REPORT ON THE CAPPA WORKSHOP IN AMMAN, JORDAN, JUNE-JULY, 1988

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1. Introduction

This report summarizes the activities of a training workshop held in Amman, Jordan, on the CAPPA system for making agricultural planning projections. The workshop was given for the benefit of government and university specialists in Jordan. It was co-sponsored by the FAO and USAID/Washington. The United Nations Economic and Social Commission for Western Asia (ESCWA) also participated in the presentation of the workshop. The locale was the University of Jordan; the University's Department of Agricultural Economics was the host for the workshop.

CAPPA workshops have been given by the FAO in eighteen countries in recent years, including Egypt, Turkey, Cyprus, Morocco, Tunisia, India, Thailand, Mexico, Brazil and the Dominican Republic. In each case, the FAO has prepared a database for the country concerned, utilizing information from FAO files in Rome on demographic, macroeconomic and agricultural variables. Thus the training has been conducted with reference to the circumstances and issues of each country.

The main purpose of the workshop in Jordan, like the others, was training local analysts regarding the kind of economic and technical relationships that should be taken into account in agricultural planning. At the same time, it represented an opportunity to explore some of CAPPA's broader potential for helping in the analysis of economic

policy issues, and it appears to have generated interest on the part of the Jordanian Government in using CAPPA for some of its own applied analyses.

Therefore this report discusses a number of related issues: the organization and content of the workshop, the role of CAPPA in a policy planning context, ways to improve the dissemination of the CAPPA system, and the nature of the Jordanian Government's interest in using it.

The next section outlines some of the principal features of CAPPA, as background for the other topics. For the interested reader, there exists a CAPPA manual (Vercueil, 1985), and two previous reports of this author that discuss various aspects of CAPPA (Norton, 1985 and 1986).

2. An Outline of CAPPA

CAPPA is a program for microcomputers that generates a linked series of projections at various levels: the macroeconomy, the agricultural sector, and specific agricultural products, inputs and resources. It creates a large number of tables that are internally consistent and also are consistent with each other, and each of the tables may be viewed on the computer's screen as well as printed. The projections are made for any desired future year, or years.

The consistency aspect of CAPPA is very important. Without it, the task of developing projections that span the range from demography and macroeconomics to agricultural products, land use and inputs would be very time consuming and might not be done in a fully consistent manner.

Another practical advantage of CAPPA is that it is very easy to use. The workshops have shown that users with varied backgrounds, and frequently no more than a B.A. in economics, quickly become comfortable with the process of generating and revising the tables according to different information and assumptions.

CAPPA is structured so that the user develops demand projections first and then specifies alternative responses on the supply side. Similarly, the user works from the more macro aspects to the more micro aspects. CAPPA is not a single model but rather a family of models. There are several points in the flow of work where the user makes a decision as to the kind of model, or the kind of detail, desired.

For example, in the demographic module, the user may implement a rather complete specification, with many demographic parameters and variables, or, alternatively, simply specify a given rate of population growth. In the macroeconomic module, the options range from a full two-gap model to an exogenous specification of the expected growth rate of real GDP, or of total real consumption.

Via income elasticities (or consumption elasticities) of demand, CAPPA moves from projections of aggregate demand to projections of the demand for particular agricultural products. Export demand specifications are included as well.

Then the user has to explore the possible responsiveness in agricultural supply. In making the transition from demand to supply, CAPPA requires the user to take full account of all uses of agricultural products, including retentions for seed, livestock feed, industrial uses,

and wastage. Effectively, CAPPA contains food balance sheets for each product.

A typical way of using CAPPA to analyze options on the supply side would be to fix in advance the expected increases in agricultural yields, as a function of historical trends and planned programs in research and extension, and to allow substitution among crops in areas planted, within limits. Then the cropping pattern could be shifted somewhat toward those products whose demand is growing more rapidly, and the implications for imports will be registered on the computer screen.

