an economic model for extension evaluation

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A large proportion of Extension programs are oriented toward decision makers, whether they be family, community groups, farm managers, or youth. These decision makers have one thing in common—they're trying to maximize something. For example, the farm-firm may be thought of as maximizing net income, while consumers are maximizing the well-being of the family.

To help us develop a general framework for thinking about how Extension programs affect these units and their decisions, let's drop the "production-consumption" distinction. Households as well as farms can be thought of as producing units. We purchase market goods and combine them with time and management skills to produce flows of goods and services.[1] For example, we combine purchased inputs, time, and skills to produce a meal.

However, this maximization isn't unconstrained. Families face limited income and prices of items purchased, and farm producers face input prices and technical production relationships that determine their costs. Households and firms generally have no effect on these input prices, that is, those prices are "givens" to the purchasers. How, then, do Extension educational programs affect the processes?

Framework

As a start, we might classify Extension programs (recognizing that there are many exceptions) as affecting household and farm production in the following ways:

1. To improve technology and/or the *rate* of adoption of new technology.
2. To improve the quantity and quality of information used in household and firm production,

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marketing, and/or consumption activities, and group decision making.

3. To improve the management skills of the farm, firm, or household owner/manager, youth, and community or local government.

Technology

Extension agents perhaps are accustomed to thinking of programs as fitting Categories 1 and 2, and increasingly thinking about ways to evaluate those programs. Under Category 1, for example, adoption of new cultural practices or a new crop and livestock genetic stock will affect output and/or production costs, and these effects are generally understood. Similarly, technological changes have occurred, generating time savings in household production. These effects within the household are generally understood, but the effects on the economy through labor markets have been more pervasive.[2]

Information

The second category would include transfer of information such as market prices/forecasts, current tax information, current pest conditions, and other time-specific information. Economic effects of any single program are likely to be short-lived and require continual maintenance. Such a program's individual benefits are likely to be small yet affect large numbers of people; therefore, they may be some of the most difficult and costly to evaluate. Informal, "case-example" evaluations offer reasonable options to formal, full-blown evaluations.

Management Skills

The third category, improved management skills or human capital, the focus of many Extension programs, will be difficult to evaluate. Many of us haven't been exposed to techniques for thinking about the effects of programs that teach skills. One caution—I'm not suggesting that each of us try to *apply* the technique, but rather my emphasis is on understanding the approach as an aid to look for, and describe, program effects.

In operating the farm or household, we frequently think of physical capital inputs (equipment, buildings, stoves, home freezers), but perhaps the most important input is human capital.[3] However defined, it's this stock of knowledge and skills that's used by the decision maker to combine inputs optimally in the production process. The task isn't one simply of finding some maximum production from a given quantity of inputs. The task is one of finding the least-cost combination of inputs for a given level of output. Since many substitutes exist for any given input, and these

substitutes have different unit prices, the task isn't a simple one. The decision making is further complicated by choices in types of outputs, for example, in farm enterprise selections.

It's in this process of maximizing net revenue (or household well-being) that management skills find their payoff. The "bottom line" of the decision-making process should be measured in terms of the effects substitutions in either inputs or outputs (or both) have on the firm's costs and revenues (or quality of life), not in terms of physical units like bushels of corn or gallons of milk.

For more than two decades now, economists have studied the payoff to investment in "schooling," using years of formal schooling as a measure for the amount of human capital acquired. Results have generally been reported in technical journals. One empirical measure of the effect of schooling is the difference in lifetime earnings streams of two groups of individuals with different levels of schooling. Individuals within each group, however, have the same level of schooling, and the researcher tries to account for the effect of nonschooling influences in the earnings.

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Many Extension educational programs augment the stock of human capital—and many of these improve our skills in managing the farm or household—but measuring that effect is difficult and involved. Not only do these effects occur over several years, but most individuals also add to their stock of human capital through means other than Extension. Programs that do have a significant impact on decision making through improved skills will have an effect, for example, on an individual's net income over time or the production of more nutritious meals at a lower cost. Theoretically, these effects can be measured just as the effects of formal schooling can, but determining the period and amount of investment is more difficult.

