

DISCUSSION: SUPPLY RELATIONSHIPS IN THE SOUTH— WHAT HAVE WE LEARNED?

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I am pleased to have the opportunity to discuss Professor Shumway's paper on supply relationships in the South. He has done an excellent job of describing the current state of knowledge on this important economic topic as well as pointing out areas in which further investigation is needed. Before proceeding to the discussion of the paper, I wish to examine the evolution of supply analysis research.

SIXTY YEARS AGO

Many of the concerns expressed by Shumway today were articulated by agricultural economists in the early 1920's. Professor John D. Black, in a 1924 article, set the stage for work to follow in the area of supply analysis. Professor Black's opening statement was, "*One of the most unexplored portions of the field of economics is the relation between price and subsequent output—which is sometimes called the elasticity of supply*" (p. 145). The problems being addressed by agricultural economists during that time period were not greatly different from the ones we are facing today. It was Black's contention that the profession was unable to answer the questions being posed to it about the effects of a change in price of one commodity on its own output and the output of other products produced by the firm. Most of the thinking during that time period was along the lines of cost of production and its relationship to product price. Concepts such as "necessary price" and "bulk line costs" constituted the methodology for empirical work.¹ It was Black's opinion that these tools were inadequate. There was only one ap-

proach left, the statistical one. However, Black saw great difficulties with statistical analysis. These concerns involved: planned versus actual output, prices of competing products, technology, and changes in costs. Another difficulty with the statistical approach was the appropriate price to use. Black stated, "*farmers do not know whether prices in any given year are high or low. Any response which is measured statistically must be in terms of the reactions which farmers habitually make in the present state of their enlightenment on the subject*" (p. 150), i.e., expected price.

Price expectations were also discussed by F. F. Elliott who stated, "*it will be necessary to eliminate the association between actual price changes and producer expectations of future price changes*" (p. 288). Elliott too foresaw difficulties in dealing with agricultural products. Nevertheless, Elliott was optimistic about the future of research in this area and stated, "*Yet it is not unlikely that the development and refinements which are now taking place so rapidly in statistical methods will proceed to the point where it will soon be possible to see more reliable results...*" (p. 302). This apparent optimism, however, was not shared by Henry Schultz. It was Schultz' opinion that the derivation of concrete statistical laws of supply and demand was beset with many difficulties, both theoretical and practical. A large part of Schultz' skepticism was the apparent effort to derive supply elasticity estimated through an approach compatible with economic theory.

By 1929, L. H. Bean concluded that the theoretical reactions of a farmer's response

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¹ Necessary price was that "price required to bring forth a certain volume of production alleged to be necessary." A price that was between the average cost of the "least successful" grower and the average cost of all producers was referred to as bulk line cost (Black, p. 45).

to price had been discussed in depth and that it was now time to provide empirical estimates of output responses to price change. Making use of correlation analysis, Bean provided estimates of acreage response to price changes for potatoes, sweet potatoes, cabbage, watermelons, flax, rye, cotton, and hogs. He concluded, "*In each case the price received for the production of the preceding season is the dominant factor in the change in production in any given year*" (1929, p. 369). Bean was concerned that account had not been taken of the effects of yield, cost of production, profits, credit, weather, and labor. Thus, while providing estimates, there seemed to be concern with the acceptance of these estimates in light of the absence of underlying economic theory.

These early works pointed out five general concerns with supply analysis.

1. An attempt to tie the estimates to cost functions or conditions of the firm. While this was desirable from a theory standpoint, the results were not readily measurable or acceptable.
2. The need to measure the effects of prices of other products on the output of the product in question.
3. The need to account for technology.
4. The impact that weather had on planned and actual output.
5. The appropriate price to use.

Cochrane's paper in the mid-fifties again sparked interest in supply analysis. Cochrane stated, "*despite the research in supply analysis since the 1920s only a scant few provide estimates of elasticity of supply that few of us are willing to use*" (p. 1,161). A reason proffered for the inadequacy of estimated supply elasticities was "*that the general or price economists have been lost in the conceptual fog surrounding supply relations*" (p. 1,161). After amplifying on the differences between supply response and supply relations, Cochrane provided estimates of elasticity of supply for various commodities. These short-run supply elasticities were obtained by Professor Cochrane by "*personal experience and judgement*" (p. 1,164). In discussing the paper, L. H. Bean called these estimates imaginary, dangerous, and unrealistic (1955, p. 1,198).