In an experimental fashion, different cropping patterns could be analyzed (for each of several types of agricultural land) in terms of their implications for imports and for the required amounts of agricultural inputs. These kinds of experiments can be conducted with an eye to comparative advantage, as discussed later in this report. Also, the user has to ask what kinds of changes in policies would be required to induce a given cropping pattern on the part of farmers; this subject also is taken up later. Nevertheless, the CAPPA experiments serve to outline the feasible options for the sector.

If, for example, the resulting projections of imports of agricultural goods are higher than expected under all scenarios, then the CAPPA analysts may wish to have further discussions with experts in agricultural research and extension and try to determine realistic goals for higher rates of yield growth, under the assumption of expanded programs of research and extension. Then an alternative yield trend may be entered into CAPPA for another round of experiments.

The kind of conclusion that may be reached could be, for example: "Agricultural imports will increase over the planning horizon unless the historical rate of yield increase for staple foods were increased from one percent per year to two percent per year." It would be up to other experts to judge the feasibility of the higher targets for yield growth, and their implications for budgeting, but CAPPA would have been able to link those targets to other economic variables, and perhaps to help underscore the importance of more effective programs in certain areas.

In other cases, investment in irrigation or improvement of rainfed land may be the key program, but again the linkage to other variables is readily made through CAPPA. Investments of these kinds appear in some of the CAPPA tables. The system also provides projections of agricultural employment under each scenario.

In this spirit, scenarios can be constructed with CAPPA for a fairly wide range of issues, including the effects on agriculture and on the agricultural balance of trade of variations in macroeconomic performance.

From a viewpoint of economc modelling, perhaps the greatest limitation of CAPPA is that it does not include the response of agricultural prices to changes in production and demand. However, base-year prices are included in the system's date set, and the results of CAPPA, including levels of production and agricultural value added, may be evaluated at those prices. This opens the way to interesting experiments, such as valuing the projected results at international base-year prices instead of domestic base-year prices, to evaluate the extent to which comparative advantage is being followed in the agricultural strategy (as discussed below).

Furthermore, as the lectures in this workshop indicated, there are ways to incorporate in CAPPA the response of production and demand to price changes, although not the converse. This option is particularly useful if certain scenarios are built around the assumption of a change in pricing policy. The demand formulation in CAPPA is flexible and is open to incorporation of the effects of price changes.

It should be noted that the CAPPA user is free to establish the list of products to be included, up to a maximum number of 52. CAPPA distinguishes between agricultural products (such as sugarbeet and sugarcane) and consumer commodities (such as sugar), and a matrix of industrial transformation coefficients is included. Livestock products are included.

The inputs include labor (monthly if desired), land by type, draft animal power, draft machinery power, fertilizers by nutrient type, pesticides, and traditional and improved seeds. The required inputs of data include production technologies, or farm budgets. As in the case of other data, the FAO supplies a basic set of technologies for each product in the country concerned, but the user may alter them.

CAPPA does not include a specification of supply response to price change, but the user may build that into CAPPA in the course of constructing the scenarios, if real price changes are foreseen as, for example, in the case of a government commitment to change the levels of protection afforded to certain agricultural products.

The modules of CAPPA are as follows:

--Population projections
--Macroeconomic projections
--Domestic demand projections
--Supply and utilization accounts (food balance sheets)
--The crop production scheme (land use by crop and type of land)
--The animal production scheme
--Projections of factor inputs (labor, animals, machinery, purchased inputs)
--Analysis of the agricultural labor force
--Analysis of economic indicators (investment requirements, foreign trade balance, sectoral value added)

An idea of the richness of the information in CAPPA, and the possibilities for analysis that it opens up, is given by the following statements from the CAPPA manual (Vercueil, 1985) that introduce the purposes of the module for analysis of the agricultural labor force:

This module:

--Displays the demand for labor by crop and land class and thus permits an identification of the major sources of agricultural employment;

--Displays the demand for labor by calendar month, thus permitting an assessment of possible seasonal bottlenecks;

--Measures the effects on the demand for labor of changes in harvested areas and yields;

--Permits a comparison of labor demand and labor supply, with the latter disaggregated by sex and age category, thus allowing for assessment of the demand vis-a-vis the capacities for field work of the different subpopulations.

