Maintaining the Cutting Edge

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UTILIZING ECONOMETRIC PRICE ANALYSIS MODELS IN EXTENSION OUTLOOK AND MARKETING PROGRAMS

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The history of extension work is one filled with applications of technology to the problems of the agricultural producer. With the shift away from diversification of many farm businesses a need has developed for more precision in financial management and marketing. In response to these needs, the extension farm management specialists in Missouri have been incorporating the findings of the Food and Agricultural Policy Research Institute (FAPRI) into various aspects of the farm management and outlook programs.

Incorporation into Outlook Programs

The Missouri extension farm management program includes as one of its segments farm price outlook projections. Various methods of delivery are utilized in getting this information to the producers. One method that is used is a series of amplified-telephone conference calls wherein 7 to 15 locations across the state are linked together. State specialists are assembled to make basic outlook statements and present current market fundamental information. These specialists are then available for a question/answer session from the participants at the remote locations.

A major part of these conferences is the presentation of the quantity and price projections that are developed by FAPRI. The major focus within the state of Missouri is centered on corn, wheat and soybeans along with cattle, both feeders and fat cattle, and hogs. The yearly average price projections are presented as a guide to producers in developing benchmarks for analyzing price offerings throughout the marketing year. These yearly average prices can also be used as base guidelines for financial projections such as cash flow projections, profit and loss estimates and long range plans. Price and quantity expectations are presented for a 10 year planning horizon.

A strength of using an econometric model for outlook work is the ability to answer the "what if" questions of producers by applying the impact multipliers that are generated by the model. Both quantity and price impacts can be handled in this matter. For example, a producer may ask what is the expected impact on soybean prices if production is cut by 100 million bushels. Through use of the impact multipliers this question is readily answered. Likewise, the impact of a reduction (or increase) in corn production can be estimated for soybean prices. Estimates of this type are useful to producers in judging how changes in

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crop size can impact price expectations. These changes in expectations can then be incorporated into existing plans and projections.

In addition to the outlook conferences, several other types of delivery methods are used in presenting outlook information. One of these is the newsletter or printed outlook statement. In Missouri, outlook newsletters are printed quarterly for hogs and cattle, semi-annually for feeder cattle and annually for land values and interest rates. In the newsletters, the projections of the econometric models are used in conjunction with other sources of information to develop composite estimates. Various segments of the newsletters, such as the interest rate projections may come directly from the models.

Incorporation into Policy Programming

A second use of econometric models is in policy programming. Analysis done by FAPRI is used as a base estimate of potential impact of the various farm programs being proposed. The policy programs then become springboards for discussion by the participants about the merits or problems associated with the various proposals. Used in this context, the results of the econometric models are not presented as absolute predictions, but rather as most likely scenarios given the assumptions about weather, government action, and other variables within the model.

The strength of using the econometric models in policy programming has been the ability to look at the comparative advantages of the various proposals. This has allowed the producers to be better informed regarding the potential impacts of farm programs over a longer horizon. Utilizing the insights gained through the econometric models, producers are better able to make informed decisions regarding long term investments, marketing plans, and the comparative advantages of participation in government programs.

Aiding Farmer Decision Making

While the information gleaned from the econometric models has been very useful to extension personnel in presenting programs, the question that begs asking is whether or not the information of the models has been useful to the farmer in decision making. The answer to this question is yes, and in many different ways.

One of the primary uses of the information has been as a marketing guide; not as a price predictor per se, but rather as a gauge to judge the relative attractiveness of current market price offerings. As an example, the model estimates that this year's yearly average price for soybeans will be $4.62 per bushel. Combining this information with the 1975-85 standard deviation for monthly soybean prices, which is $1.00, one can build a cumulative probability schedule for analyzing soybean prices relative to the expected yearly average price. Using this naive approach, a schedule would be generated that suggests that the probability of monthly prices being above $5.62 is 0.16 and that the probability of prices being above $6.12 is approximately 0.1. This type of analysis allows a basis for comparing the current market price

offerings relative to expected average prices. Making the assumption that prices more than one standard deviation above the average are likely to be short-lived, a producer would have been in position to evaluate the recent rally in soybean prices.

A second use of the information by farmers has been in evaluating long term investment decisions. The predicted prices of the model can be used in long term profitability estimates and cash flows. Likewise, the long term estimates can be used to evaluate such problems as the relative impact of placing land in the conservation reserve versus growing crops on it over the next 10 years. Information from the model can be used to generate the relevant financial analysis for each year of the planning horizon. While it is obvious that other variables need also be considered, the estimates of futures prices can be quite valuable in making decisions concerning investment and disinvestment.

A Note of Caution

While the econometric models can be useful in aiding decision making by producers, there are some points of caution which should be exercised when using the output of such models. The first point to note is that the information generated by such models is no better than the accuracy of the data which is inputted. Secondly, the models are typically unable to react to system shocks until after the shocks are known, although the impact multipliers do give relatively good estimates of the effects of minor shocks. A third point is that most of the models currently operating generate yearly average estimates which may be quite misleading for shorter planning periods. These and other concerns should not deter the use of econometric models, but the user should be aware of the limitations of the models and their relevancy to the particular situation.

