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EVALUATION OF FOOD CONSUMPTION PROGRAMS
IN RURAL EGYPT: METHDOLOGICAL CONSIDERATIONS

by

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Carlos A. Benito

The Case for Cost-Effectiveness Analysis

This paper investigates few aspects of a methodology for evaluating food production and consumption programs in rural Egypt. The evaluation of this kind of program is peculiar on two accounts: one is that it is oriented toward a specific social group; another is the complexity of the economic unit of the program's beneficiaries—the household-farm of the fellahim (egyptian peasant).

Group-specific programs aim at satisfying a basic need of a specific population, for example, a low-income group, a group located in a given region, a given age group, etc. Policymakers undertake these programs under the assumption that the social benefits of such activities are relatively larger than their social costs. From their perspective, their cost-benefit analysis is redundant. A most useful approach for these cases is cost-effectiveness analysis. Under this approach, a set of independent projects, which are designed as to generate the same impact, are ranked by their fiscal costs. The project with the least fiscal cost is called the most cost-effective project.

Project impacts do not need to be transformed into dollar values; but, preferably, they are measured in different physical units, for example, energy or protein intakes per person for a given age and sex group, rice yields per feddan, family underemployment, family cash income, etc. This way of describing the impacts or benefits of a project is closer to the way of how

targets and goals are prescribed by policymakers, administrators, and beneficiaries.

Under cost effectiveness, the project costs refer to fiscal expenditures as estimated in government budgets rather than to economic or opportunity costs as measured in cost-benefit analysis.

The effects and impacts of a project on the production and consumption of a household-farm depends on the family response to price changes, income transfers, and other signals generated by the project. In the case of a household-farm, the set of behavioral equations representing these responses are larger than in the case of urban households, and the estimation of their parameters is more complicated. A fellahim family makes simultaneous decisions about crop and livestock production, supply of family labor, family consumption, human procreation, childrens' education, migration, and capital accumulation. Moreover, the government programs for improving the nutritional and health status of fellahim families are more diverse than in the case of poor urban workers. Programs for these urban families are demand oriented, e.g., commodity subsidies, food distribution, and nutritional education. For the household-farm, in addition to demand-oriented programs, there exist supply-oriented projects, i.e., food consumption can also be induced indirectly by means of farm price-support programs, input distribution and subsidies, credit for small farmers, and technical assistance.

