Fisher and Fleissig's paper in light of this ideal.

Christ's first criterion is that the estimated model should provide a good description of some interesting set of past data. Certainly, Fisher and Fleissig's model has been used to investigate an interesting issue—money holdings. There are also a reasonable number of coefficients that are statistically different from zero, and they test and find the residuals of their model are white noise.

The second criterion that Christ sets out (and one that he stressed) is that the model should be testable against data that were not used to estimate it and were not available when it was specified. Fisher and Fleissig have not done this. Since their sample ends in 1985, and Fisher and Fleissig have presumably formulated their model in recent years, this would be a tough challenge. A model estimated on data that ends eight years ago could not be expected to predict today's data very accurately. The new data set collected by the research staff of the St. Louis Fed could be used to estimate a dynamic flexible model, which then could be put to this test over the next few years.

Christ's third criterion, related to his second, is that the estimated model should describe events for at least a few quarters after it was formulated and estimated. As with Christ's second criterion, Fisher and Fleissig's specification cannot be reasonably put to this test. But a specification estimated with the St. Louis Fed's updated data could be.

The fourth criterion is that the model should make sense in the light of our knowledge of economics. Of course, the dynamic Fourier specification is flexible with respect to arbitrary elasticities, and it also does not generate negative shares. But Fisher and Fleissig's specification does generate asset pairs that switch from substitutes to complements over their sample. This is a puzzling result that they do not explain.

Christ's fifth criteria is that a simple model is superior to a complex model. Fisher and Fleissig's model is not simple, leaving open the possibility that an otherwise equal but simpler model will be found. Of course, this could be said of any specification. This does suggest that someone might want to test Barnett's Asymptotically Ideal Model with this type of data since it has similar characteristics to the Fourier model and may be simpler, depending on the formulation used.

The sixth criteria for judging a model is that, other things being equal, a model that explains a wide variety of data is better. Fisher and Fleissig's model does explain a wide variety of data, but some of it has been aggregated. An argument could be made to estimate this model before aggregating the data. But Fisher and Fleissig have used the soundest aggregation techniques in the literature, the model they necessarily used is very parameter-intensive, and the disaggregate data series is of a relatively short duration.

Christ's seventh and final criterion is that models that nest special cases are preferable. Fisher and Fleissig's dynamic Fourier models nest the static Fourier and, in that respect, meet Christ's ideal. Unfortunately, these models do not nest other Flexible Functional forms nor do the dynamic specifications nest each other.

Of course, Fisher and Fleissig's dynamic Fourier flexible functional form does not meet all of Christ's ideals. Fisher and Fleissig did not, nor would they, claim that it does, and I do not mean to give the impression that they would make such a bold claim for their model. Their model seems to meet the first and the fourth through the seventh criteria fairly well. Criteria two and three concern the ability of flexible expenditure systems to predict future behavior, which seems a worthwhile area of investigation to pursue with such specifications.

For the most part, Fisher and Fleissig's specifications meet their own criteria that they set out to meet, and Christ's criteria for an ideal specification that they were probably only generally trying to meet. Their paper is an important contribution to a growing literature on economic monetary aggregates. I want to close with a few comments on this literature.

### THE ECONOMIC MONETARY AGGREGATES LITERATURE

I feel that Fisher and Fleissig's paper is an important contribution to the question of what is money. Much of my work in this area has involved nonstochastic revealed preference tests.

Not much is known about the power of such tests, and there are doubts about the validity of these tests, so work such as Fisher and Fleissig's showing that per capita behavior is consistent with stochastic models is very important.

The literature on economic monetary aggregates suggests that the aggregates on which the central bank focuses may not be the ones that people use. If people are using one aggregate and the central bank is controlling another, then stable "policy" may lead to an unstable price level. Policy in such a situation might be destabilizing, because the public and the central bank are engaged in a two-sided game, with each side having a different objective—the monetary aggregate each uses. This implies that it is important for central banks to attempt to identify what the public in their country is using as money.

Also, there may not be an economic monetary aggregate in an area. When looking for an economic monetary aggregate, the question we are really asking is, "Is there a common currency for a particular area?" This area may or may not be a nation state. If there is no economic monetary aggregate in an area, then, again, "monetary" policy would not likely lead to predictable results.

Finally, there may be multiple economic monetary aggregates in use. Consumers may be using one aggregate and business another. Controlling both aggregates may be mutually exclusive. In such a case, optimal monetary policy may require minimizing some loss function over the aggregates, with each one weighted by how closely related each aggregate is to the price level.

### REFERENCES

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