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**Commodity
Costs and Returns
Estimation
Handbook**

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

July 20, 1998

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CHAPTER 8

LABOR AND MANAGEMENT: FARM LABOR AND RELATED SERVICES

Labor is one of the most important inputs in agricultural production. How it is measured and valued is critical for establishing the cost of producing agricultural commodities and accurately portraying labor's relative share of the total cost of production. Historically, in agricultural commodity cost and return (CAR) methods, labor and management have been treated as distinct, unrelated, or disconnected inputs. A variety of reasons undoubtedly exists for this separation. The perspective that leads to a separation of labor and management, however, is not useful to clear thinking about CAR estimates because human capital, including allocative ability, and human time of an individual are inseparable and jointly allocated (Huffman, 1985).

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. A comprehensive accounting procedure is recommended for the farm labor input in ways that will most likely increase recognition of the quantity of unpaid farm labor used in farming. The cost of hired farm labor (type 1 farm labor) is total producers' costs, 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, including the most preferred opportunity cost method. The particular opportunity cost is the off-farm wage, paying careful attention to point-in-time availability or use and quality dimensions (for example, years of schooling completed, years of postschooling experience) and local economic conditions (high or low structural unemployment rates, unusually attractive or unattractive local amenities, and unusually high or low trend growth of employment). Thus, the 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. We suggest procedures for producing and distributing this information.

The recommended procedures for farm labor and related services will lead, in general, to higher estimated costs of operators' unpaid farm labor than procedures that use the average local wage rate for hired farm labor as the cost and use engineering estimates of labor use. Higher costs occur because in most situations both the per unit cost and total number of units of labor will increase.

TERMS AND DEFINITIONS

Laborers or workers are defined as 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 a service (person-years per year) and includes all human time-using activities, including what is sometimes labeled separately as labor and management. Labor services are perishable and hence cannot be moved to another period in time for use; workers, on the other hand, are durable, potentially working for many years as well as being geographically mobile.

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Farm labor includes 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.

A broad definition of labor and related services makes for a relatively homogenous input category over time, as specialization and change in the economic organization of farms and of our economy occur. All units of farm labor are not assumed, however, to be the same with respect to skill, location, and availability or period of use. Suggestions that hired labor is a fixed input are not compelling, except in the very short run. Even when a farmer makes a contract for a month (or year) with a worker for a certain number of hours of labor, there is generally considerable flexibility about exactly when and what work is done. Thus, labor that might sometimes seem to be "fixed" is really "variable."

Services of highly skilled professionals such as lawyers, tax accountants, and veterinarians are not included in the definition of farm labor and related services because these individuals possess skills from human capital investments and specialization that are very different from the skills possessed by farmers and ranchers. As a result, these services are not "close" substitutes for farm labor as defined here. Costs associated with the services provided by such skilled professionals should be reflected in other input expense categories.

OPPORTUNITY COST OF FARM LABOR

The opportunity cost of farm labor is the maximum value per unit among the alternative uses of that labor. Skill or human capital, location, and period of use are generally important factors for determining the opportunity cost of farm labor. **For hired farm labor (no ownership claim), the compensation (wage plus cost of benefits) is the opportunity cost.**

Though unpaid farm labor does not generally receive a wage, it does have an economic cost. **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.** As long as adjustments are made for labor quality or effective labor units so that implicit wages measure effective labor market skills, cost of production estimates will not be affected greatly by whether hired or unpaid labor is employed in farming or nonfarming enterprises. To the extent that there are specific human capital skills or experience associated with particular agricultural enterprises, there may be minor differences between the opportunity wage of an individual working on a particular farm, on another farm, or in the nonfarm sector. When farming enterprises differ in their technologies and, at the same relative input prices, have different labor intensities of production, the decision maker who sets the price of labor "too low" is giving (at least on paper) an absolute and relative cost/profit advantage to the most labor-intensive enterprise(s). This means that both absolute and relative marginal costs of production will be distorted, resulting in nonoptimal allocation decisions. Note that for a given farm, "homogeneous" labor will have the same cost across all farming enterprises.