This brings us to the mid-fifties and the seminal work of Nerlove. Much of the work in supply analysis as we know it today was advanced by Nerlove. Askari and Cummings reported supply elasticity estimates from some

602 models relying on some formulation of the Nerlove approach.

RECENT WORK

Given this background information, let us turn to Professor Shumway's paper. The basic conclusions drawn or implied by Professor Shumway on supply relationships are the following.

1. As a profession, we have devoted a great deal of resources and time to the study and analysis of agricultural supply response.
2. Our ability as a profession to predict producer response to price beyond a very narrow range of economic conditions "*has not been very good.*"
3. Many of the estimates obtained do not maintain or conform to the theory of the competitive firm.
4. Since most agricultural firms are multiproduct firms there is a need to consider the impact of technical and economic relationships between these products.
5. For a number of reasons we have little confidence in using a particular elasticity (or narrow range) for most agricultural products.

The status of supply analysis research presented by Dr. Shumway does not differ greatly from what was reported some 60 years earlier.

What are the uses that we make of supply elasticities? One use is government policy analysis. Estimating the social cost of alternative government commodity programs requires estimates of the elasticity of supply of the product in question. If intercommodity effects are to be reflected, estimates of cross price elasticities are also required. The evaluation of proposed marketing orders requires estimates of the demand and supply elasticities of the product in question if one is to determine whether the producer or consumer bears the costs of the program. Elasticity estimates, or models from which supply elasticity estimates have been derived, are used for forecasting to provide price predictions for producers and quantification of spatial equilibrium models. A cursory review of articles in the *Southern and American Journals of Agricultural Economics* points out the reliance of related research on estimates of supply elasticities.

The estimates provided by Shumway, excluding those derived from the dual ap-

proach, are seen to vary widely for field crops. Estimates provided for vegetable crops and livestock showed less variability but this may have been due to much less work in this area. It is not surprising that Professor Shumway correctly cautions us on placing confidence in any particular supply elasticity estimate for southern agriculture.

Given the wide range of the estimates reported, the question that should be posed is, "Why?" Is it, the diversity of the models employed? These have varied from linear programming to the application of a dual approach accommodating revisional price expectations. Or, are the differences due to the time periods estimated or the geographic areas considered? Is it logical to expect the elasticity of supply of soybeans obtained from the same model and time period to vary from 0.75 for the Delta to 1.70 to 3.30 for the Atlantic area? Estimates provided by Dr. Shumway for Texas also show a wide range of variability. Shumway reports supply elasticity estimates for corn for Texas that vary from 0.07 to 1.59. The point here is to question whether we as a profession are to be satisfied with estimates that vary as greatly as reported for such an important tool for policy analysis and research? This is a question that is left unanswered.

The profession may not have emerged from the conceptual fog that Cochrane spoke of

in the mid-fifties surrounding supply elasticity estimates. The primary problem and underlying theme of Professor Shumway's paper is the need to obtain estimates that are theoretically consistent with the theory of the firm. That is, we need estimates that are in a reasonable range, statistically significant, and that are consistent with the underlying theory of the firm. These are extremely difficult to develop.

For multiproduct firms, the problem is further compounded by intercommodity effects which may be both technical and pecuniary in nature. The approach suggested by Shumway is the use of the dual. This approach permits more direct estimation of output supplies and intercommodity adjustments which largely have been ignored in previous supply work. These intercommodity effects are not without importance. They are important in both the profit maximizing calculus of the firm and for policy applications. Penn and Irwin state, "*The interdependence between the soybean economy and those of corn, cotton, and rice means that policy changes directed toward one crop can have very decided effects upon the others*" (p. 115).

Professor Shumway has called attention to problems besetting supply research in the South. It is to be hoped that his paper will stimulate much-needed research in the area.

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