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ASSESSMENT OF PAST EXPERIENCES IN USING THE POLICY ANALYSIS MATRIX (PAM) APPROACH IN SELECTED ESCWA MEMBER COUNTRIES

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PREFACE

The approach to policy evaluation used and advocated in this report is built around a simplified analytical framework, the policy analysis matrix (PAM). The method contains a number of theoretical assumptions and empirical simplifications, and a thorough understanding of its underpinnings is essential for useful application. In most situations, the advantages of the method outweigh its shortcomings. Results are comprehensible to policy-makers and yet are theoretically consistent. The method allows measurement of the effects of policy on producer income as well as identification of transfers among key interest groups, producers in agricultural systems, consumers of food, and policy-makers controlling allocations of the government budget. Results can be easily disaggregated to focus on particular regions, types of farms, or technologies. These items represent critical information for any evaluation of agricultural policy. The PAM is composed of two sets of identities, one set defining profitability and the other defining the difference between private and social values. The selection of an empirical method to estimate PAM is therefore a matter of choice. Traditionally, empirical policy analysis has relied heavily on the estimates of supply and demand curves for various inputs and outputs. In principle, these estimates provide an accurate assessment of market behaviour and response. But in practice, sufficient historical data of reliable quality are only rarely available. Even when parameters describing the response to output price changes can be estimated, input demands and the impact of various interventions on production costs are usually overlooked. Further, data are often not sufficiently disaggregated among regions or types of farms. Hence, analysts are unable to assess satisfactorily the impact of government policies on the behaviour of a particular commodity system. The resulting analysis is incomplete and often incomprehensible to policy-makers.

It is in this context that the relevance of the PAM approach cannot be overlooked. The methodology is based on the formulation of budgets for representative activities-farming, marketing, and processing-that compose an agricultural commodity system. Private valuations of costs and returns are altered with information about divergences so social costs and returns can be determined. These data are almost always available or can be easily collected, and evaluation can proceed in a timely manner. When reliable information is available for predicting responses of inputs and outputs to social prices, this information can be introduced into the calculation of social costs and returns. But more often, this latter set of adjustments will be made in only an approximate manner. Once these estimations are complete, policy-makers and analysts can decide whether more costly and time-consuming approaches are needed. The PAM approach to agricultural policy analysis provides decision-makers and analysts with both a helpful conceptual model for understanding the effects of policy and a useful technique for measuring the magnitude of policy transfers. The PAM examines the objectives-constraints-policies frameworks in an operational context. The objectives-constraints-policies framework applies to macro-economic policy as well as to price policy. The Policy Analysis Matrix (PAM) brings together the interactions of macro-economic and agricultural sector policies so that the true (micro-economic) effect of such policies on the economy and private sector activities can be estimated. The PAM is essentially designed to measure the competitiveness, efficiency and effect of policy-induced changes by comparing private (actual) and economic (social) income (profit) of different policy interventions. The PAM measures three related dimensions of agricultural policy simultaneously: agricultural (farm or firm) income or profit, agriculture's contribution to national income or GDP and income transfers as a result of commodity, sector or macro-economic policies.

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ACRONYMS

CIF	:	Cost, Insurance and Freight
DRC	:	Domestic Resource Cost Ratio
EEC	:	European Economic Community
EER	:	Equilibrium Exchange Rate
EPC	:	Effective Protection Coefficient
EPP	:	Export Parity Price
ERP	:	Effective Rate of Protection
ESCWA	:	Economic and Social Commission for Western Asia
FAO	:	Food and Agricultural Organization of the United Nations
FEER	:	Fundamental Equilibrium Exchange Rate
FOB	:	Free On Board
GATT	:	General Agreement on Tariffs and Trade
GDP	:	Gross Domestic Product
HCP	:	Handling Costs at Port of Entry
IMF	:	International Monetary Fund
IPP	:	Import Parity Price
ITMEER	:	Intermediate-Term Model-Based Equilibrium Exchange Rate
MC	:	Marketing Costs
MTD	:	Measure of Total Distortions
NERP	:	National Emergency Recovery Program
NPC	:	Nominal Protection Coefficient
NTR	:	Net Transfer Ratio
OPP	:	Observed Port of Entry Price
PAM	:	Policy Analysis Matrix
PC	:	Profitability Coefficient
PCR	:	Private Cost Ratio
PPP	:	Parity Purchasing Power
PSE	:	Producer Subsidy Eqyivalent
PVA	:	Private Value Added
SCF	:	Standard Conversion Factor
SDR	:	Special Drawing Right
SRP	:	Subsidy Ratio to Producers
SVA	:	Social Value Added
TCBM	:	Transport Cost from Border to Market
TCFM	:	Transport Cost from Farm to Market
TPC	:	Total Processing Cost at the Factory
UIP	:	Uncovered Interest Parity
VAT	:	Value Added Tax
WTO	:	World Trade Organization

I. INTRODUCTION

Agriculture is vitally important to the economies of most countries in the ESCWA region. Agriculture is an important contributor to gross domestic product (GDP) as well as a significant generator of employment in several countries of the region. The sector is also important in trade terms, both as a source of foreign exchange earnings and as the means of satisfying domestic food demand. Thus, a more robust and dynamic agricultural growth could significantly boost sustainable economic growth and rural development in the countries of the ESCWA region. An appropriate option for improving agricultural growth is to expand agricultural exports in countries with appreciable agricultural sectors and comparative advantages. However, high levels of protection in many countries, especially for manufactures and certain food products, along with overvalued exchange rates, contribute to a significant bias against agricultural trade and development.

