Commodity Costs and Returns Estimation Handbook

A Report of the AAEA Task Force on Commodity Costs and Returns

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CHAPTER 1

INTRODUCTION

GENESIS AND OVERVIEW OF REPORT

Production agriculture occupies an important role in the U.S. economy, both in terms of the domestic supply of food and fiber and its significant contribution to world trade in agricultural commodities. Agriculture remains a unique industry because of the diversity of farm production coupled with the relatively large number of participants. The historic variability of input and product prices for agriculture, due to weather and other unforeseeable factors, has helped to stimulate producer, consumer, and political awareness of the costs of producing food and fiber. Estimates of commodity costs and returns (CARs) have become one of the basic statistics used to characterize performance in agriculture, yet there seems to be little consensus about the exact components of CARs, or the appropriate procedures to estimate them.

There are many approaches used to arrive at CAR (cost and return) estimates. Differences between approaches stem from the varying purposes for which the information is to be used and the amount and type of data available for determining costs of production. The many purposes for which CAR estimates are developed broadly include farm-level decision making, policy and government program analysis, performance analysis, the study of resource allocation issues, and the archiving of CAR data in a convenient and understandable format. Farm-level decision analysis examines options for a given farm in the coming year, and for longer-range periods using projected information. Policy analysis often uses historical cost information for a group of farms producing the same commodity, or projected CARs, to analyze the likely impacts of proposed policy change. The study of efficiency of resource allocation usually involves details on the components of CARs for a composite of farms. Economic or financial performance of a particular enterprise can involve both historical and projected cost information for a single farm and/or a group of farms. To address these various information requirements, CAR estimates are prepared to provide measures of the costs of producing a unit of a commodity for a specific farm, for an average or representative farm in a region, or for an average or representative farm for a nation as a whole.

Recognizing the variety of approaches used and the inherent problems created for interpretation and use of CAR estimates, a national conference was held in Kansas City during February 1991. The conference brought together analysts from universities and government, statisticians, political scientists, extension workers, and farmers to examine how different purposes for measurement of enterprise CARs may lead to alternative estimation methods and to explore preferred approaches. One outcome of this conference was the establishment of a Task Force by the American Agricultural Economics Association's Economic Statistics and Information Resources Committee. The mission given to the Task Force by the committee was *"to recommend standardized practices for generating costs and returns estimates for agricultural commodities after a careful examination of the relevant economic theory and the merits of alternative methods."*

This report discusses alternative methods to estimate enterprise CARs for agricultural production, and identifies both conceptual and practical issues faced when evaluating alternative estimation methods. The report points out the merits and flaws of these methods and suggests guidelines to apply in preparing estimates for use in planning individual farm businesses, financial consulting work, teaching, extension,

research, and policy analysis. This effort addresses the growing concern among professionals in agricultural economics about how CAR estimates are used by noneconomists as well as by economists and the responsibility of those presenting CAR estimates to do so in a way that the estimates will be used correctly, to the advantage of society. In publishing this information the Task Force does not intend to imply that recommendations provided should be viewed as a rigid, inflexible set of rules, but rather as a set of guiding principles.

The National Task Force on Commodity Costs and Returns Measurement Methods consists of professionals from various agricultural institutions. The Task Force operates under a committee structure which is coordinated through a steering committee. The Task Force has provided an organized forum for the exchange of ideas among those performing costs of production analysis in land grant universities, the United States Department of Agriculture (USDA), and other agricultural research institutions. Establishing uniformity in the terms, methods, and presentation of CAR estimates developed for similar purposes will help to broaden the use and understanding of the financial conditions of various enterprises. Also, the Task Force recognizes that as technology and other conditions change, the approach to CAR measurement may also change.

The goal of the Task Force is to develop a report that

1. defines relevant terms;
2. defines what is to be measured;
3. explains the relevant theoretical and accounting issues;
4. discusses appropriate ways to apply theoretical principles to empirical data;
5. contrasts alternative measurement methods and provides recommendations on preferred methods;
6. discusses the appropriate data sources;
7. recommends a format for the output, including specification of the assumptions and data sources; and
8. recommends methods for verification, updating, and sharing data bases.