The data set CAPPA is sufficiently detailed and complete that an important step in making applications of the system would be to construct a data set that is more recent than the one normally supplied by the FAO, and perhaps more in accord with parameters from the national information agencies. The consistency requirements for making the data set are strict: all planted areas, summed over the crops, have to add up to the

availability of land by class; and all crop supplies, transformed through the food balance sheets and the processing coefficients, plus imports, have to add up to domestic demand. But as the experience of constructing input-output tables and social accounting matrices has shown, constructing a consistent data base for the entire sector is in itself a useful exercise. Normally, a period of about two months should be allowed for the development of the new data base.

In summary, the CAPPA system is fairly comprehensive in the variables it covers, from the macro to the micro level. It is relatively easy to use, and it is quite a useful tool for putting together consistent sets of planning projections for agriculture. The extent to which it is applied to other kinds of policy issues depends on how much additional information the user is able to bring to CAPPA. In this regard, the possibilities generally are greater than earlier presentations of CAPPA have implied, so part of this report is devoted to reviewing them.

3. The Organization of the Workshop in Jordan

The workshop took place from June 25 until July 7. The instructors were Dr. Abdel-Aziz Ibrahim, from the Institute of National Planning in Egypt; Dr. Mahmood Ahmad, from ESCWA in Baghdad; and the author of this report. Dr. Suleiman Arabiat, Chairman of the Department of Agricultural Economics at the University of Jordan, organized the facilities for the course and participated in some of the sessions. Dr. Zuhair Mubarak Abdalla, of the FAO Office for the Near East and North Africa, took the responsibility for overall organization of the course and attended several of the lectures.

There were fifteen registered Jordanian participants plus two staff members from ESCWA. Some of the university faculty attended occasionally on an informal basis.

Of the registered Jordanian participants, one was from the Ministry of Planning, eight were from the Ministry of Agriculture, one from the Agricultural Marketing Organization, one from the Ministry of Municipalities and Rural Affairs, one from the Agricultural Credit Corporation, one from the Ministry of Occupied Territories, and two were from the Faculty of Agriculture at the University of Jordan.

Given the importance of the Ministry of Planning in all areas of economic policy and planning, it would have been desirable to have more participants from that agency. Likewise, of those from the Ministry of Agriculture, only three were from the Economics and Planning Unit, and it would have been useful to have more concentration on that unit. Nevertheless, virtually all of the students participated quite actively.

The daily format of the course included three hours of lecture in the morning and two hours or more of practice with CAPPA on the computers in the afternoon. Drs. Abdel-Aziz and Ahmad led the students systematically through all the modules of CAPPA, and by the end of the course the students were constructing alternative scenarios with CAPPA.

Dr. Ahmad's and this author's lectures were given in English, with extensive use of blackboard. Virtually all of the students possessed a sufficient command of English to understand the lectures, but for the one or two who didn't, and to reinforce the content of the lectures, Dr. Abdel-Aziz gave periodic summary translations of the English lectures.

This author's lectures attempted to place CAPPA in the broader context of tools of economic planning and policy analysis, to give guidelines on how to use CAPPA in ways that are meaningful from a viewpoint of development economics, and how to orient it to practical problems of economic policy. The content of those lectures is summarized in the next section of this report.

At the suggestion of Dr. Arabiat, in the afternoon of the last day of the course, a university lecture was arranged for this author under the chairmanship of the General Secretary of the Ministry of Agriculture. About seventy persons attended from the university and the government. The topic was simple techniques of agricultural policy analysis, drawing upon a paper prepared recently for the U. S. Department of Agriculture's Office of International Cooperation and Development.

4. CAPPA as a Tool for Policy Analysis

4.1. CAPPA in a General Analytic Context

Viewed in the spectrum of tools of policy analysis, CAPPA is a projections tool for generating consistent scenarios for specified years in the future, taking into account both macro and micro variables and the restrictions imposed by sectoral resource endowments. It is not an optimizing model, nor does it include endogenous prices. It can include responsiveness to specified changes in real prices, for both demand and supply, but it does not include the response of prices themselves. However, it should be noted that all analytic frameworks for agriculture that include endogenous prices are static rather than multi-period, and

for the most part they required more advanced training in economics on the part of the user.