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QUANTITY OF FARM LABOR

Measuring labor as the number of workers or employees is using a stock item to approximate a service. All workers generally do not work the same number of hours per period and are different in ways that affect the quality of a unit of service. Thus, approximating farm labor by the number of workers or by assuming a uniform rate of conversion from stock to flow, such as eight hours per day, is not a recommended practice.

Measuring farm labor as person-hours per period used in farming is the appropriate services measure. Homogenous labor can be aggregated by adding together hours in the same period. Surveys of labor availability and possibly time-and-motion studies can provide the details needed for good labor quantity measures. Heterogenous labor should not simply be added together to obtain an aggregate because if the labor is available in different periods, intertemporal transfer is generally impossible and it is costly to change the skills or geographic location of workers. Thus, measuring available farm labor or farm labor use by adding up annual hours of work is not a generally recommended practice.

When heterogenous farm labor must be aggregated, an index created as the price-weighted hours has major advantages. In this approach, hours of labor provided at a higher price receive a greater weight than those associated with a lower price. This practice reflects the fact that opportunity costs are greater for higher-priced labor. A price-weighted labor index can be thought of as being expressed in efficiency units. Although two farms may be using the same physical units of farm labor, one of them may have more "effective" labor because it is using higher-quality labor. As an example, a dairy farm employee responsible for bST injections, artificial insemination (AI), and supervision of dairy parlor operations may receive a much higher wage than an individual who milks cows or fills feed bunks. Similarly, the cost per hour for individuals to pick apples may be higher during some periods than others.

The choice between alternative methods to estimate the quantity of farm labor is influenced by the type of information available and the purpose of the estimation. Accurate farm labor data are frequently difficult to obtain. One approach is to estimate labor hours from input-output relationships, engineering coefficients, or labor requirement data. For example, in the Upper Midwest Dairy Farm example, Tables 14A.1-14A.4 contain machine use coefficients that are sometimes used to generate labor use (for example, 100 hours of field cultivation requires 100 hours of labor and 100 hours of machine services). Farm labor data created from this method tend to underestimate "true" labor use, even for these machine operations, unless they are specifically calibrated to labor surveys. The use of labor coefficients often ignores important labor quality differences. For example, the skill level and labor time required per hour of operation for operating an ultra-modern combine using a global positioning system (GPS) and special yield monitors may be very different from the time and skill needed per hour of machine time in operating a field cultivator. The use of machine time coefficients also ignores the time required for other tasks associated with production, some which may be substantial. Labor requirement data are particularly vulnerable to rapid changes in technology. When machine time coefficients are used, it is important to calibrate them to surveys as much and as frequently as possible, and adjust them to account for total labor use. Labor quantity estimates developed using input-output coefficients tied to specific tasks are most useful for projected CAR estimates where actual data on labor use are not available.

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A better alternative for estimating farm labor quantities is to survey farmers concerning actual use. There are two general types of surveys used to obtain labor quantity data: whole-farm surveys designed to measure the total quantity of labor utilized in the operation over some time period, and task-specific surveys that ask for detailed information on the total time (machine operation, downtime, time to field, etc.) required to perform well-defined tasks such as disc one acre of cornstalks in the spring on firm soil with a 22-foot disc and a 140-HP tractor. While a large detailed survey could conceivably collect both types of information simultaneously, expense has generally dictated separate surveys, or surveys that collect whole-farm data along with specific surveys on a small number of tasks. Whole-farm surveys are particularly important for obtaining data on labor costs associated with allocated overhead, such as time spent planning, on farm bookkeeping, on analysis of records, on collection of information, and so forth. In many instances labor data are collected as part of a survey designed primarily for other purposes and must be combined with nonsurvey information in order to estimate economic costs.

For historical CAR estimates, the recommended procedure, after obtaining a whole-farm estimate from a farm operator of the total amount of labor (hired and unpaid) used in a farm business during some period (say a year), is to have the operator allocate the share of each of the major types (or cost) of labor to each major commodity or enterprise. A tableau similar to the one in Chapter 5 on operating costs for machinery, equipment, and buildings, or to the one in Chapter 9 on joint costs may be useful in this regard. It is important that information be collected in a way so that shares sum to one (or 100 percent).

