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Commodity Costs and Returns Estimation Handbook

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

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Ames, Iowa

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GLOSSARY

Accumulated (cumulated) repair costs Total machinery repair costs incurred since the machine was purchased (new).

Allocated overhead All enterprise costs except those associated with expendable inputs.

Annuity A sequence of equal payments, made at equal intervals of time. In cost and return (CAR) estimation one often finds the annuity that has the same present value as a time varying stream of income. For example, the purchase of an asset at the beginning of period 1 with real value V_0 , with sale at the end of period n for real payment V_n has a specific present value for a given real interest rate (r). One is often interested in the annuity (equal payments in each time period over n periods) that has the same present value. The present value of this income stream is $V_0 - \frac{V_n}{(1+r)^n}$. The real

annuity (a') with the same present value is

$$\begin{aligned} a^{real} &= \frac{\left(V_0 - \frac{V_n}{(1+r)^n} \right)}{\left(\frac{1 - (1+r)^{-n}}{r} \right)} \\ &= \frac{\left(V_0 - \frac{V_n}{(1+r)^n} \right)}{US_0(r,n)}. \end{aligned}$$

If all values are in nominal terms then a nominal interest rate (i) is used for discounting and the annuity is also in nominal terms, i.e.,

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

AUM Abbreviation for animal unit month and indicates the carrying capacity (forage yield) of a pasture or range for various classes of animals.

Bulk commodities Items produced for sale or farm use as inputs to other production activities including those used in off-farm industrial uses. These items almost always require some level of intermediate processing before consumed.

Capital *Stock that is not used up during a single production period, provides services over time, and retains a unique identity. Examples include machinery, buildings, equipment, land, breeding livestock, stocks of natural resources, production rights, and human capital.*

Capital services *Flow of productive services that can be obtained from a given capital stock during a production period. These services arise from a specific item of capital rather than from a production process. It is usually possible to separate the right to use services from ownership of the capital good.*

Capital service cost *The cost of providing the services of a capital asset for a specific time period (usually one production period). This cost is usually made up of the following items:*

Opportunity cost of holding the asset

- + **service capacity reduction cost**
- + **change in the price of the capital asset's remaining service capacity**
- + **service enhancement cost**
- + **maintenance cost**
- + **other time costs.**

Carryover *The amount of an input, such as fertilizer, that is applied in one season but still provides a residual service in the following period.*

Commodities or products *Specific items produced by production activities and marketed by marketing activities.*

Commodity quality *The differentiated characteristics of a commodity that determine when, where, how and at what price it can be sold, often measured by grades.*

Composite CAR (farm) *A simple or weighted average of enterprise CARs for some period for some group of individual or representative farms.*

Consumer commodities *Items that are produced for direct consumer use. Production activities often include some on-farm processing, marketing, or packaging.*

Contract labor *Work performed on a farm or ranch, such as fruit or vegetable picking, when the provider of the service (crew leader, contractor, etc.) is paid for the use of materials, equipment, or labor as agreed to informally or as specified in a contract.*

Custom operation *The joint hiring of machinery, labor, and/or materials to perform some field operation or activity.*

Custom rates *Charges or expenses incurred by a farmer for a custom operation.*

Custom work *Agricultural work performed by laborers and machines hired as a unit.*

Database *A comprehensive set of data together with sufficient documentation to make it accessible, preferably by computer.*

Data file *The complete collection of variables, data values, etc. which are needed to meaningfully use the data.*

Discount rate or rate of interest *The market determined rate of time preference for the numeraire commodity in the economy (money).*

Discounting *The process of adjusting cost or return streams to a common point in time using market or individual rates of discount. This process is also called present or future value analysis.*

Durable or durable asset *A term often used to describe physical capital such as machinery and equipment that provides service for more than one period. The term durable implies long-lived or not temporary.*

Economic depreciation *The change in the value of an asset over a single period ($V_0 - V_1$). It can occur because of a **reduction in the service potential** of the asset or due to **changes in market prices**.*

Editing *The process of changing one or more coefficients used in a specific CAR budget.*

Engineering approach/equations *Mathematical relationships developed by agricultural engineers to estimate typical costs for a given machine. These are typically reported in annual editions of the ASAE Standards.*

Enterprise *(see production enterprise)*

Enterprise allocation *A method, either objective or subjective, of allocating whole-farm expenses to each enterprise on a farm.*

Expected price *The price anticipated or forecasted for some specified future period.*

Expected yield *A forecast of yields for planning purposes. It can be based statistically or subjectively on historic yields, experimental data, or subjective factors.*

Expendable factors of production *Raw materials, or produced factors that are completely used up or consumed during a single production period. Common examples of these factors that lose their identity with a single use are seed, fuel, lubrication, some pesticides and fertilizer, feed, and feeder animals.*

