

Appendix B: The Farm Costs and Returns Survey

The 1993 Farm Costs and Returns Survey (FCRS) provided most of the data for this report. The U.S. Department of Agriculture's (USDA) Economic Research Service (ERS) and National Agricultural Statistics Service (NASS) conduct this survey each year. The FCRS is the most comprehensive national annual data source available on farm financial and operating characteristics. A major advantage of the FCRS over other data sources is that details on expenses, income, assets, debt, and many other items can be disaggregated by farming region, farm size, production specialty, and other characteristics. Such detail is essential for a thorough understanding of farming, because farms are such diverse enterprises.

Both NASS and ERS use FCRS data extensively for production expense summaries, financial analyses, publications, and staff work. NASS annually releases FCRS statistics on farm production expenses (U.S. Dept. of Agr., Nat'l. Agr. Stat. Serv., 1994b), while ERS publishes a detailed summary of financial characteristics of U.S. farms (Morehart et al., 1992). ERS also conducts research on the financial status of farms and presents the findings in USDA publications, professional journals, conference presentations, and other outlets.

Data Reliability and Survey Coverage

Approximately 8,000 farm and ranch operators in the 48 contiguous States provided useable data during February and March of 1994 (U.S. Dept. of Agr., Nat'l. Agr. Stat. Serv., 1994b, pp. 23-24). The sample originated from two sources. The first is a list of known operators of farms stratified by farm size and other attributes. That sample, the list frame, contains larger, more specialized operations. Maintaining a current list for smaller operations is difficult. Thus, an area frame is used to compensate for any incompleteness in the list frame. The area frame sample consists of land segments located within the 48 contiguous States stratified by land use. Rigorous procedures are followed to prevent the inclusion of any one operator in both sample frames.

The FCRS is a probability-based survey, where each respondent represents a number of farms of similar size and type. Thus, the sample data can be expanded by using appropriate weights to represent all farms in the 48 contiguous States. Estimates based on the expanded sample differ from what would have occurred if a complete enumeration had been taken. These differences

result from sampling and nonsampling variability (Ford et al., 1986).

A measure of sampling variability is available from survey results. The relative standard error (RSE) is the standard error of the estimate expressed as a percentage of the estimate. The RSE, also called the coefficient of variation (CV) when computed for means, is calculated by dividing the standard error of the estimate by the estimate and multiplying the result by 100. Estimates with an RSE exceeding 25 percent should be used with caution, because an RSE that high raises questions about the reliability of the estimate.

Because of space limitations, RSE's are not published for all items in the appendix tables. However, when RSE's not given in the tables exceed 25 percent, indications of their magnitude are provided. An asterisk (*) precedes estimates with an unpublished RSE greater than 25 percent but no more than 50 percent. Two asterisks (**) precede estimates with an unpublished RSE greater than 50 percent but no more than 75 percent. Estimates with RSE's more than 75 percent (with or without a published RSE) are not printed and are denoted with an "r."

The standard error can also be used to calculate a confidence interval around an estimate. For example, the 95-percent confidence interval for average acres operated for all farms is estimated to be between 404 and 468 acres. The standard error of an estimate can also be used to evaluate the statistical significance of differences between groups. For example, the appropriate t-statistic for a comparison between average acres operated by farms in the Northeast and the Lake States can be constructed by taking the difference between the mean of the two groups and dividing by the square root of the sum of the squared standard errors of the two groups. Or:

$$t = (\text{Acres operated}_{\text{Northeast}} - \text{Acres operated}_{\text{Lake States}}) / (\text{Standard error}_{\text{Northeast}}^2 + \text{Standard error}_{\text{Lake States}}^2)^{0.5} \\ = (183 - 266) / (10.49^2 + 17.68^2)^{0.5} = -4.04$$

Although t-statistics are not published in this report, the text makes comparisons between groups only when estimates are significantly different at the 95-percent level, unless noted otherwise.