The state of knowledge about how to conduct good surveys of time use is quite advanced (Juster and Stafford) and with the use of appropriately worded questions, farmers can make reasonable estimates of the use of unpaid farm labor. For example, fairly accurate information on hours of farm labor by a farm operator can be obtained by the following procedure. First, identify the farm operator (or farm operators) for a farm. Second, ask each operator how many hours were allocated to farm work (broadly defined), to off-farm work, to work around the house, and to all other activities during the last month (week). This type of question has the advantage of having a control total on hours allocated by a given individual to all uses of time during a day. Thus, an error in the estimate of one use of time causes an offsetting error in the opposite direction in other uses of time. Using this procedure, most individuals have a relatively good perception of how their time is allocated to major activities.

Although using subjective information provided by farmers about the total time spent on farm work is a reasonably accurate way to estimate total labor use, farmers can be expected to present much less reliable information about how they allocate their time to particular farming activities or commodities than about the total time used. There are several reasons for this outcome. First, farmers are frequently engaged in a fairly wide range of activities during any day, week, month, or year. Human recall for small details is difficult for everyone (Juster and Stafford). Second, farmers frequently use time that affects more than one commodity or enterprise and have zero output from some enterprises that take time to consider in a production plan. Thus, estimating exactly how much is to be allocated to each enterprise or commodity is often arbitrary. When the purpose of the analysis is the construction of cost estimates by enterprise or commodity, allocation of some type is required and so the researcher must proceed with the best method available.

Regardless of the approach taken to estimate the quantity of farm labor, a supplemental schedule to the CAR statement should be developed which reflects the number of different types of farm labor used in producing agricultural commodities. The statement should have one category of hours for the major decision

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maker(s) of a farm. Most of allocated overhead labor would be in this category. For hired labor with no ownership claims, there should be a category for each different skill availability type. The categories might be (i) farm operator hours (male vs. female), (ii) spouse, (iii) other unpaid farm labor (male vs. female), (iv) hired labor, full time and seasonal, (v) contract farm labor, and (vi) hours of related labor services (by major type). An ideal example of how this statement would be prepared is shown in Table 8.1. Although it may not be possible to obtain this level of detail in many surveys, this example gives a starting point from which to design a survey instrument.

COSTS OF FARM LABOR

In considering costs, it is useful to distinguish hired labor (that does not have an ownership interest in the farm business) from unpaid labor and labor that is paid a salary and has an ownership interest in the farm business. The reason for including individuals who have both a salary and ownership claim in the same category is that no good reason exists for the salary of these individuals to be related closely to their labor input in the farm business. The salary might be either a significant under- or overstatement of contribution, or misstated in terms of timing because of tax and financial reasons.

Hired Labor (No Ownership Claims)

The Task Force recommends that hired labor with no ownership claims and related purchased services be valued at the wage rates (regular or piece rate) plus fringe and other benefits for contract farm labor.

Thus, the "full cost" per hour is more than the regular wage rate, and frequently is 10 to 15% higher.¹ These fringe and other benefits include the following: the employer's contribution to social security, workman's compensation and retirement plans; the value/cost of time spent screening and training new workers; paid vacation and sick leave time of workers; health insurance; and employer housing, food, and transportation costs. If specific labor services are always hired at lower rates due to local labor market conditions (surplus of student labor, large number of individuals seeking summer-only employment, availability of retired individuals who "enjoy" the work, etc.), the tasks performed by these individuals could be broken out in estimating labor quantities, and the appropriate wage rate applied to these transactions.

¹This is based primarily upon the fact that benefits to workers in the nonfarm sector are currently slightly greater than 25% of the wage and salary cost, and the share has been increasing rapidly since the mid-1980s. In aggregate studies, a wage or compensation index can be obtained as hours-weighted-average compensation or converted to a Törnqvist compensation index (see Chambers: 243-49). An index that uses only the wage, excluding benefits, will underestimate unit labor cost for agriculture by at least 10%.