For its class of models, CAPPA is more complete than any other one, and it also is easier to use. Its ease of use has caused it to be adopted in some countries where workshops have not yet been held (Peru, for example). It does have some rigidities that need to be relaxed, such as the existing definition of classes of agricultural land, and its documentation could be improved, but nevertheless agricultural planners and policy makers generally have found that it assists them greatly in their work.

In some other respects, CAPPA is quite flexible. As noted, it is a family of models, rather than a single model. The user has to decide on how to close the system on the supply side, for example (see below), and it is open to additional information on policies that can influence acreage allocations over crops, and limits to changes in those allocations.

In a sense, CAPPA is a tool for tracing out feasible, consistent scenarios for the sector, but complementary analyses are required in order to determine whether in fact those scenarios are attainable within the normal limitations on the government's budget and other limitations on the flexibility of policies.

For a given set of projections of demographic variables and the macroeconomy, CAPPA supplies the following information for agriculture and livestock:

--Feasible growth paths for output;
--Associated projections of real income (real value added);

--Exports and imports and the sector's trade balance;
--Required investments in irrigation, land improvement, machinery, livestock and tree crops;
--Required amounts of current agricultural inputs; and
--Agricultural employment.

These projections are disaggregated by product and, where appropriate, by land class. The output projections are disaggregated into projections of yield improvements and of increases in arable land.

Its projections are particularly helpful in the following aspects of the design of agricultural strategies:

--Choices in agricultural trade;
--Investment programs, including by land class;
--Cropping pattern choices; and
--Input requirements over time.

Choices in these areas can be assessed with CAPPA according to a variety of criteria, including the effects on employment, foreign exchange earnings and value added, and considerations of comparative advantage.

The key assumptions in a CAPPA scenario are i) that relative prices will not vary enough to distort the specified relationships between the demand for agricultural products, on the one hand, and population and income, on the other; and ii) that policy instruments are available, and have enough flexibility, to induce the projected changes in cropping patterns and yields. To the extent that variations in domestic supply-demand gap are met by variations in agricultural imports, then the first assumption is more likely to be correct. This situation, of course, would imply the absence of import quotas or restrictive import licensing.

The force of these two assumptions can be weakened somewhat by judicious use of complementary information in setting up the CAPPA

scenarios, information which comes from, for example, estimated supply elasticities and studies of the effects of policy instruments on relative prices in agriculture. It is in this area that prior experience can be the most helpful; this is an area where the "art" of policy analysis enters the work with CAPPA. (It also is an area where the CAPPA manual should be revised to provide more guidance to the user.)

In other words, for a CAPPA-based study to realize its full potential, the system needs to be complemented with two kinds of information: i) behavioral information, on how farmers respond to incentives and policies, and the limits to their possible responses; and ii) normative information on the preferences of policy makers and the changes in policy instruments that they are willing to contemplate.

4.2. The Consistency Dimensions of CAPPA

CAPPA ensures consistency in the following dimensions:

—Population growth and overall economic growth, on the one hand, and the demand for agricultural products, on the other hand;

—Consumer demands for food and industrial agricultural goods (e. g., wheat flour, refined sugar, cotton cloth, beef) and the implied requirements for agricultural products (wheat, sugar-cane or sugarbeets, raw cotton, cattle);

—The demand for agricultural products and the sum of imports and domestic production;

—Agricultural production and the possibilities for increases in yields and arable land;

—Agricultural production and the agricultural labor force;

—Agricultural production and the availability of current inputs.