ORGANIZATION OF THE HANDBOOK

This handbook is organized around the major issues in preparing CAR estimates. Each chapter outlines a set of issues, discusses alternative methods for obtaining estimates, presents examples, and suggests a preferred approach for CAR estimation. A brief outline of each chapter and highlights follows.

Chapter 2 - Conceptual Issues in Cost and Return Estimates

Chapter 2 lays the groundwork for the remainder of the report by defining many terms and introducing concepts that will be developed in more detail later. The chapter distinguishes historical and projected estimates and individual farm versus composite estimates. The Task Force recommends that the end of the production period be the reference point in time at which to value all CAR estimates. An important distinction is drawn between expendable inputs which are used up during the production period and capital inputs which provide service over several production periods. The Task Force strongly endorses the idea of using market transactions to value CAR flows. When market transactions are not available, the

opportunity cost of the relevant factor or product should be used to estimate CARs. Opportunity costs should, in general, reflect implicit market values. For example, produced expendable inputs should be valued at the cost of purchasing the input from off-farm. Similarly, capital services provided by the owner of a given enterprise should be valued at the cost of obtaining these services from an alternative source in an arm's length market transaction.

Chapter 2 discusses the time preferences, discounting and the rate of interest. The Task Force recommends that all transactions be valued at the same point in time using standard discounting formulas. Given the fact that most price data is reported in nominal form, the Task Force recommends that all CAR estimates be reported in nominal terms as of the end of the production period. To ensure that real and nominal values are equivalent at the base time point, the Task Force recommends that the base point in time for the computation of all real values be the end of the current production period or the end of the current year, whichever is chosen as the base time point for CAR estimation. Nominal CAR flows for periods other than the current one should be adjusted to the end of the current period using the appropriate interest rate. Real CAR flows for periods other than the current one should also be adjusted to the end of the current period using the appropriate interest rate. The Task Force recommends that analysis outside the current production period generally be done in real terms so that no assumptions (other than zero inflation since the analysis is real) about inflation are made for periods other than the current one. The Task Force recommends that the exact Fisher formula

$$\begin{aligned} (1+i) &= (1+\pi)\,(1+r) \\ \Rightarrow i &= r + \pi + r\pi \end{aligned} \tag{1.1}$$

be used to model the relationship between the nominal interest rate (i), the real interest rate (r), and the rate of inflation (π). The Task Force recommends that interest charges and adjustments within a period be made using the exact monthly compounding formulas. Specifically the interest charge (ic) on an expenditure (R) n months from the end of the production period is given by

$$ic = R(1+i)^{\frac{n}{12}} - R. \tag{1.2}$$

The Task Force recommends that the bottom-up approach be used to estimate a nominal risky rate for agriculture. The Task Force suggests a real rate of interest based on government securities such as treasury bills and notes, a risk adjustment based on the relative riskiness of agriculture compared to the rest of the economy, and an inflation adjustment based on the chained price index for the consumption component of GDP. Specific formulas, data, and examples are presented in the chapter.

The Task Force recommends that the capital recovery approach based on annuities representing the costs of owning capital assets be used to value the services of owned capital when market transactions are not readily available. The capital recovery approach approximates capital service cost (CSC) by mimicking the various costs of providing the services of a capital asset to a user for one period. Specifically, this report defines capital service cost for one period as

$$\begin{aligned} \textit{Capital service cost (CSC)} &= \textit{Opportunity cost of holding the asset} \\ &+ \textit{service capacity reduction cost} \\ &+ \textit{change in the price of the capital asset's service capacity} \\ &+ \textit{service enhancement cost} \\ &+ \textit{maintenance cost} \\ &+ \textit{other time costs.} \end{aligned}$$