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TABLE 8.1 Categories of Labor and Related Services

Hours of Farm Work and Quality Attributes:

- i) Operator (by age, education, experience, gender, race, etc.)
 - ii) Spouse (by age, education, experience, etc.)
 - iii) Other unpaid or with ownership claims
 - Adults (age, education, experience, etc.)
 - Children: 16-18 years of age
 - < 16
 - iv) Hired farm labor (no ownership claims)
 - Full-time (by age, education, experience, etc)
 - Seasonal (by type)
 - Part-time (by type)
 - v) Contract labor (by type)
(Expenditures also)
 - vi) Related Services
 - Mechanical repairs and maintenance
 - Bookkeepers
 - Other(Expenditures also)
-

Unpaid Labor and Salaried Labor with Ownership Claims

There are a number of alternative measures that could be used to estimate the cost of unpaid labor and salaried labor with ownership claims. These include (1) the marginal value of farm labor obtained via shadow values from programming models, or value of the marginal product from econometric models; (2) wage rates of farm managers and/or hired farm labor; (3) off-farm wage rates of farm people; and (4) off-farm wage rates of nonfarm people who have similar human capital characteristics as unpaid farm labor.

The most insightful approach to considering the economic cost of unpaid farm labor and salaried labor with ownership claims is from the perspective of "opportunity cost."

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Alternative 1

The cost of a unit of unpaid (or family) farm labor in one enterprise can frequently be measured as its value in another farming enterprise. This approach, however, is strictly appropriate only if the farm value exceeds the value in nonfarm uses (e.g., nonfarm employment, leisure, or home production). The value of labor in a particular farming enterprise is generally determined by a number of other farm decisions, such as the quantity of accompanying inputs and type of technology used. Thus, a value of farm labor determined internally to the farm business is frequently of suspect quality and a weak measure of the costs of farm labor. Farm operators who are very successful will have a marginal value of time in farming that exceeds by a large margin their implicit wage for off-farm work. When we use the implicit off-farm wage as the price of these successful operators' time for agriculture, the "quasi rents" that their farming skills are earning will appear as part of the returns aggregated together in the "residual" farm return category.

Alternative 2

For unpaid farm labor, the wage rate of professional farm managers is sometimes used to approximate the (replacement) cost of the hours used by a farm operator in decision making, and the wage rate of hired farm labor is used as the cost of all other unpaid farm labor. Although this approach has the frequent advantage of being fairly easy to apply, there are some problems with the economics of the approach. First, a farm operator's labor cannot generally be divided easily into decision making hours and other farm work hours. Much of his or her farm labor produces a joint product of "field work" and decisions. Attributing the wage rate of professional farm managers or hired farm laborers to field work performed by the farm operator independent of his/her off-farm opportunity cost may lead to errors in calculating the true cost of the field work. Second, the quality of decision making by farmers and professional farm managers may be quite different. Third, the human capital investment in schooling and useful experience of farm operators is generally much larger than that of hired workers; so when they are working at the same task, farm operators are generally more productive. Fourth, farm operators (and unpaid family members) have stronger incentives for getting farm work done in a careful and timely fashion than do hired nonfamily members. The primary reason is that farm family members can expect to share directly or indirectly in net farm income, but hired nonfamily farm labor generally does not.² If these differences in skills and incentives are important, it is also essential that the hours utilized (required) for specific tasks or enterprises be adjusted to reflect this difference in productivity. Given the difficulties in attributing wages of farm managers and/or unskilled workers to unpaid family labor in a way that is consistent with tasks performed, incentives, and relative productivity, this method is probably only appropriate when no other estimates exist. The farm labor of children of farm operators frequently may be approximated well by the wage rate for similarly skilled hired farm labor.

²Performance-based incentive plans for hired labor are sometimes used to strengthen the incentives for hired labor to complete farming activities in a timely fashion. These plans can make a dramatic difference in performance, but they are generally imperfect.