CAPPA does not ensure consistency in the price dimension, that the restrictions on policy will indeed permit the variations in relative prices that would be consistent both with the projected cropping patterns and yield levels, and with the projected levels of demand. Nor does it ensure that the projected cropping patterns are consistent with the non-price aspects of farmers' decision functions, for example risk aversion and a preference for home retentions of staple crops. However, these problems are common to all projections frameworks, and efforts can be made to reduce the potential for inconsistency. For example, the space of possible changes in cropping patterns can be restricted ex ante to marginal changes around the base-year patterns, unless specific changes in relative prices, with the accompanying policy changes, are foreseen.

In other words, while CAPPA generates estimates of the feasible space for performance of the agricultural sector at an aggregate level, a necessary input into CAPPA is a set of estimates of the feasible changes at the micro level: cropping patterns, technologies and yields by product.

Another way to address the issue of consistency in the price dimension is to conduct complementary studies for the estimation of supply functions. When such functions are specified in terms of the relative prices of competing crops (such as cotton vs. rice, cotton vs. corn, corn vs. soybeans, and so forth), it often turns out that the supply elasticities with respect to the price pair are significantly larger than those often assumed. For staples, much of the literature suggests short-run elasticities in the range of 0.2 to 0.4, with respect

to product prices deflated by general price indexes. But when relative prices of competing crops are used, the elasticities may turn out to lie in the range of 0.5 to 1.0. This implies that excessively large price changes may not be necessary in order to induce significant shifts in cropping patterns, but it is important to attempt to obtain some quantitative estimates of what the required price changes may be for a given CAPPA scenario.

By the same token, it is important to complement CAPPA (or any other projections exercise) with estimates of the base-period rates of economic protection (positive or negative) that are afforded to each of the major agricultural products. If a product already enjoys a high rate of protection, then a further shift of cropping patterns in the direction of that crop, with the likely implication of an even higher protection rate, should be ruled out before constructing the CAPPA scenarios.

On the other hand, if a product has negative protection in the base period, it may be useful to explore with CAPPA (and with supply response studies) the implications for other crops, for employment and for other variables, of raising that product's protection rate to zero or small positive levels, and therefore of increasing its area planted.

In sum, steps to increase the realism of CAPPA's projections are possible, and they are likely to be associated with analysis of options in the area of pricing and protection policies.

Another feasibility check that should be made concerns the investments in CAPPA, particularly those in irrigation and land development, and their consistency with the probable size of the

investment budget. This is a fairly straightforward matter, but it does require communication between the analysts and the policy makers who are responsible for investment budgeting. This check may impose a fairly strong limit on the possible rates of growth of the sector's output.

Likewise, as noted earlier, the projected rates of increase of yields (by crop and land class) should be reasonably consistent with the country's historical experience and with the planned programs in the area of research and extension. It can be helpful to develop two alternative sets of yield projections, under high and low estimates of the size of the programs of research and extension, and with CAPPA to explore their implications for net foreign exchange earnings, employment and the like.

And finally, it can be important to discuss with experts in international marketing the prospects for agricultural exports. This is an area in which the judgment of other experts becomes translated into parameters in CAPPA.

4.3. Production and Productivity

There are many criteria by which a scenario may be interpreted and evaluated. Among them are sector-wide increases in production and in the productivity of agricultural land. CAPPA projects production levels by individual products, and it has base-year prices, so it contains the elements that are necessary in order to calculate a production index for each scenario. Eventually, a production index should be built into the CAPPA program, but in the meantime it is a fairly straightforward matter for the user to calculate the index associated with each scenario.

Among the primary factors in agriculture, arable land usually is the factor that is most limiting to growth prospects. Therefore it is important to assess each scenario in terms of how efficiently it is utilizing this resource. This may be done by computing for each year in the planning horizon the economic productivity of agricultural land, that is, the constant-price value of output divided by the acreage planted. Sometimes this calculation reveals surprises, as in cases in which strategies that favor staple crops turn out to reduce the productivity of agricultural land, because those crops have a lower value per hectare than some other kinds of crops do.

The productivity index can be calculated for each class of land and for total agricultural land. Again, this measure should be built into future versions of CAPPA.