The first item is typically estimated as iV_0 where i is the nominal rate of interest and V_0 is the value of the asset at the beginning of the period. Service capacity reduction cost refers to the fact that the remaining use value of a capital asset usually declines with use. The last three items are often included as separate costs, and the first three used as an approximation to CSC. Given the approximation, the second two items are equivalent to the change in value of the asset over a period. The report defines this change (V_0 - V_1) as economic depreciation where V_1 is the value of the asset at the end of the period. This then gives the shorthand formula for CSC

$$\begin{aligned} \textit{Capital service cost (CSC)} &\approx \textit{Opportunity cost} + \textit{service reduction cost} + \textit{change in price} \\ &= \textit{Opportunity cost} + \textit{Economic depreciation (ED)} \\ &= iV_0 + (V_0 - V_1). \end{aligned}$$

The real annuity approximating capital service cost is given by

$$a^r = \frac{\left(V_0 - \frac{V_n^r}{(1+r)^n} \right)}{\left(\frac{1 - \frac{1}{(1+r)^n}}{r} \right)}.$$

where V_n^r is the real valued of the asset at the end of n years of life. The Task Force suggests that this real annuity be adjusted to nominal terms at the end of the production period using the current inflation rate.

The Task Force recommends that the microeconomic concepts of fixed and variable costs not be used in preparing and reporting CAR estimates. Instead, the Task Force recommends that costs should be categorized as to whether they are associated with expendable factors or the services of capital assets. For the purpose of preparing CAR estimates for specific enterprises, the Task Force recommends that all the

costs of expendables be allocated to the generic group OPERATING COSTS and that all other costs be allocated to the group ALLOCATED OVERHEAD.

Chapter 3 - Revenues and Government Programs Participation

Chapter 3 discusses issues related to calculating revenues from the sale of products, government program payments, and miscellaneous sources. The examples on government revenue refer to the 1991-1996 period, since that is when the bulk of this report was prepared. Modifications for changes in programs can be made as they occur. Estimated revenue to an enterprise should include the value of primary products produced by type and grade, the value of any by-products produced, government payments, and other receipts associated with the enterprise such as patronage dividends, crop insurance receipts, and market pool returns. The Task Force recommends that commodity yields and prices be estimated at the end of the production period, or the point in the production-marketing process at which the commodity leaves the ownership of the grower, whichever is more appropriate for the purpose of the analysis. Costs and revenues should be compared in a common time frame to be valid. ***The end of the production period is the recommended time period to compare all costs and revenues.*** However, many commodities are harvested over several months and have no single harvest month. All revenues and costs should be compounded/discounted to a common point in time as discussed in Chapter 2. The recommendation to adjust all revenues to a given harvest month or end of the year does *not* imply that a harvest month or end-of-year price should always be used. The price at which the product was sold (or is expected to be sold), adjusted to a common time point, is the appropriate price. The Task Force also recommends that CAR estimates for crops be done on a planted-acre basis. Keeping revenue and cost calculations on a planted-acre basis incorporates acreage not in production, but needed for that particular production system. This is particularly important in situations where government mandates set-aside acres or the cropping system involves fallow periods. Cost and return estimates should be carefully prepared to ensure that inputs, outputs, costs, returns, and management levels are mutually consistent. For example, if a product is routinely stored for some period on the farm before sale, costs and losses due to storage should be included in the analysis.

Chapters 3 and 4 discuss the pricing of products produced by one enterprise and used by another enterprise. In the case of such factors, the Task Force recommends using the cost of purchasing the factor from off-farm as the cost of the factor to the utilizing enterprise because this reflects the opportunity cost of the factor to the utilizing enterprise. And similarly, the Task Force recommends using the market price of selling a product from off-farm as the revenue to the producing enterprise because this reflects the opportunity cost of the factor to the producing enterprise. In situations where transactions costs are large and buying and selling prices for products are not the same, the net position of the operation as a net buyer or seller of the commodity in question must be considered. If the farm is a net seller of the product (produces some for on-farm use and some for off-farm sale), the Task Force recommends the product be valued to the producing enterprise at its net selling price (market price minus transactions costs) and to the utilizing enterprise at its net buying price (market price plus transactions costs). This applies the appropriate opportunity cost to each enterprise. The difference in cost per unit is a return to the marketing enterprise or vertical integration in the business.