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Alternative 3

Off-farm wage rates of farm people contain valuable information about wage opportunities of similarly skilled and located individuals who do not work off-farm. This method views off-farm work as the best alternative to farm work. In order to add precision to the process of valuing characteristics of individuals and localities, hedonic wage regression equations could be fitted to a national sample of off-farm work participants. Furthermore, the results are most useful if there is a significant number of farm operators working off-farm in each state. An example of this approach is the work by El-Osta and Ahearn.

A major advantage of this approach is that it uses labor market information to value personal and locational characteristics, which are generally more objective than other values. This approach does not assume that all farm labor has the same skills or productivity in farm work, or that they have the same opportunities in off-farm work. Upper-aged farm operators, having no prior off-farm work experience, may not have "good" off-farm work opportunities. For farm households located in sparsely populated areas, a locally thin labor market may exist for some skills. If individuals in these areas are going to consider off-farm work as their best alternative, they might need to move to another geographical location. Some individuals/households in all locations are always operating at this margin, (i.e., considering switching to part- or full-time off-farm work) so this prospect is not too dramatic. This fitted wage equation could be used to predict off-farm wage rates by state for farm operators.

Alternative 4

Off-farm wage rates of nonfarm people also contain much information about the value of human characteristics as assessed by the labor market. In principle, all individuals, irrespective of their residence and skills, are being evaluated by the same general market forces because there is arbitrage across geographic locations and skills (Rosen 1986; Tokle and Huffman). Nonfarm individuals might have significantly different characteristics from farm people. Existing evidence suggests that the primary difference is the quality of a year of postschooling experience. At any age, a year of postschooling experience of farm people is worth less in the nonfarm labor market than a year of nonfarm work experience of nonfarm people. Thus, although hedonic wage equations fitted to a sample of nonfarmers contain much useful information about the implicit market price of personal and local characteristics, they should be interpreted with some care. A more specific discussion of the implementation of alternatives 3 and 4 is contained in the next section.

Although each of the alternatives has certain merits for specific situations, the Task Force recommends that for unpaid farm labor (and salaried labor with ownership claims), the cost for all operators, partners, and spouses, who are adults, should in most cases be the market wage (or compensation) per hour for nonfarm work. The preferred method to estimate this is alternative 3, but alternative 4 is also acceptable, particularly when off-farm wage information is not available for farm people. For children in farm households, the Task Force recommends that their farm labor be valued at the wage rate for hired farm labor if they are 16 years of age or older and be set at the local minimum wage if they are less than age 16. If the children are obviously more skilled than (nonfamily) hired labor, then a higher wage should be used such as the amount a neighbor would pay them for similar work.

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Nonfarm employment is the primary cash-earning alternative activity to farm work for most individuals. Nationwide almost 50% of U.S. farm operators and spouses participate in off-farm work sometime during a year (U.S. Dept. of Commerce—Census of Agriculture). When unpaid farm laborers make a decision on whether to continue with farm work or seek nonfarm employment, they generally weigh their earning prospects in nonfarm employment against those in farming. Thus, the most important aspect of the off-farm wage used to approximate the opportunity cost of farm labor is that it pertains to labor containing similar useful characteristics (e.g., schooling, experience, location, and time of availability). Variables such as gender and race are often included in such regressions because they seem to capture information (proxy) that is not otherwise reflected in imperfect quantitative measures of human capital characteristics included in the model.³

HEDONIC WAGE EQUATIONS FOR ESTIMATING LABOR COSTS

On a national basis, the most reliable means of implementing opportunity cost valuation of farm labor is by using predictions from econometrically fitted wage or labor demand equations. The concept of equalizing differentials due to employee and job (or employer) attributes (see Elliott: 313; Rosen, 1986) has been given empirical content through hedonic wage or labor demand equations for labor services of individuals holding particular jobs. The hedonic or characteristic approach to explaining or determining the wage (or price of a good or service) is based upon the empirical hypothesis that asserts that the multitude of skills or attributes of workers and jobs (or models and varieties of a particular commodity) can be comprehended in terms of a small number of characteristics or basic attributes (Griliches: 4; Rosen, 1974). By viewing the problem in this way, the magnitude of the number of truly different types of labor services, jobs, or submarkets available is greatly reduced because "new ones" are just viewed as a new combination of "basic" attributes that have been present for some time.