4.4. Comparative Advantage and CAPPA

In many countries, one of the more important policy-related analyses is an assessment of the comparative advantage of each major product, via calculations of domestic resource cost coefficients (DRCs), and then a calculation of the protection rates for each crop, to see how closely protection policy is aligned with comparative advantage. For those products that have a comparative advantage, it would be unwise to give them too much protection, for that could make them uncompetitive in international markets. On the other hand, policies that result in negative protection for such products (which often occur) can discourage them and lead to lowering their output levels and hence the sector's foreign exchange earnings.

[At this point in the discussion, the workshop lecture was devoted to a detailed example with two products and two countries--Jordan and Turkey--illustrating how comparative advantage is measured and what the gains are for each trading partner when comparative advantage is exploited.]

Therefore it can be important to evaluate each CAPPA scenario according to the principles of comparative advantage. The fact that CAPPA includes base-year prices provides an opening to do this rather easily. The procedure, for a given scenario, is to run the CAPPA system twice, once at base-year domestic (farmgate) prices, and once at base-year international prices. Among several scenarios, the one that maximizes value added at international prices is the one that best utilizes the principle of comparative advantage. The one that maximizes value added at domestic prices would be most favorable to farmers provided that the base-year structure of protection (subsidies etc.) is continued throughout the planning horizon. In many cases, that is not a tenable assumption.

The best scenario from a comparative advantage viewpoint is likely to be the one that maximizes the sector's net earnings of foreign exchange. More precisely, it probably will maximize the ratio of net foreign exchange earnings to subsidy outlays.

A requirement of this procedure is that the international prices--border prices--be converted to farmgate equivalents, taking into account marketing and processing margins for both the purely domestic products and the internationally traded products.

This procedure is a way of building considerations of economic efficiency into the exercises with CAPPA, and, correspondingly, of providing more of the economic information that is needed to choose among the agricultural strategies represented by the scenarios.

4.5. Pricing Policy Experiments with CAPPA

The price aspect of CAPPA may be utilized in another way, to simulate hypothetical options regarding pricing policy. Suppose that in the base year, one crop has a nominal protection rate of 75 percent and another has a nominal protection rate of -30 percent. Further, suppose the government has made a commitment to reduce the protection rate on the first crop to 40 percent and to raise the protection rate on the second one to zero. (Obviously the year-to-year fluctuations that characterize agricultural prices cannot be controlled, but a clear policy commitment can affect the trend in prices.)

These assumptions can be built into CAPPA in three ways:

i) The base-year domestic prices can be altered to correspond to the target rates of protection, so that value added and the production indexes are evaluated at the projected domestic prices.

ii) The demand curves for the products in question can be shifted to reflect the projected price changes. CAPPA contains alternative functional forms for the demand curves, one of which includes a shifter term, and that term can be utilized to represent the otherwise-absent price effects.

iii) With the aid of complementary estimations of supply functions, the acreage allocations over crops can be adjusted to reflect the projected changes in prices.

In other respects, the CAPPA scenarios would remain unchanged, and so these modifications would lead to a set of CAPPA results that

quantified the implications of the assumed change in pricing policy as regards production, foreign exchange earnings, employment, and the like.

These last possibilities, of using CAPPA to explore comparative advantage and to simulate the effects of basic changes in pricing and protection policy, have not been brought out in previous workshops or in the previous CAPPA literature. They would appear to be worth exploring further, especially in the context of applications of CAPPA, for it would bring the CAPPA analyses closer to a set of policy issues that are confronted with increasing frequency in many countries.

4.6. Building a Policy Matrix with CAPPA

Ultimately, the role of a tool like CAPPA is to provide information to those who make the decisions regarding the agricultural development strategies that should be followed. The CAPPA analysts do not make those decisions, and hence they cannot be assumed to be aware of all the criteria that go into the decisions. Nevertheless, with the aid of CAPPA it is possible to provide policy makers with quite a bit more information than they normally would have regarding the consequences of different strategies.

