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A SYSTEMATIC APPROACH TO THE DEVELOPMENT AND MAINTENANCE OF ENTERPRISE BUDGET DATA

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The Commodity Economics Division of the Economic Research Service has recently implemented a systematic approach to the development and maintenance of enterprise budget data. This paper describes this system, its components, its use, its future refinement, its problems and some potential direct and indirect benefits to the profession.

HISTORY

Enterprise costs and returns budgets have long been an accepted research and management tool used by agricultural economists and farm managers. With the development of computers and particularly the linear programming algorithm, large mathematical models have been built which demand large volumes of enterprise data. Past studies undertaken on a national basis to provide this type of data have been extremely time consuming, expensive and have not been periodically updated.

National studies of enterprise costs and returns have generally been deficient in two major areas: 1) the enterprise data have not been comparable across regions or commodities and 2) they have not been maintained in a consistent manner over time.

The problems resulting in these deficiencies are apparent. Given the number of resource situations and the variety of production techniques found on farms, the number of budgets required for broad coverage of even one commodity is quite large. Adding to this the substantial time required to develop a single budget by hand and the multitude of decisions associated with it provides ample explanation of the reasons why budgets have not been comparable across regions nor maintained over time.

Therefore, it appears it would be of benefit to have a standardized, efficient method of developing and maintaining enterprise budgets, one that requires minimal time from professional economists, one that provides for comparability across regions and commodities, and one that facilitates the updating of the budgets as prices and technology change.

Such a system is currently in operation. Certainly, it is not a solution to all budget data problems but it is superior to many older procedures. It is called the Firm Enterprise Data System.

FED SYSTEM

The FED system is relatively new. A decision to create this type of system within ERS was made late in 1973 and a small staff was assembled in the early summer of 1974 to begin the work of implementing new ideas. Production areas were defined, areas and enterprise coding systems were devised and the process of developing crop budgets was begun. Although the original decision included a provision for the development of livestock budgets, crop budgets have received the majority of emphasis within this system to the present time.

The FED system can be viewed as having four distinct but interrelating parts. It is made up of computer programs operating on stored data under a standardized methodology managed by economists of the FEDS staff.

The primary computer program used in the system is the budget generating program. Although the FEDS budget generator is based on the Oklahoma Budget Generator[1], the actual programs bear little resemblance to one another. The FEDS program takes stored data, performs computation on them to determine machinery and labor requirements, and prints a listing of products, purhcased inputs, machinery, and labor requirements, and prints a listing of products, purchased inputs, machinery, and labor required by the enterprise. Prices for products and inputs are included so that costs and returns may be determined. (An example of the current FEDS output is provided in table 1.)

The second major program used is an aggregation program. This program provides for the accumulating and weighting of inputs, production or costs on an area or region basis. For example, any input or group of inputs

[1] Rodney L. Walker, and Darrel D. Kletke, *The Application and Use of the Oklahoma State University Crop and Livestock Budget Generator,* Research Report, P-663 (Stillwater, Oklahoma: Oklahoma State University Agricultural Experiment Station, 1972.)

Table 1. Other spring wheat after fallow for northeastern Montana, 1973

	Unit	Price or Cost/Unit	Quantity	Value or Cost per Acre	Cost per Unit of Production
1. Gross receipts from production:					
Wheat	Bu.	4.300	23.400	100.62	
Total receipts				100.62	
2. Variable Costs:					
Preharvest:					
Grain seed	Bu.	3.750	1.000	3.75	0.16
Nitrogen	Lbs.	0.113	4.950	0.56	0.02
Phosphorus	Lbs.	0.231	10.800	2.49	0.11
Herbicide	Pt.	0.600	1.000	0.60	0.03
Crop Insurance	Acre	1.560	1.000	1.56	0.07
Tractor fuel and lube	Acre			1.07	0.05
Tractor repairs	Acre			1.30	0.06
Equip fuel and lube	Acre			0.25	0.01
Equip repairs	Acre			1.04	0.04
Machinery labor	Hrs	2.050	1.139	2.33	0.10
Interest on op. cap.	Dols	0.080	4.171	0.33	0.01
Total preharvest				15.29	0.65
Harvest:					
Custom combining	Acre	5.450	0.246	1.34	0.06
Custom hauling	Bu.	0.040	5.850	0.23	0.01
Equip fuel and lube	Acre			0.60	0.03
Equip repairs	Acre			0.52	0.02
Machinery labor	Hrs	2.050	0.313	0.64	0.03
Interest on op. cap.	Dols	0.080	0.038	0.00	0.00
Total harvest				3.34	0.14
Total variable costs				18.63	0.80
3. Income above variable costs				81.99	3.50
4. Ownership costs (depreciation, taxes, interest, ins.)					
Tractors				4.21	0.18
Machinery & equip				8.73	0.37
Total ownership costs				12.94	0.55
5. Return to land, overhead, risk & management				69.05	2.95
6. Land charge (share rent)				37.17	1.59
7. Management charge (5.0% of gross receipts)				5.03	0.21
8. Total of above costs				73.77	3.15
9. Return to overhead & risk				26.85	1.15

Footnotes: Rotation - fallow, wheat. Fallow costs charged to wheat.
Twenty-five percent custom combined and hauled.

11/01/74
Heid
12/06/74

Enterprise code: 762002110
Area Code: 9/30/2/0
File no. 154
Acres rep. by budget:1140.3 (000) acres
Annual capital month: 8

Machinery complement no. 44
Name set: 1
Parameter set: 30
Harvested acreage as percent planted: 98.30
Edition no. 1

Date printed: 12/06/74

may be selected for a specified region to determine average quantity used or cost per acre for a given commodity.