Program Impacts and Cost—Needed Information

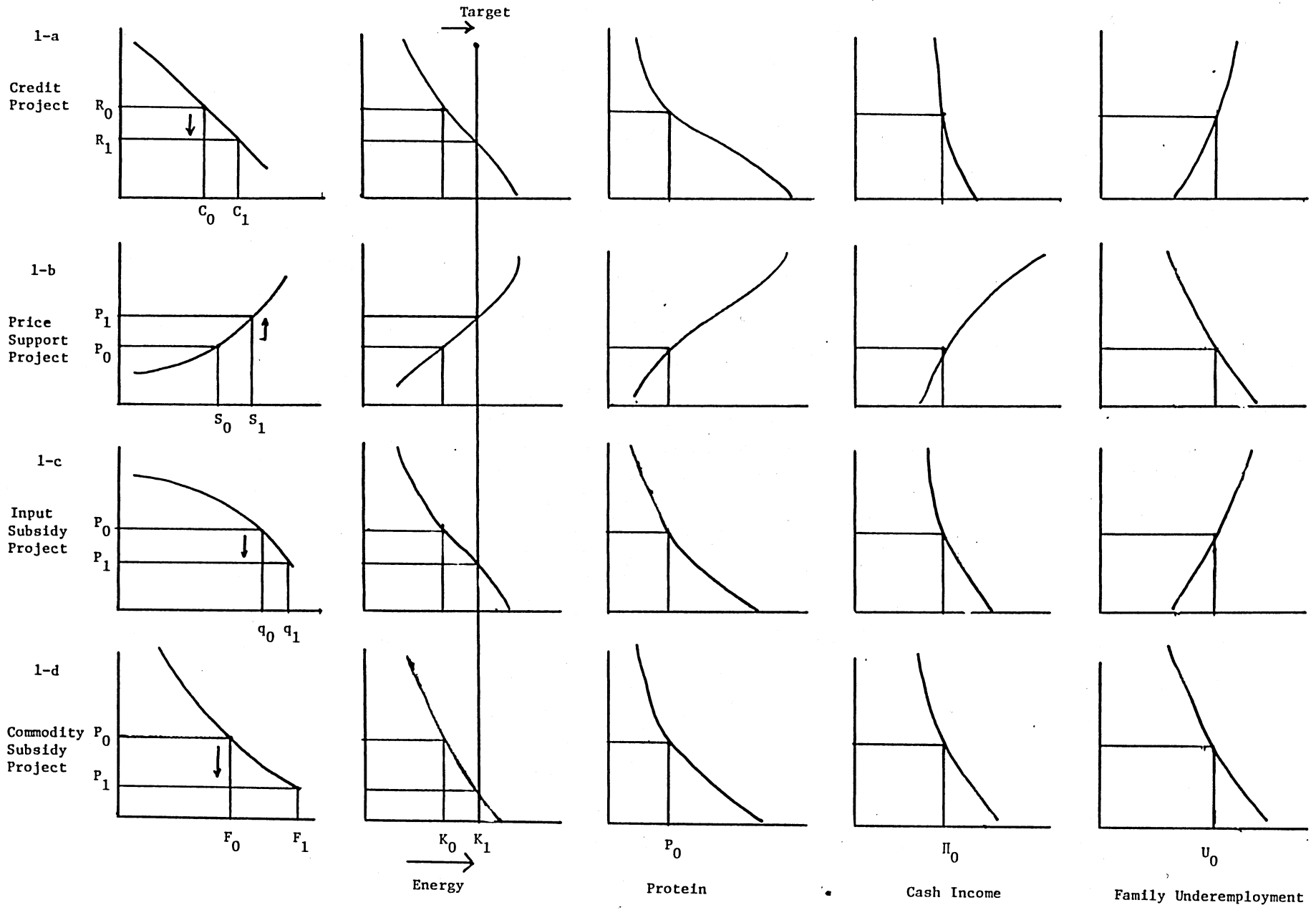
For the purpose of program evaluations, it is convenient to distinguish between program inputs and outputs and program effects and impacts (United Nations). Program inputs and outputs refer to the level of activity and performance of the agency responsible for the implementation of projects

(supply side). Program effects and impacts refer to changes in activity levels and performance of the program beneficiaries (demand side). More specifically, the effects of a program are measured, say, by changes in the use of credit and modern inputs, by changes in the supply of marketable crops and the purchases of food, etc. The impacts of a program are the result of these effects and are, say, the changes in the welfare of a fellahim family, for example, changes in nutritional intake, family underemployment, family cash income, etc.

Assuming that the delivery agency has implemented the program, what is needed for evaluation purposes (ex ante or ex post) is a consistent framework of reference for investigating effects and impacts under alternative kinds of projects. Figures 1-a through 1-d illustrate these relationships. Each Figure represents an independent project—its instruments, its effects, and its impacts. The instrument and direct effect by definition are different among projects, while the relevant impact is the same. For example, Figure 1-a represents a demand for loans. In Egypt, like many other countries, the cost of borrowing money (that is, the rate of interest) charged by public banks is fixed regardless of the amount borrowed. In fact, the real limitation for a farmer is his lack of access to a credit market. But this lack of access—reflecting a capital market imperfection—can always be represented by a large rate of interest. At a sufficient large rate of interest, there is most likely to be a supplier of loans, for example, a usurer. Figure 1-b represents a demand for fertilizer. Figure 1-c represents a supply of marketable crops, that is, crop production surplus after family and animal consumption. Figure 1-d represents a family demand for food. Note that, in the case of supply of a marketable food, for example, corn,