To apply CAPPA in this way, the first step is to define scenarios that are representative of well-defined strategies. As illustrations, alternative strategies may be established according to the emphasis given to export promotion, or the size of the sector's investment budget, or the emphasis given to programs of research and extension and hence the expectations regarding rates of yield increase. Or according to pricing

and protection policies as defined in the preceding section. It is also possible to define strategies according to shifts in cropping patterns--more land in wheat, for example--or according to alternative macroeconomic growth expectations.

However the strategies are defined, they should be clearly identified with certain program and policy options. That is, decision makers should have the means at their disposal to implement, at least approximately, one strategy or another by their policy choices and allocations of budgetary funds.

The strategies also should be capable of representation in CAPPA, which is in fact the case with all of the above examples.

The next step is to list the target variables, or variables of interest to policy makers. Typically the list would include variables like agricultural production, agricultural income, net agricultural foreign exchange earnings, agricultural employment, and perhaps income in certain land classes if they represent regions or farm size groups. They may also include quite a few other concepts, such as agricultural exports and imports independently, the production of staple crops, or even of selected individual crops, and the investment cost associated with the scenario.

Then CAPPA is used to simulate the effects on each of the target variables of each of the strategies, where each strategy is a CAPPA scenario, that is, a complete solution of the CAPPA system. The results of the scenarios may be summarized in the form of a policy matrix for the terminal year of the planning horizon (or, alternatively, for the

cumulative values of the target variables over the planning period). In such a matrix, each strategy would be represented by a column, and each of the target variables would be a row, as in the following illustration:

AN ILLUSTRATIVE POLICY MATRIX

	Alternative Strategies				
	S1	S2	S3	S4	S5
Production index					
Value added					
Exports					
Imports					
Net fx earnings					
Employment					
Production of grains					
Investment cost					

S1 = base scenario
S2 = large investments in rainfed land expansion
S3 = large investments in irrigation
S3 = large investments in research and extension
S4 = stronger emphasis on export promotion
S5 = reductions in agricultural protection rates (in specified amounts by crop

The role of CAPPA is to fill in the blanks in the policy matrix, utilizing as necessary complementary analyses of the kinds indicated above. Clearly, the process of defining the matrix requires interaction with policy makers, and the process of compiling the data needed by CAPPA requires interaction with agronomists and other kinds of specialists. Thus, like many other types of applied analysis, a CAPPA exercise is

effectively a multi-disciplinary effort, though the system itself may be managed by one or two persons.

While the analyst does not make the policy decisions, the provision of the information in the policy matrix will go a long way toward making the policy decisions better informed.

5. Possible Further Work with CAPPA in Jordan

At the conclusion of the workshop in Amman, the Jordanian Government expressed considerable interest in updating the data base of CAPPA and making a series of applications to Jordanian planning and policy questions. A new medium-term economic plan is due to be completed in 1990, and the Ministry of Planning already has developed economic models for the macroeconomy and for the energy sector, and it views CAPPA as the most appropriate vehicle for developing the planning projections and policy analyses for the agricultural sector. The Ministry of Planning would like to carry out the CAPPA exercises jointly with the Ministry of Agriculture.

In response to this expression of interest, Drs. Abdel-Aziz and Ahmad and the author met with Dr. Rima Khalaf of the Ministry of Planning to define the outlines of an appropriate work program with CAPPA, without pretending to speak for any external funding agencies. She indicated especial interest in disaggregating the employment coefficients in CAPPA, into farm owners/managers, machinery operators, and field labor; in a rather complete specification of the stages in the agro-processing industries; and in new estimation of the income (or consumption) elasticities on the basis of recent Jordanian surveys.

It was agreed that a work program along the following lines would be appropriate to meet the Government's needs:

1. Select two or three persons from each ministry (agriculture and planning) to form the CAPPA team (September, 1988).

2. Develop a new data base for CAPPA, as a joint exercise by the Jordanian team and a person experienced in CAPPA such as Dr. Abdel-Aziz (October-December, 1988).

3. Stratify the new household survey into 15 to 20 income strata in each of the rural and urban areas, and then estimate consumption elasticities of demand for each of the products in CAPPA on the basis of stratum means; to be done by Jordanian experts after the commodities in the new CAPPA are defined (november-December, 1988).