If we were to compare the average income streams for a group of Extension program participants with nonparticipants (but otherwise similar), we might hypothesize those streams to look something like Figure 1. Note that the income stream might originate from *increases* in income

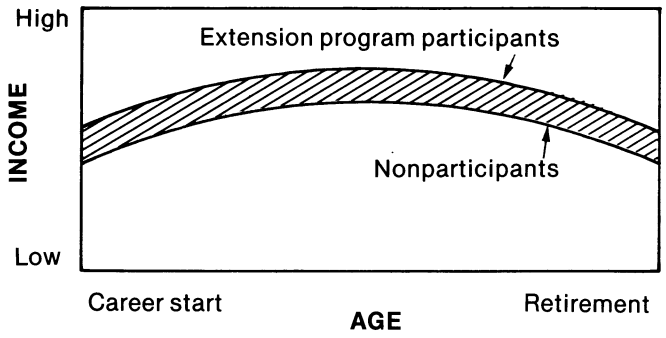

Figure 1. Income streams.

(improved agricultural enterprise selection or new income from a craft) or from *reductions* in costs (cost reduction from improved agricultural practices on the farm or cost reductions as a result of improved skills in meal preparation).

The lower curve might represent an average lifetime (or other appropriate time horizon) income stream for nonparticipants in Extension programs, and the upper one that for participants. To simplify the discussion, I'm assuming that annual costs borne by program participants have been deducted from the higher income generated by participation. The hatched difference would represent a gross payoff to Extension programs (or perhaps a major single program).

If this income difference is created by a single, one-time program, then the payoff is the *present value* of the difference in income streams after adjusting for any costs to maintain that stream.[4] A type of cost-benefit analysis could then be done by comparing the present value of additional earnings with initial program costs.

More programs than one might at first imagine could be thought of in this simple framework. Time savings in addition to money savings from improved management skills accrue over time. Just how long they accrue is a relevant question as skills may erode or become obsolete. However, once a reasonable time is decided on, one can at least think in terms of the returns (value of time saved, cost savings, or additional revenue) to a program over this period.

Actual calculations may not be necessary, or perhaps even attempted, to describe more realistically the output of a program. In fact, I'd argue that no more than a few such complete evaluations be tried nationwide. Yet, the framework provides a way for us to think in terms of *flows* of benefits from a given educational program that augments the *stock* of an individual's human capital. Human capital,

as Schultz argues, is an economic good—it has value and an acquisition cost.

Conclusions

The human capital approach suggests we think of outputs in terms of improvements in the economic well-being of participants. The framework also suggests we think about how long those effects, or benefits, are realized. This may be a short time for some programs, and several years for others. And, there will be programs whose output can't easily be converted to income. Yet, even with these, we may think about possible market alternatives (for valuing the program output), or simply the quantitative effect over time. What's the number of youngsters expected to be reached, and over what expected period, by a 4-H leader training program?

If many of the educational programs offered by Extension were highly productive and easily packaged and evaluated, firms would probably be packaging and selling them. Therefore, what remains for us to do is by its nature difficult to evaluate.

Evaluation of Extension programs should be no less developed or rigorous than that employed to evaluate other government programs. I feel rather than have many of us around the country involved in evaluation, we should try only a few complete evaluations, and perhaps have these done by individuals outside Extension.

The major gain from the effort to do a better job of evaluating Extension educational programs may be that Extension staff, especially at the local level, increasingly think in terms of program accomplishment or output rather than program activity. Such a reorientation is already occurring.

Thinking in terms of what actually happens to clienteles' output, input costs, time savings, and trying to observe those changes may yield benefits to Extension programs in terms of both internal resource allocation (do we spend less time in Program A and more in Program B) and bids for external resources.

Footnotes

1. G. S. Becker, "A Theory of the Allocation of Time," *Economic Journal,* LXXV (September, 1965), 493-517. An example of some recent applications of Becker's household production ideas—as well as time-use ideas in general—is the special issue on household production of *Family Economics Review* (Washington, D.C.: USDA, Agricultural Research Service, 1982).
2. One of the most important of these effects is the increasing proportion of women in the labor force.

3. Nobel economist T. W. Schultz argues that investment in human capital is more important than investment in physical capital (especially land) in explaining improvements in income and welfare in less-developed countries (and less-developed rural areas in general). Schultz discusses various forms of human capital, including entrepreneurial ability, schooling, child care, and health. His Nobel lecture is highly recommended reading. See, T. W. Schultz, "The Economics of Being Poor," *Journal of Political Economy,* LXXXVIII (August, 1980), 639-51.
4. The present value of a stream of income over time is simply today's equivalent value of that entire stream. Since a dollar received in the future is worth less than a dollar received today, those future values are adjusted downward, or "discounted." An example of this approach, as well as discussion of more general issues surrounding economic evaluations, is contained in "Economic Evaluation of Integrated Pest Management," *Tar Heel Economist* (Raleigh: North Carolina State University, Department of Economics and Business, September, 1981).