In its parametric, or wage equation, version, the methodology asserts the existence of a reasonably good fitting empirical relationship between the hourly wage and an employee's skill and the employer's various but not too numerous attributes. Labor economists have accumulated a large amount of evidence about (1) the relevant set of basic attributes for employees and jobs, (2) the algebraic form of the relationship between the wage and attributes, and (3) special problems of sample selectivity or nonrepresentativeness of actual workforce participants relative to the population of potential participants (Pencavel). The relationship can be summarized as

$$\ln W = \beta_0 + X_1\beta_1 + X_2\beta_2 + \delta_3\lambda + \mu \quad (8.1)$$

where W is the average (hourly) wage, X_1 is a vector of personal attributes of the worker that are exogenous to current workforce participation decisions (e.g., age, years of formal schooling, years of potential or actual postschool workforce experience, etc.), X_2 is a vector of job or employer associated attributes that are

³Wage differences not explained by a hedonic model may well reflect discrimination or other factors that are not associated with past, present, or future productivity of labor. The value of using a properly specified hedonic regression model is that on the average these errors will have a mean of zero and be uncorrelated with the included variables.

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exogenous to current workforce participation decisions (e.g., geographical location of work, anticipated and unanticipated local labor market conditions, local cost of living indicators, and indicators of local amenities), and λ is a function of the probability of an individual being employed in wage work. The variable λ controls for sample selectivity of workforce participants from the pool of all potential workforce participants. The disturbance term μ is a random zero mean variable that represents the impact of many other factors that affect wage rates, but that are individually of minor importance to the wage or labor demand facing an individual.

The hedonic wage equation (8.1) is a type of reduced-form equation, and its parameters (β s) need not be constant over time, regions, broad industrial categories, or classes of workers. Empirical studies by labor economists, however, have shown considerable stability over time and across similar, but not exactly the same, individuals. The evidence does suggest, however, at least for the nonfarm population, that wage equations for men and women usually differ by more than the constant term. The primary reason for this is greater within-gender homogeneity of particular attributes than across-gender homogeneity (Gunderson; Rosen, 1986; Willis; Goldin; Smith and Ward, 1984, 1989; Fuchs; Juster and Stafford; Pencavel; and Killingsworth and Heckman). Given that only about 7.5% of all farm operators identified in the 1992 Census of Agriculture were women, however, the analyst must weigh the potential for increased accuracy from separate equations with the reduced precision of a smaller sample size.

An important consideration in estimating wage equations for members of farm households is the joint aspect of the labor force participation decision. The farm operator and/or the spouse may choose to work full or part-time off the farm or to work only in the farming operation. Since farm and nonfarm family income is usually lumped together in making consumption decisions, the joint aspects of this decision to work may affect the estimated value for λ in equation 8.1 (Huffman and Lange).

The size and density of labor markets may matter in valuing farm labor. When some of the prospective workers and some of the jobs are tied to specific geographical areas, aspects of local labor markets matter for labor market outcomes. For example, members of farm families tend to be tied to particular parcels of land, married adults are largely tied to each other, and jobs are tied to particular geoclimatic aspects of the local environment or distance from large centers of consumption. Kenny and Denslow, Adams, Topel, Tokle and Huffman, and others have found geographic boundaries defined by states to be adequate representations of local labor markets in the United States. For large states like Texas and California and some others on the border of the contiguous 48 states, such as Minnesota, Wisconsin, Michigan, and New York, it might be important to separate the state into two or possibly three labor market regions.