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HOW CAN THE POLICY MODELS SERVE THE FARMER DECISION MAKERS?

John Ferris [1]

Extension economists should make more use of policy models in their programs with farmers and other audiences. Clientele not only want more detailed analysis of policy options, but also have a growing understanding of the modeling process. At least this is my impression from early efforts to explain a microcomputer version of a model of U.S. and world agriculture. This particular model generates long-range annual projections of about 180 endogenous variables to the year 2000. The solution requires only about three minutes, making possible "live" demonstrations and testing of alternative policies.

Few issues generate more lively discussion and debate than do questions related to farm policy. This has sparked repartee at dinner tables in farm homes, at rural meetings, and in the halls of Congress. And this has been going on for many years. This innate interest in farm policy has provided the Cooperative Extension Service with excellent opportunities for educational programs. Such programs can serve not only to inform farmers, agribusinesses, others in the food system, and the general public about the choices, but also to teach economic principles.

There are some excellent examples of well developed extension programs in farm policy. Last fall when I was interviewed for a videotape on mandatory production controls, the background materials which helped me most were a set of pamphlets prepared by a national extension committee in the early 1960s.

Effective as many of our policy extension efforts have been, we have not been able to be as definitive as we might wish to be in explaining the consequences of alternative policies. Considering the sophistication of our extension audiences today, it is not sufficient to say that mandatory production controls would raise consumer prices and lower Treasury costs. They want to know how much and the timing of the changes. This type of information policy models can provide.

As evidence of the interest in the level of detail, the FAPRI (Food and Agriculture Policy Research Institute of Iowa State University and the University of Missouri) analysis of the Harkin/Gephardt Bill has been given substantial visibility in the popular press. The July 1987 issue of Michigan Agriculture, published by the Michigan Democratic Agriculture Committee, carried extensive references to the study. A recent issue of Farm Bureau News (published weekly by the American Farm Bureau Federation) featured an article on the effects of

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freezing the level of federal outlays as analyzed by the Washington University Macro Model (WUMM) of Lawrence H. Meyer and Associates.

With improved microcomputer technology and growing availability, new opportunities will rapidly emerge for use of policy models in our extension programs. In recent months, I have developed a fairly comprehensive model of the grain-soybean-livestock sector for the domestic economy and an aggregate international sector to generate export demands. While patterned after the MSU Agriculture Model, this model, known as AGMOD, was basically built from scratch and estimated from annual data beginning in 1960. AGMOD was made possible by a new version of the software package Micro TSP, which just became available in 1986 (Lilien and Hall).

AGMOD presently includes 186 equations, 180 endogenous variables, and 44 exogenous variables. The model could be expanded to a total of 300 variables which is the current maximum for Micro TSP. Micro TSP is not only an excellent program for regression analysis, but it provides a convenient way to formulate models with those equations. The Gauss-Seidel procedure is used to solve the models.

With an upper limit of 300 variables, I have had to be very selective in terms of which items to include and how much detail was really needed. While some sectors of the agricultural economy are omitted, the model is capable of generating answers to the salient policy questions. The relative simplicity of the model facilitates updating, re-estimation, and necessary trouble-shooting that modelers must regularly do. The scale of the model is also an asset in explaining and demonstrating its operation to others, particularly lay audiences.

AGMOD generates annual projections to the year 2000. On my Zenith 248-82 with 512 K, the solution generally is completed in two to three minutes. This facilitates the examination of numerous alternative assumptions about farm policies and other exogenous variables. With a little imagination, microcomputer models such as this could be easily incorporated in extension policy education programs. The process could be demonstrated live with small groups and, with the improvement in computer screen projection technology, could be used with large groups as well. My limited experience in showing this model to lay audiences has been encouraging.

We do need to guard against the possible misuse of these models and their results. We must be liberal with the usual caveats concerning the validity of the assumptions and the inherent errors in the model and the data. Since the policy issues are very sensitive, extreme care must be taken in the presentation of the results. Political figures are tempted to extract the information that supports their case and ignore the negative.

One of the deficiencies of our policy models is that we have not adequately incorporated risk factors. Alternative scenarios are usually depicted by single-valued projections with no direct accounting for the differences in risk. One way to begin to incorporate risk (and model error as well) in policy models is to apply random number generators to the equations. Repeated solutions would trace out the implied probability distributions on the results.

I want to take this opportunity to congratulate Abner Womack and his colleagues who have developed and maintained FAPRI. This is a respected

research group that has demonstrated the value of econometrics in policy analysis. Our Michigan State Agriculture Model group has operated somewhat in a parallel fashion, but with differences in emphasis. We have benefited from the FAPRI experience and I hope the information we have shared with FAPRI has benefited them.

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