Figure 1

Food Consumption Projects--Instruments, Effects, and Impacts

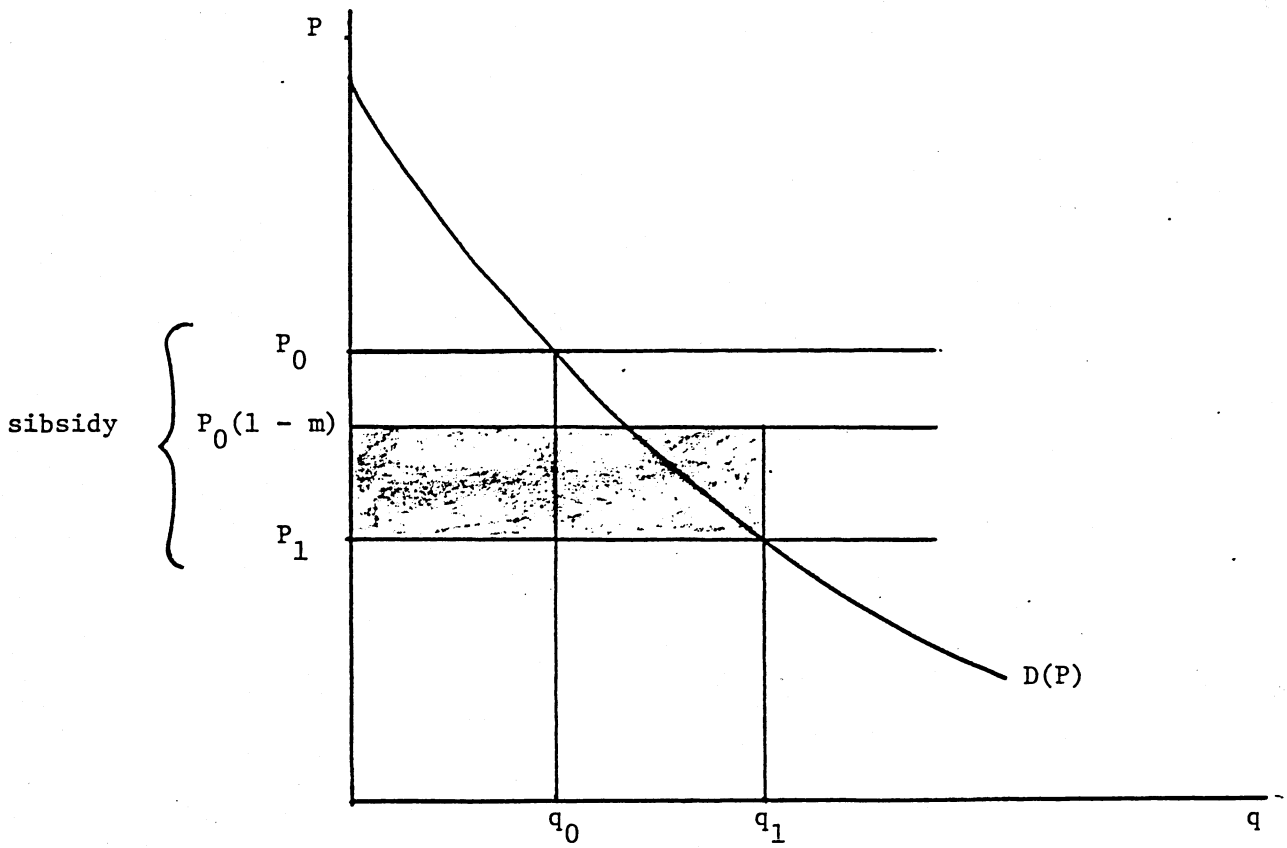


the relevant price is the farm-gate price. In the case of the demand for food, for instance, corn, the relevant one is retail level price. For each project (for example, credit, input subsidies, price support, and commodity subsidies), there exist a set of behavioral functions explaining the relationships between the project instruments (for example, interest rate, input prices, farm-gate prices, and commodity prices), the effect variables (for example, credit received, input used, crops sold, and food purchases), and the impact varables (for example, protein and calorie intake, family underemployment, and cash income). The subscript 0 indicates the variable level without the project, and the subscript 1 indicates their levels with the project. Thus, the levels of effect and instrument variables of this project are derived for a given level of an impact variable, e.g., calorie intake. The levels of the other impact variables are also derived for the same given impact variable, i.e., calorie intake. Thus, this system of relationships allows the estimation of change in instruments which are necessary for increasing, say, calorie intakes within a fellahim family.