Chapter 3 suggests ways to handle revenues from forward, futures, and options transactions, particularly in the case of historical estimates. The chapter provides an extensive discussion of data sources that can be used to estimate commodity prices. The chapter also suggests appropriate ways to adjust data to fit particular enterprise situations. A detailed discussion of how to handle participation in government

programs is provided along with several example calculations. The chapter concludes with a discussion of miscellaneous revenues and how they are included in CAR estimation.

Chapter 4 - Purchased and Farm-Raised Expendable Inputs

Chapter 4 discusses how to estimate the costs of expendable inputs for an enterprise, whether purchased or produced as part of a larger operation. The cost of an input for a given enterprise is the price of the input (if it was purchased from an off-farm supplier) or the opportunity cost of the input (if it was produced on the farm) multiplied by the quantity used per unit of the enterprise. In cases where such data is not available, the chapter suggests alternative ways to obtain estimates. The Task Force suggests that fertilizers with significant carry-over effects should be handled as capital inputs rather than as expendables. The Task Force suggests that manure be treated as a by-product with nutrient value with a positive cost of handling that may exceed its nutrient value. The Task Force recommends that chemicals be identified by chemical name as well as a trade name. To simplify pricing, cost reporting, and uses of the information contained in the CAR estimate to address environmental and rotational questions, a detailed listing of brand names, pounds of active ingredient, and chemical formulation (such as wettable powder, granular, or aqueous suspension) and concentration is preferred.

Chapter 4 discusses alternative methods for pricing farm raised feeds for livestock. As mentioned in summarizing Chapter 3, the preferred method is to use the off-farm opportunity cost whenever possible. The chapter also discusses how to estimate the cost of feed additives and concludes with a section on grazing fees.

Chapter 5 - Machinery, Equipment, and Buildings: Operating Costs

Procedures to use in calculating the costs of using machinery, equipment, buildings are presented in Chapters 5 and 6. Chapter 5 discusses the operating costs associated with these capital assets while Chapter 6 addresses the ownership costs of these assets. Expenditures for maintenance and other time costs for capital assets often involve the use of expendable inputs such as lubricants, parts, hired services, or operator labor, thus they are often estimated in conjunction with other operating costs such as seed, fertilizer, and supplies. Chapter 5 addresses alternative ways to estimate these machinery operating costs and provides extensive discussion of the use of engineering equations to estimate these costs for crop enterprises. The American Society of Agricultural Engineers (ASAE) publishes procedures for estimating the costs to own and operate farm machinery and these are the most common way to estimate the costs of repairs, fuel, and lubrication. The chapter provides extensive examples of how to estimate these costs accounting for inflation, different hours of use per month, and changes in useful life. Simple constant costs per hour of use and costs adjusted for the time pattern of repairs are analyzed. The appropriate way to handle operating costs on repairs is also discussed.

Chapter 5 has a detailed section on the cost of operating and using irrigation equipment. The costs of the rights to use irrigation water are discussed in Chapter 9, while the appropriate way to value an existing well or pumping machinery is discussed in Chapter 6.

Chapter 5 follows up on the discussion from Chapter 2 with a detailed discussion on operating interest. Various alternatives are presented. The Task Force recommends the exact method which says that

the nominal interest charge for the j^{th} expense C_j (incurred n_j months from the terminal point of the estimation procedure) is calculated as

$$(interest\ charge)_j = C_j(1+ i)^{\frac{n_j}{12}} - C_j$$

where i is the annual nominal interest rate. The total of all interest charges can be computed as

$$interest\ charge = \sum_{j=1}^{m} \left(C_j(1+ i)^{\frac{n_j}{12}} - C_j \right)$$

where m is the number of expenses on which interest is charged.

Chapter 5 also discusses problems involved in estimating the fair market value of custom operations whether they occur as an expense or a revenue. The Task Force suggests that in situations where custom operations are common and the market well tested, the custom rate may be a better source of machinery costs than can be obtained using the engineering equations and the capital recovery procedures discussed in Chapter 6.