Factor of production (input) *Goods and services that are employed in the production process. Some factors are purchased; others are produced within the operation.*

Farm labor *All hired, contract, exchange, and unpaid family labor used in agricultural production. Farm labor is defined here to encompass what is sometimes distinguished as traditional labor, management and other overhead time, and also includes labor acquired through farm labor contractors and all semiskilled services used in farming, such as mechanics for machinery and building repair, and bookkeepers.*

Field efficiency *The effective accomplishment of a machine, expressed in percent, as compared to the theoretical maximum area covered in a specific period of time at a specific field speed.*

Field operations *The listing of all tractor and machinery operations performed on a given acre or field.*

Field performance/capacity *The efficiency of a machine expressed in terms of acres per hour, tons per acre, or some other units.*

Fisher equation *An equation that relates the real interest rate (r), the rate of inflation (π), and the nominal interest rate as follows $(1 + \pi)(1 + r) = (1 + i)$.*

Forecasting *Projecting CARs for some future period based on expected input-output coefficients and a set of prices. The procedures recommended by the Task Force are primarily used for planning or analysis of expected response. The resulting CARs can therefore be defined as forecasts of expected CARs based on documented input-output relationships and prices.*

Format *A set of directions that describes a field or location and the contents of that field to help the computer to read and write data values.*

Government payments *Direct cash or in-kind payments to farms for complying with specific government requirements. In the U.S., government farm program payments may require farmers to meet certain conditions, including setting aside (not planting) some acreage, before direct payments are made. Such government payments are usually related to specific crops and commodities. Conditions for payment change each year.*

Harvested yield *That portion of the yield that is collected for possible use. Harvesting charges are often based on harvested yield.*

Historic price *The price realized in some specified historic period.*

Historic yield *The output per technical production unit as observed from historic data.*

Historical CAR estimates *A summary of enterprise CARs for some historical period such as the past calendar year, crop year, or production cycle.*

Individual farm *Either a specific farm currently or previously in operation or a representative farm that has a set of resources, production practices, objectives, and enterprises similar to some class of actual farms.*

Inflation rate (π) *The rate at which the general level of prices increases over time.*

Intermediate products (inputs) *Bulk commodities that are consumed by another production activity on-farm without directly entering the marketing system.*

Joint products *Two or more distinct commodities produced by a single enterprise or technical unit. Such products may be produced in fixed, or in variable, proportions to one another.*

Laborers *The number or inventory of persons at a point in time. Workers are generally heterogenous because of differences in productive skills, location, and availability for work. Labor is services (person-years per year) and includes all human time using activities, including what is sometimes labeled separately as labor and management.*

Machinery set *A combination of machines found on a (representative) farm.*

Machinery operating costs *Expenses farmers incur when they operate crop and livestock machines (excluding overhead costs) including costs for fuel, repairs, lubrication, operating interest, and labor.*

Maintenance costs *The expenses required to maintain the service potential of a capital asset at a reasonable level and to extract services for a single time period. Activities associated with these costs are not usually viewed as enhancing the service capacity of the capital asset in any significant way when determining its end-of-period value.*

Marketable yield *That portion of the yield which is marketable. The salable portion of the product is often diminished from the harvested yield.*

Marketing activity *The activity of selling the product or products. Marketing begins when the decision maker initiates activities directed at selling the commodity. Activities after the point the commodity reaches the final marketing form while still under the ownership of the farmer are marketing activities.*

Modelbase *The set of equations and the specified calculation procedures that are used to manipulate/use a database, for example, a CAR modelbase.*

Multiyear enterprise *An enterprise with more than one annual production period.*

Nominal rate of interest (r) or discount *The market rate of time preference for the numeraire commodity (money) in terms of current prices and incomes. This rate is not adjusted for the expected (or realized) rate of inflation.*

Nondurable *(see expendable factors of production)*

Operating costs *The costs of all expendable inputs used in a particular enterprise.*

Opportunity cost *The value of any good or service in its next best alternative use. For example, the opportunity cost of the service of an input used in the production of any particular commodity is the maximum amount that the input would produce of any other commodity. Opportunity costs are usually measured in monetary terms so that the opportunity cost of any good or service is the maximum amount the good or service could receive elsewhere for use as a production input or for final consumption. The opportunity cost of financial capital is usually measured by the discount rate.*

Output or production *The quantity of a commodity produced by a farm enterprise expressed in traditional output units. Production can refer to output from a single production unit, or to the aggregate of production units for a farm or a region.*

Output unit (unit) *The standardized physical unit used to measure output. These can be English, metric, or other traditional units.*

Preproductive period *(for a multiyear crop enterprise) The period that 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%). A similar definition holds for livestock enterprises.*