Survey data are also influenced by nonsampling errors. Data collection procedures are made uniform and con-

sistent across the Nation by extensively training and supervising data collectors. Efforts are also undertaken to minimize other types of potential nonsampling errors by extensive editing. Questionnaires are edited by hand in State offices and by computerized routines in Washington, DC. The extent of nonsampling errors is not known or directly measurable.

NASS personnel in Washington, DC, combine the data collected in the various States and use the reported information to construct farm size, geographic location, and production specialty variables for each farm operation. NASS is also responsible for constructing survey expansion factors, or weights. ERS provides additional information by constructing additional classification variables and by defining aggregated expense, income, asset, and debt categories. ERS also calculates major financial indicators, such as net farm income and the debt/asset ratio for each farm.

Comparability with Other Sources of Agricultural Data

F CRS estimates, for various reasons, often differ from those based on other agricultural data sources. Therefore, direct comparisons between F CRS estimates published in this report and other available data should be made only with careful consideration to sample design, data collection procedures, and underlying variable definitions.

Previous Farm Costs and Returns Survey. The procedures that NASS uses to expand the F CRS sample to create national estimates were rewritten in 1992 to more accurately account for undercoverage and nonresponse. The data for calendar year 1991 were adjusted and re-summarized using these new procedures (Dillard, 1993). Earlier estimates from the F CRS did not represent the entire farm population; the number of farms represented in the F CRS was usually between 1.7 and 1.8 million. The new procedures, however, adjust the expanded number of farms to match the official estimates of approximately 2.1 million farms. Estimates since 1991, therefore, are not comparable to those for earlier years.

Census of Agriculture. Both the census of agriculture (U.S. Dept. Comm., Bur. Cen., 1994a) and the F CRS gather economic and physical agricultural data from the same target population: all farms that sold or normally would have sold at least \$1,000 worth of agricultural products. Aside from this similarity of purpose, there are several differences that limit comparability of data obtained from these surveys.

The most obvious differences pertain to sample design and data collection procedures. The census of agriculture requires mandatory participation, while the F CRS relies on voluntary response. As a result, the census has a complete enumeration of farms (for most items). The F CRS uses a probability-based, multiframe sampling approach, which provides estimates that are representative of the U.S. population of farms based on a smaller subsample. Questionnaires are mailed to targeted farms and are completed by respondents for the census. F CRS data are collected through personal interviews by trained enumerators. The F CRS is conducted in the 48 contiguous States, while the census includes Alaska and Hawaii. The census of agriculture also includes institutional farms, which are excluded from the F CRS. And, the census of agriculture is conducted every 5 years, while the F CRS is conducted annually.

In many instances, there are also conceptual differences associated with specific pieces of information obtained from these surveys due to the wording of questions asked or the instructions associated with collecting the information. For example, the census obtains a combined estimate of expenses paid by all participants in the farm business, which includes operators, landlords, contractors, and partners. This estimate is subtracted from the estimated total value of products sold to obtain an estimate of the net cash returns to all participants in the business. The F CRS, however, obtains a separate estimate of the cash expenses paid by the farm operator, landlords, and contractors. This allows a separate estimate of the net cash income received by the farm operation to be computed. In other cases, the level of detail may differ between the types of questions asked, which prohibits direct comparisons.

USDA Agricultural Data. Estimates of income, expenses, assets, and debt of the U.S. farm sector reported in Economic Indicators of the Farm Sector (ECIFS) series are not directly comparable with estimates from this report (U.S. Dept. of Agr., Econ. Res. Serv., 1993a; U.S. Dept. of Agr., Econ. Res. Serv., 1994b, Hoppe, 1995). ECIFS estimates represent a combination of several data sources. In many instances, procedures used and assumptions made are dictated by the format of available data. Since the F CRS estimates represent farm operators, these estimates are typically below those of ECIFS, which represent the entire farm sector (farm operators, landlords, contractors, and others). ECIFS estimates also cover all 50 States, compared with the 48 contiguous States covered by the F CRS.