Two other computer programs also form part of the system. A search and sort program is available to produce a listing of budgets currently on the system by region, state, area, or commodity or in combination. The other program, yet to be written, is a comparability program that will provide for comparison of various input and output item levels across regions and commodities.

The second major component of the FEDS system is the stored data. Two types of such data may be defined. One type is specific to each budget and can be called the budget input data. The other type of data applies to all budgets in an area or a given enterprise. This second type may be called simply data files. Budget input data are made up of identification information, including the number of acres or other units to which the budget applies, quantities and prices of products and purchased inputs used by months, and machinery operations performed by months. The data files include: 1) complements of machinery which provide repair and depreciation coefficients, annual hours of machine use, fuel use coefficients, purchase prices and other items necessary to compute machinery costs, 2) a set of standarized names for inputs and products, and 3) a set of parameters iisting fuel prices, interest rates, labor wage rates, fertilizer prices and other parameters that may be fairly constant for a given region.

To produce the output listed in Table 1, the computer program takes the budget input data, retrieves the appropriate machinery complement and parameter set and performs the computations to provide the various components of costs and returns.

The third major component of the FED system is the standarized methodology used. In addition to the standardization inherent in the internal handling of budgets by the computer programs, standardized methods of obtaining and utilizing data are followed.

Data to be used in the development of these budgets come from a variety of sources. Since the budgets generally reflect average production technology for a relatively large area, SRS data are used for yields, acreages, fertilizer use and in some cases production practices. SRS can also supply input and product price data.

The budgets currently used will be updated from cost of production surveys required by the Agriculture and Consumers Protection Act of 1973. The first such survey was initiated in January 1975. These surveys will furnish data which relfect machinery sizes and types used as well as operations performed. Prices and yields will be updated using SRS and census data. While prices and yields will be updated annually, it is anticipated that technology coefficients will be updated every three to five years.

The fourth and final major component of the FED system is the most important. Though often omitted in explanations of models and systems, professional economists both within and outside of ERS form the most important component of the system. The FEDS staff itself is made up of only three full-time professionals and a part-time computer programmer. With such a small staff, it is obvious that no large scale project such as this could be undertaken without cooperation of many other ERS, state university and extension professionals. It is upon these groups that the FEDS staff relies most heavily for patient critiques which serve to insure budget accuracy.

SYSTEM RESULTS

As of the date of this paper, approximately 700 crop budgets have been placed on the system. The major producing areas of the 48 contiguous states have been covered as well as a majority of the production of the major crops.

Output from completed budgets is considered public property and is distributed automatically to a mailing list of FEDS contacts in almost every state in the country. Currently 100 copies of each budget are being printed. Of these, 50 copies are distributed within ERS, 25 are distributed to state research and extension staff located in the regions and the remaining 25 are kept for special requests.

In March and April, cost of production estimates were made for commodities from budgets available to the system at that time. Separate estimates of yields and prices were made for both 1974 and 1975 and aggregations run on the budgets to provide cost of production estimates on a per acre and per bushel or other standard unit basis.

By the time this paper is presented, the FEDS staff plans to have completed a major study on energy use in agriculture. The aggregation program will again be used to estimate gallons of gasoline, diesel and other fuel types required by months, by crops, by states, and totals for regions and the U. S. Crops to be included will be the major feed grain crops plus wheat, soybeans, cotton, rice and peanuts.

FUTURE PLANS

It was mentioned previously that the major emphasis to date has been placed on crop budgets. However, during the summer of 1975, much emphasis on livestock budgets is planned. Other crop budgets to receive emphasis include tobacco, potatoes, fruits and vegetable crops.

During the next year, the FED staff plans to develop a series of whole farm budgets. These approximately 50 farms budgets will attempt to represent major farming situations scattered throughout the U. S. It is hoped that these budgets will be able to replace the function pre-

viously served by the now discontinued ERS cost-and-return series.

Future plans also call for establishing a timetable of updating by commodity so that the most current economic intelligence can be made to coincide with policy decision deadlines faced by the U.S. Department of Agriculture.

LIMITATIONS OF SYSTEM

Although the FED system is designed to be sufficiently flexible to handle most farm resource-technology situations, it still does not solve the problems associated with allocating costs and returns to residual claimants. Land and operator management are the major factors here. Land assumes particular importance in view of the possibility that future target prices will be set using cost-of-production concepts.

Currently, the budget generating program can charge for land in any one of three ways, cash rent, crop share lease, and land price with a specified interest rate. But the variety of methods for computing land charges has not answered the theoretical question of the correct return to land nor have the alternative methods insured that "rachet" effects would not be built into any target prices tied to cost-of-production estimates made by the FED system.

SUMMARY

In summary, there are four aspects of the FED system that need to be stressed. First, this system involves an approach to providing economic intelligence relative to the development and maintenance of crop and livestock budgets over time. It is not simply a set of computer programs.

Secondly, it is a system that was designed to make a contribution to the cost-of-production mandate included in the 1973 Farm Bill. As such it can serve as a focal point for a variety of groups working with cost-of-production studies.

The second aspect leads directly to the third. The FED system relies very heavily on constructive criticism from the agricultural economics profession. The current climate of national farm policy behooves our profession to provide a consistent set of cost-of-production estimates. In order to prevent the destructive counter playing by commodity interest groups that could result from numerous disparate estimates, state and USDA professionals will need to closely coordinate research efforts with a free exchange of ideas and data.

And lastly, the FEDS approach forms a system that has already begun to demonstrate a usefulness to a variety of research interests within the Economic Research Service. Data relating to energy use, fertilizer and pesticide levels, cash flow, labor requirements, machinery costs and other items are all a part of the output coming from the FEDS efforts. And the FEDS staff hopes that at least a portion of this data will be found useful in contributing to research efforts throughout the entire agricultural economics profession.