Price *The per unit value (explicit or implicit) received from the sale or transfer of commodities.*

Price change costs *Costs associated with changes in the market value of a capital good (with a fixed service flow) during a single production period that occur because of general inflation or deflation or changes in market conditions related to that specific capital item.*

Production activity *The activity of an enterprise that relates to producing products. Production activity begins with the physical and financial decision to produce. It ends when the commodity reaches the final marketing form while still under the ownership of the farmer whether this final form is reached on the farm or off the farm.*

Production enterprise (enterprise) *Any coherent portion of the general input-output structure of the farm business that can be separated and analyzed as a distinct entity. Such an entity uses inputs and incurs costs while producing products or services.*

Production system or method *A description of a given production process including the factors of production or inputs (including quantity and timing) and the set of outputs produced.*

Profits (to the firm or enterprise) *The revenues from production minus all the market-determined costs of factors and the opportunity cost of the operator's time and any other unaccounted for resources.*

Projected CAR estimates *Forecasts of enterprise CARs for some future period such as the coming calendar year or crop year and are based on information available at a certain point in time.*

Real rate of interest (r) or discount *The market rate of time preference for the numeraire commodity (money) adjusted for changes in purchasing power so that it reflects time preferences over goods in different time periods.*

Receipts *The sum of the cash payments a farmer receives for the sale of commodities that results from a production activity.*

Remaining value (of an asset) *The ratio of the current market price (conceivably at the end of the costing period) to the initial purchase price of the asset. This is often expressed as a percentage.*

Residual returns (to a given factor of production) *The revenues from production minus the opportunity cost of the operator's time and the market-determined costs of all but that factor of production. With all other factors accounted for, any residual returns are said to accrue to this factor.*

Revenue (Returns) *The total value in monetary terms received from a production activity. This value may be derived from product sales, government payments, estimated cash equivalent value of on-farm*

use of the commodities, or other sources. Revenue should be directly associated with the production activity.

Rights to produce *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.*

Risk premium *The difference between the rate of return on a given investment compared to some base investment, usually a risk-free or low-risk bond.*

Salvage value (SV) *The market value of an asset at the end of the costing period.*

Service enhancement costs *The direct costs of increasing the service capacity of a capital asset. They are the costs of expendables and other capital services that are used to alter the productive capacity of the asset. Because these costs allow for the provision of services for more than the current time period, they are normally treated as an investment in a capital asset and not as a period expense when the asset is not sold at the end of the period but is held for future use.*

Service reduction due to time *The decline in the original service capacity of a capital asset that occurs only as a result of the passage of time.*

Service reduction due to use *The decline in the service capacity of a capital asset due to operating, as opposed to not operating. These implicit costs occur because the use of the factor alters its future service potential.*

Software *A program or collection of programs (package) designed for a specific purpose. For example, EXCEL is a spreadsheet software package. Data created by software packages generally hold compressed data and formatting codes that control how they will be displayed on a screen or printed.*

Technical production unit *The standard unit of production activity which produces revenue in a CAR estimate. Two general categories, per unit of land (acre or hectare) or per head of livestock, are commonly used.*

Timeliness costs *Additional expenses associated with excess machinery capacity that is maintained on a farm for purposes of insuring that a particular field operation is performed in a timely manner.*

Transaction costs *Costs incurred to either transform or move a product (physically or in ownership).*

Unpaid farm labor *Work done on a farm or ranch in conjunction with the production of agricultural products where there is no payment for services.*

$US_0(i,n)$ *A uniform series of n payment discounted with interest rate i . The formula for the series is*

$$\begin{aligned}
 US_0(i,n) &= \sum_{t=1}^n \frac{1}{(1+i)^t} \\
 &= \frac{1 - (1+i)^{-n}}{i} .
 \end{aligned}$$

A uniform series with real interest rate r is denoted $US_0(r,n)$.

Updating The process of changing the data used in making the CAR estimate. As new data becomes available, users will want to replace the obsolete data. "Updating", as used in this report, refers to the data rather than the calculation procedures and specified input-output relationships.

V_0 The value of a cost and/or return stream discounted to the end of period 0 (equivalent to the beginning of period 1). This value can be in real or nominal terms depending on the situation and assumptions made.

V_n The value of a cost and/or return stream discounted to the end of period n (equivalent to the beginning of period $n+1$). This value can be in real or nominal terms depending on the situation and assumptions made.

Verification The process of confirming that the data used in the calculations was, in fact, the data the user intended to use.

Yield The quantity of commodity per technical production unit produced by a production activity or enterprise for either crops or livestock.

Yield basis Refers to whether the yield is historical or potential (forecast); and if historical, over what time frame and region.