The chapter concludes with a discussion of a variety of commodity specific costs. Topics include drying costs, storage costs, transportation costs, ginning costs, shearing costs, marketing charges, cartons, bags, tags, etc., involuntary checkoffs, marketing order assessments, permits and quotas, and crop insurance.

Chapter 6 - Machinery, Equipment, and Buildings: Ownership Costs

Chapter 6 discusses estimation of the ownership costs of machinery, equipment, and buildings. The chapter depends heavily on Chapter 2 and suggests capital recovery as the preferred method to estimate the ownership costs of capital. The Task Force recommends using the remaining value equations developed by Cross and Perry (1995, 1996) to estimate the salvage value of tractors, combines, and other farm equipment. The chapter discusses the traditional method of computing ownership costs using straight-line depreciation and opportunity interest on a machine midvalue. This procedure is rejected in favor of the real capital service cost formula given by

$$CSC = \frac{\left(V_0 - \frac{V_n}{(1+r)^n}\right)}{\left(\frac{1 - \frac{1}{(1+r)^n}}{r}\right)} = \frac{\left(PP - \frac{SV}{(1+r)^n}\right)}{\left(\frac{1 - \frac{1}{(1+r)^n}}{r}\right)}. \quad (6.7)$$

where r is the real rate of interest, V_0 and V_n are in real terms, PP is the purchase price of the machine in real terms and SV is the salvage value in real terms. This annuity can then be adjusted to the end of the production period in nominal terms using the current year's inflation rate. The chapter provides a complete example calculation for the case of zero and non-zero inflation. The chapter also discusses other time costs such as property taxes, insurance, and housing. The chapter concludes with a section on joint costs and the determination of an optimal machinery complement. Appendix A to Chapter 6 discusses the estimation of ownership costs when productivity of the asset varies significantly over its useful life.

Chapter 7 - Land

Chapter 7 discusses the costs associated with owning and operating land. The chapter makes a clear distinction between land's agricultural use value and its market value and suggests that the agricultural use value is appropriate for measuring costs of production. The major costs of owning land are the opportunity cost of the land and property taxes. The land may also incur some service reduction and maintenance costs like other capital assets. In areas where cash rent is common, the Task Force recommends the cash rental rate as the appropriate value for the service provided by the land. In some cases share rental rates can also be used. Only in limited situations, should capitalization or net return methods be used to value the service provided by land.

Chapter 8 - Labor and Management: Farm Labor and Related Services

Calculating the quantity and cost of human services (labor and management) is discussed in Chapter 8. Two major categories of farm labor are proposed: (1) hired labor without farm ownership claims, and (2) unpaid farm labor and salaried farm labor having ownership claims. The cost of hired farm labor (type 1 farm labor) is the sum of all the costs the producer pays to obtain the services, including wages, salaries, fringe benefits, and other hired labor associated costs. Several alternative methods for valuing unpaid farm labor and salaried farm labor having ownership claims are evaluated. The preferred implicit compensation for unpaid farm labor is based on the opportunity cost of off-farm work, or the return available in the next best alternative use of this labor time and effort. The particular opportunity cost suggested is the off-farm wage, paying careful attention to point-in-time availability or use and quality dimensions, and local economic conditions. The chapter suggests that this cost of a farm operator's labor in farming can be forecast from a

wage equation, given the operator's characteristics and local economic conditions. The chapter also suggests procedures for producing this wage information using hedonic wage equations. The chapter discusses alternative ways of distributing estimated wage data for ease of use. The chapter also discusses the issue of how to estimate the quantity of farm labor used by a given enterprise and the whole farming operation.