4. Disaggregate the employment coefficients for each of the products in CAPPA (November-December, 1988).

5. Estimate supply functions, with relative product prices as arguments in the functions, for the principal products, with the participation of members of the Department of Agricultural Economics at the University of Jordan (November 1988 - February 1989).

6. Estimate the required agro-industry coefficients, including employment coefficients for each stage of processing (November 1988 - January 1989).

7. Estimate base-year DRCs and protection coefficients for the main products in the sector (November 1988 - January 1989).

8. Establish the principal strategy options and target variables (January, 1989).

9. Run the CAPPA system for several scenarios and make tentative interpretations of the results (February, 1989).

10. Review the initial results with outside experts and revise the definition of the scenarios accordingly (March, 1989).

11. Make the final CAPPA runs and interpret and write up the results (April-May, 1989).

This timetable would be consistent with the timing of the work on the new medium-term economic plan. The program of work should stimulate

a dialogue on some meaningful policy choices and strategy choices in Jordanian agriculture before the final strategy is selected for inclusion in the plan.

6. Further Development of the CAPPA System

For the first three years or so of its existence, the CAPPA system was regarded by the FAO as purely a training tool, to make planners and policy analysts more aware of the kinds of relationships they need to consider when formulating policy documents and plans for agriculture. However, partly in response to the demands for assistance in applying CAPPA that have arisen in several countries, it now appears as though the FAO has begun to regard CAPPA as a system that can be used for actual applications.

CAPPA does have many useful characteristics as a tool for applied analysis. At minimum it would speed up considerably a lot of the projections work that would have to be done by other means. More likely, it would ensure greater consistency in that work and in some cases would be able to shed new light on some strategy options for agriculture, if used appropriately.

In its present form, CAPPA is useful for these purposes, but if it is to be regarded as a major tool of applications, a number of improvements in the system and in its presentation would be helpful.

First, the manual should be updated and rewritten to include more material on how to apply CAPPA to policy questions. It needs an introduction that places CAPPA in the spectrum of tools of planning and

policy analysis. It would be highly desirable to have a section on creating a new data base for CAPPA. Also, the text needs to be edited. And it would be very helpful to create a companion volume with case studies. The new version of the manual should be published, rather than issued in photocopied form without a cover, and it should be made available in Spanish, French and Arabic as well as English.

Second, the CAPPA program itself would benefit from some minor improvements. As mentioned, the definitions of the land classes need to be made flexible, and the economic analysis module should be expanded to include calculations of production and productivity indexes.

Third, one or two case studies should be carried out for the purpose of applying CAPPA to questions of formulating investment programs, and the investment module should then be improved in light of that experience.

And fourth, a small office is needed to provide advisory assistance to national teams that are attempting to apply CAPPA, to serve as the focal point of a communications network for CAPPA, to issue publications on case studies, and to supervise occasional revisions of the CAPPA program and corresponding new editions of the manual. The FAO would appear to be the logical place to create such an office.

These suggestions follow from viewing CAPPA as an instrument of applied analysis and not just a training tool. They are follow-up actions, based on the considerable accomplishment of creating CAPPA and on the receptivity that CAPPA has engendered in several countries on its own merits.

In summary, CAPPA appears to be quite a useful addition to the tool kit that agricultural development economists have to work with. It has more potential for application to policy issues than the manual and the previous workshop experiences suggest. But in order to reap the full benefits from it, more systematic support and follow-up is needed.

REFERENCES

Norton, Roger D., "A Review of the Role of CAPPA in Agricultural Policy Planning," report prepared for the Policy Analysis Division of the U. N. Food and Agriculture Organization, Rome, December, 1985.

Norton, Roger D., "Agricultural Investment in the CAPPA System," report prepared for the Policy Analysis Division of the U. N. Food and Agriculture Organization, Rome, June, 1986.

Vercueil, Jacques, Technical Description of the CAPPA System, Policy Analysis Division, U. N. Food and Agriculture Organization, Rome, July, 1985 [also available in Spanish].