The fiscal cost of each project has two components: the transfer cost and the operation cost. Once the required change in the instrument and the associated change in the effect variables needed for inducing a given impact are known, it is possible to estimate the transfer cost of each project. For example, in the case of input subsidy, the transfer cost for the government is the difference between total expenditures at the retail market price (price without the project) and total expenditures at the subsidized price (price with the project) minus the total discount that the government obtained by operating at the wholesale rather than retail market level. Figure 2 represents transfer costs for a representative household-farm assuming that

Figure 2

Input Subsidy Project



P_0 = input price at the retail market level

P_1 = price charge by government coops

m = mark-up rate of retailers

and

TC = Transfer cost = $[P_0(1 - m) - P_1] \cdot q_1$.

the supply of fertilizer operates at constant cost within the relevant range of trade (that is, supply price elasticity is infinite). The operating costs are integrated by the salaries and other costs necessary for delivering the project services.

Methods for Estimating Program Impacts

There exist two major approaches for estimating the system of economic relationships exemplified by Figure 1: the econometric approach and the optimization approach.

Econometric Methods

In theory, the parameters of the above system of simultaneous equations could be inferred by means of econometric procedures. In practice, however, this possibility is severely limited by various factors. Although it is possible to find point estimation or average figures for most of these variables, it is difficult to find or even to generate cross-section and even less time series data reflecting variability. Even if the necessary data were generated, say, by means of a statistical survey, one is still likely to face serious econometric problems like multicollinearity and identification of parameters in a large simultaneous equation system.

There exist some studies of nutritional policies and programs based on econometric estimations; but, they either apply to urban populations, which only require estimation of demand functions (Reutlinger and Selowsky; Perrin and Scobie), or they take the economic as a whole with a high degree of aggregation (Pinstrup-Andersen and Caicedo; Pinstrup-Andersen, de Londoño, and Hoover).

Optimization Methods

The system of relationships depicted in Figure 1 can be interpreted as a reduced-form expression derived from a structural form. The structural form is integrated by production, consumption and marketing activities, a set of resource and budget constraints, and an objective function. That is, the structural form represents the economy of a household-farm as an optimization problem. A specification of this nature allows for large complexity. A numerical solution is possible by using some algorithm like linear or quadratic programming. The behavioral equations (those of Figure 1) can then be derived in a numerical way by means of parametric programming (i.e., comparative static for an empirical model). Some applications of this approach are found in Benito and Calkins.

References

Benito, Carlos A., "Policies for Food Production and Consumption in Underdevelopment: The Case of Mexico," Journal of Policy Modeling, Vol. 1, No. 3 (1979), pp. 383-398.

Calkins, Peter H., "Nutritional Adaptations on Linear Programming for Planning Rural Development," American Journal of Agricultural Economics, Vol. 63, No. 1 (May, 1981), pp. 247-254.

Perrin, Richard K., and Grant M. Scobie, "Market Intervention Policies for Increasing the Consumption Nutrients by Low Income Households," American Journal of Agricultural Economics, Vol. 63, No. 1 (February, 1981), pp. 73-82.

Pinstrup-Andersen, Per, Morah Ruiz de Londoño, and Edward Hoover, "The Impact Increasing Food Supply on Human Nutrition: Implication for Commodity Priorities in Agricultural Research and Policy," American Journal of Agricultural Economics, Vol. 58, No. 2 (May, 1976), pp. 131-142.

Pinstrup-Andersen, Per, and Elizabeth Caicedo, "The Potential Impact of Changes in Income Distribution on Food Demand and Human Nutrition," American Journal of Agricultural Economics, Vol. 60, No. 3 (August, 1978), pp. 402-415.

Reutlinger, Shlomo, and Marcelo Selowsky, Malnutrition and Poverty: Magnitude and Policy Options. (Baltimore: Johns Hopkins University Press, 1976).

United Nations, Systematic Monitoring and Evaluation of Integrated Development Programmes: A Source Book. (New York: Department of Economic and Social Affairs, ST/ESA/78, 1978).