Chapter 9 - Joint Costs, General Farm Overhead, and Rights to Produce

Chapter 9 discusses a variety of topics related to the allocation of costs that are incurred by several enterprises. Joint production costs are defined as costs that are incurred on groups of products rather than on individual and separate ones. At least three different situations give rise to joint costs. These include (1) expenses incurred in the production of joint products (defined as technically interdependent commodities arising from a joint technology), (2) expenses for inputs that affect the production of more than one enterprise (independent but organizationally related commodities) even if the production technologies are non-joint, and (3) outlays for production inputs that are either purchased for the farm as a whole or are used for the entire set of production activities undertaken by the farm. The second category is best exemplified by the allocation of capital inputs (and/or their services) or fixed expendable inputs to different enterprises. For example, the total number of tractor hours is divided between crop and livestock operations. The third category is usually referred to as general farm or business overhead and typically includes items for which it is difficult or impossible to determine the impact of the input on either output or cost for a specific enterprise. For example, it is difficult to determine the impact of buying a new set of Allen wrenches on the average corn yield per acre. Each of the three situations may give rise to joint costs that occur either as direct costs or as indirect costs. Direct costs are defined as those costs that can normally be associated with a specific enterprise though not necessarily with individual products generated by the enterprise. Indirect costs are those costs which may apply to several enterprises or production cycles. The Task Force recommends that costs of production for joint technologies be estimated for the technology as a whole allowing for multiple outputs in the enterprise definition. In cases where there is a need to estimate costs for individual outputs such as for corn and soybeans in rotation, the Task Force recommends that costs be allocated to each crop reflecting the amount of input applied for use by that crop and that neither warehouse nor mine inputs. In the case of non-joint technologies, the Task Force recommends that the costs of inputs be allocated based on objective data on individual enterprise use. The Task Force recommends the use of data on land allocations, hours of use, acre-trips, pounds applied, etc., to determine these allocations. If objective data on the allocation of inputs between enterprises is not available, the costs of these inputs should be excluded, should remain unallocated, or in rare instances allocated following the guidelines pertaining to general farm overhead expenses.

The Task Force generally recommends excluding estimates of general overhead expenses from enterprise CAR estimates when those costs cannot be allocated on an objective basis. When allocation is necessary to compute the total costs of production for a specific enterprise, however, the method chosen should be enterprise neutral; i.e., enterprise selection or production decisions made after this allocation should coincide with those made before the allocation. Suggestions of such methods are presented in the chapter. For general farm overhead, the Task Force recommends when an objective method to allocate general farm overhead is not available, the allocation be based on enterprise gross margins.

Chapter 9 also discusses rights to produce which pertain to incidents of ownership of resources used in production, the impact of regulations governing the use of those resources, access to markets for the commodities produced, and access to enhanced prices or other incentives associated with market access.

These rights generally involve payment of rent, royalties, increased production costs, or foregone production in exchange for benefits of enhanced production or markets. The chapter lists a variety of such rights including irrigation and grazing and suggest ways to estimate the costs of acquiring and exercising them.

Chapter 10 - Allocating Preproductive Costs for Multiyear Enterprises

Chapter 10 discusses methods to estimate preproductive costs as well as considerations in allocating them to individual enterprises. Many enterprises are of a multiyear nature. A multiyear enterprise is an enterprise with more than one annual production period. The preproductive period for a multiyear crop enterprise begins with the first expense associated with establishing the crop enterprise and ends in the crop year just before the crop yields a substantial percent of its expected mature yield (usually 70-80%). An example of a multiyear enterprise with one preproductive year is alfalfa. A single-year enterprise with a multiyear preproductive period is an enterprise that has harvestable yield in only one year but requires several years to establish and produce. An example would be Christmas trees. Issues of inflation and discounting are important in correctly reflecting preproductive costs and allocating them over the life of the crop or livestock enterprise. Given that current data is most frequently used to prepare preproductive cost estimates, the Task Force recommends that such data be used to estimate costs and returns for each preproductive period as if they occurred for the current time period and that these data then be adjusted to the period of occurrence. Specifically, the Task Force recommends that preproductive costs be computed for each preproductive year using current nominal CAR data. These costs should be adjusted to the end of the respective year using the current nominal interest rate. Following the recommendation from Chapter 2, the Task Force suggests that these costs be adjusted to reflect expenditure at the end of their period of occurrence relative to the current one by using the current nominal interest rate for the current year and the real interest rate for years prior to the current year.