Fixed employment-related costs and density of demand for particular skills, frequently referred to as the size of the market, also have major impacts on the distribution of skills available in the labor market and the overall functioning of the labor market. Adam Smith (1776 and reprinted 1937) noted more than 200 years ago that the extent of specialization that can be achieved (obtained or supported) in a market is proportional to the size of the market (Stigler, 1951, 1962; Rosen 1983; Becker). Thus, only very large labor markets or urbanized areas can support extremely specialized human capital (specialized accountants, tax preparers, lawyers, and medical doctors are a few examples). The reason is the very large investment in skill that is required relative to the size of the demand by any one household, firm, or individual for these services (Rosen 1983). Modern communications and microcomputer systems have extended the accessibility of rural areas to some of these services.

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In rural and some other areas where people are tied to particular places due to the location of farm land, family relationships, and fixed costs, and where other transaction costs are high, employees' skills (men and women) and jobs are likely to be less perfectly matched than in urban areas, which can lead to employees being overqualified for the jobs that they hold. The relative degree of the mismatch and the frequency of significant mismatches are likely to be larger in rural areas and small towns than in large urban areas. The outcome of this mismatch is subject to several different interpretations. The issue of thin rural labor markets is a research topic that Briggs (1981, 1986) has examined. In some areas of the United States, especially in the Great Plains and Mountain States, low density of people and jobs and high transaction costs seem likely to reduce the efficiency of the functioning of rural labor markets.

As an example of wage or labor demand equations fitted to a large sample of individuals drawn from the farm population, consider the United States Department of Agriculture (USDA) publication by El-Osta and Ahearn. The study considers the off-farm work activities of individuals from selected farm households. The regressors in these equations are variables for individual characteristics as well as characteristics of the state in which the individual resides. Using this information on characteristics, the equations can be used to predict an individual's wage for nonfarm work.

As a practical matter, wage equations would not need to be fitted every year to data in order to obtain good forecasts of off-farm wage rates. Real wage rates for particular attributes are relatively stable over time, except for trend. Better wage equations can be obtained by pooling data together for individuals in the 48 contiguous states than by fitting equations to observations for each state separately. Most likely, wage equations would need to be fitted at least once in five years. A more complete discussion of some of the issues involved in measuring the costs of farm labor is contained in Huffman (1996).

A joint Economic Research Service-State Agricultural Experiment Stations (ERS-SAES) venture in production of new farm labor cost data could contribute significantly towards obtaining this information. This venture could take the form of a small committee to set methods and oversight consisting primarily of USDA and SAES researchers. The USDA, however, appears to have a large advantage in carrying out the procedures and distributing information to all interested clientele.

CONCLUSION

Farm labor was defined as labor and related services. Furthermore, it was recommended that all of this class of inputs be treated similarly in CAR analysis. Farmers should be surveyed for their estimate of the annual amount of labor used on their farm. As needed, they should be asked to allocate the time among the commodities that they produce. In the long term, it would be desirable for cost of production estimates to move away from such subjective methods for allocating labor to particular commodities. This could possibly be achieved by using econometric estimates of cost or profit functions for multicommodity technology.

The chapter contains several recommendations for valuing farm labor in CAR analyses. The recommended approach for hired labor (with no farm ownership claims) is to value labor at producers' cost. Specifically, hired labor with no ownership claims should be valued at the wage rate (plus fringe and other benefits) for contract farm labor. All adult unpaid farm labor (and salaried labor with ownership claims)

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should be valued at its opportunity cost, defined to be the maximum value for nonfarm uses. Hedonic wage equations are the suggested method for estimating these values. The preferred alternative (3) is to estimate these equations based on the off-farm wage rates of farm people. An acceptable alternative (4) is to obtain estimates based on the off-farm wage rates of nonfarm people who have similar human capital characteristics as unpaid farm labor. Equations based on alternative 3 can be estimated using data available from the USDA's national farm household surveys (El-Osta and Ahearn). Except for children employed on the farm, wages and salaries paid to spouses of operators, partners, and shareholders for farm work should not be used in cost of production estimates. These wages are unlikely to be closely related to the opportunity cost of labor provided by these individuals since the determination of these salaries is usually arbitrary.