The Task Force recommends that preproductive costs be allocated over the life of an enterprise using the cost recovery (annuity) method outlined in Chapter 2. The annualized real preproductive cost is estimated as

$$A_{CR} = \frac{\left(PPC - \frac{SV}{(1+r)^{(N-J)}} \right)}{\left(\frac{1 - \frac{1}{(1+r)^{(N-J)}}}{r} \right)} \qquad \textbf{(10.6)}$$

where PPC is total preproductive costs adjusted to the beginning of the first productive period, r is the real interest rate, N is the total life of the enterprise, J is the number of preproductive years, and SV is any salvage value of the enterprise in the same dollars as PPC. This can be adjusted to nominal terms at the end of the first productive period using the current inflation rate.

Chapter 10 also discusses the traditional method of allocating costs using straight-line depreciation and interest on a midpoint asset value, the current cost method, the historic cost method and the market value method. The last three methods are more commonly used for livestock enterprises where the enterprise is in some type of long-run equilibrium with acquisition and sales of capital assets such as breeding stock on

a regular basis. A detailed example for a dairy operation is presented in connection with the example farm in Chapter 13. The Chapter concludes with a section discussing the comparison of annual and multiyear enterprises and the use of equivalent annual annuities.

Chapter 11 - International Comparisons

All of the considerations discussed in Chapters 1 through 10 are important in preparing CAR estimates for comparisons among countries. In addition, consideration of exchange rates, inflation rates, policy-induced price distortions, differences in technology, and other issues of importance in making such comparisons are discussed and illustrated in Chapter 11. Chapter 11 discusses some common differences in estimates between countries, alternative sources of data, and ways to create estimates that can be easily compared. Special attention is given to issues related to inflation and exchange rates. The chapter includes a detailed example comparing corn production in Honduras and California.

Chapter 12 - Data Sources and Statistical Issues

Chapter 12 analyzes issues related to obtaining the required data for CAR estimation, verification of the data, updating, and sharing the data. The chapter provides a brief primer on survey sampling and the collection of data for CAR estimation. The chapter also reviews a number of studies that have compared estimates prepared in various states and nationally using alternative data sources and methods. The chapter has a short section of reliability issues including sampling variability and sample bias. The chapter also suggests ways to improve data collection in the future. Appendix 12A gives an overview of statistical sampling techniques.

Chapter 13 - Structure and Content of Cost and Return Reports

Cost and return estimates are presented in a wide range of formats. Some of the important considerations in selecting a format and recommendations for the organization of CAR estimates are given in Chapter 13. The Task Force recommends two CAR summaries. The first is a simple, one-page CAR summary with little detail, a limited list of aggregated input items, and an estimate of residual returns over included costs, properly labeled. The second provides data on the units, prices, and quantities, in addition to the total values. Items are more disaggregated but the format is still one readable page. The Task Force suggests that the these summary tables be heavily footnoted with information on how the results in each line of the summary table were obtained. The Task Force also recommends that each CAR estimate include appropriate supporting tables, including details that cannot be provided in the one-page summaries. Chapter 13 presents an extremely detailed example of a Minnesota dairy enterprise. Real and nominal estimates are provided for this multiyear enterprise. A number of alternative approaches are also considered. The footnotes and supporting tables for this example are very complete, giving careful attention to detail so that practitioners can see exactly how to implement Task Force recommendations. The chapter also provides suggestions on data verification, editing, updating, and sharing.

Chapter 14 and Chapter 15 - Examples of Cost and Return Estimates

The final two chapters illustrate many of the concepts discussed in the report. Chapter 14 includes CAR estimates for an upper-Midwest dairy farm growing corn, soybeans and hay. Chapter 15 contains

projected estimates for the production of almonds and cotton in California. Like the examples in Chapter 13, the estimates and supporting tables are quite detailed.

SUMMARY

The guiding principles for this handbook are the use of opportunity cost, appropriate discounting of values over time, internal consistency and the use of market values as the basis for all estimates. Numerous individuals have contributed to this handbook. The recommendations presented here are a consensus of the many formal and informal discussions between members of the Task Force. While not everyone agrees completely with everything contained herein, the recommendations here provide a clear guide to the issues and the preferred methods to use. Throughout this report, recommendations of the Task Force are shown in ***bold italics***. Happy reading.