Currently, the agricultural sector is facing the constraints of increased limitations of water resources availability in the face of increased and competing demands/uses, high cost of new land development, shortages of labor and above all, the need to sustain and enhance its competitiveness in both domestic and world markets. Thus, countries of the region need to formulate and implement comprehensive land use plans that incorporates inter and intra-sectoral needs. In addition, sound measures are needed to address the problem of labor shortages. Also, serious efforts are required to enhance the efficiency of water resource management and use in agriculture as well as to increase its yield attainment and ensure the long-term sustainability of resources. The exploitation of substantial growth possibilities arising from the synergistic effect of the linkages (both forward and backward) should be an important consideration in the development of land, crop types and related sub-sector development and production methods within agriculture.

The task of transforming agriculture into viable agribusinesses and commercial undertakings and one that is dynamic and competitive in both world and local markets must also involve a predominant role for the private sector. Its expertise with the rich and varied entrepreneurial, managerial and marketing skills, innovativeness, capital resources, and marketing and distribution network should be tapped and put to efficient use. The regulatory, incentives, and policy framework should be supportive of the strategy that aims at building-up the growth and development of the agriculture sector on the resources and resourcefulness of the private sector.

The rate and direction of agricultural growth will hinge on the capability of the sector to penetrate and expand new and traditional markets and to generate supplies to meet the quality and quantity needs of domestic and international markets. Issues related to market access, competition, market shares, prices and trade practices to be addressed through an integrated approach combining demand and supply aspects and by creating conditions for market transparency. The marketing efforts should ensure that agricultural products are competitive, specifically oriented to changing market and consumer preferences and responsive to market needs and opportunities.

Food security issues are of primary concern to almost all countries in the region and seem to be the main factor behind the reluctance of many food deficit countries to join the World Trade Organization. The high dependence on imported food, together with domestic supply constraints particularly shortage of water, made these countries worried about the implications of the multilateral liberalization of agriculture for their ability to sustain production of a reasonable share of their food requirements as well as their access to world food markets. Generally, most countries prefer to retain more flexibility in the choice of policy measures and in the pace of reform.

Thus, there is no simple solution to the problems facing agricultural and rural development in the ESCWA region. The countries of the region have similar production patterns and face similar policy and institutional challenges. However, they differ in their resource endowments and their ability to invest in agriculture and meet food import requirements. The issues involved are multifaceted and require a multi-pronged strategy, the elements of which should converge to form an inducement mechanism that would produce the desired results.

The agriculture sector is characterized, among other things, by dearth of institutions, lack of coherent agricultural policies and weak regulatory frameworks. The agriculture sector is still expected to play a more dynamic role in the economy in the coming years, especially by coping with the rapidly rising demand for food and by reducing deficits in the commodity balance of trade. Likewise, employment patterns in agriculture should develop in such a way that drain of labor from this sector is halted, and employment capacity is expanded, though not at the expense of productivity gains which may be realized through continued adaptation of new agricultural technologies. A fundamental prerequisite to building an efficient and highly competitive agriculture sector is the formulation of wide ranging organizational and investment policies.

The challenge at hand is how to make the contribution of agriculture to the socio-economic development process effective and sustainable. Agricultural institutions and policies play an instrumental role in the process development. The design of a right policy mix in this context is significant. With positive and reinforcing interaction among policies, institutions and technologies backed by the required investments and skilled manpower, agricultural productivity could be improved and made sustainable with favorable implications for growth, employment and exports and economic growth as well. Rapid increases in food and agricultural production require investments in infrastructure, training and institutions building. Food and agricultural policy is of paramount concern to economic development efforts of both developed and developing countries alike. In most countries, governments are earnestly striving to confront their food and agricultural problems; however, they need good analysis and good analysts to do so. Food and agricultural problems are actually well immersed in the broader problems of economic development, thus solving food and agricultural problems is a complex task involving a long-run vision of how food and agricultural systems evolve under alternative policy environments. Analytical tools and frameworks constitute the foundation of a meaningful sectoral analysis in general and domestic food and agricultural policies in particular.

In virtually every country, developed and developing alike, governments intervene in agricultural markets. They subsidize farmers (mostly in developed countries); they tax farmers (mostly in developing countries); they try to stabilize prices; they impose import tariffs and quotas; they restrict production; they provide food subsidies for urban areas; they support the use of fertilizers; they build irrigation systems; they offer extension services; they try to control marketing; and they provide credit, often below market rates. These programs have been at the center of controversy. They often impose huge financial burdens on governments and generate allocative inefficiencies in countries that are poor enough already. In general, there are some facts about the agricultural policies of developing countries, the interactions among which have not fully been appreciated. First, most developing countries have attempted to encourage the growth of industry through policies of import substitution and protection against imports competing with domestic production. Second, overvalued exchange rates have often been maintained through exchange-control regimes and import licensing mechanisms even more restrictive than those that would have been adopted in connection with import substitution. Third, many developing countries have attempted to suppress producer prices of agricultural commodities through government procurement policies (especially agricultural marketing boards), export taxation, and/or export quotas. Fourth, some governments have attempted to offset part or all of the disincentive effect on producers by subsidizing input prices and investing in irrigation and other capital inputs.

Suppression of producer prices has been extensively studied but there have been few attempts to estimate the combined impact of those direct policies and the three other sets of government policies. While international trade theorists have long known that protection of some activities discriminates against the remainder, that knowledge has not been transformed into usable estimates of the extent of total discrimination against agriculture. Those few studies that have attempted to measure the indirect effects on agricultural policies and incentives have widely used varying methodologies. This has precluded systematic comparative analysis of the effects of differing degrees of discrimination against agriculture. Although systematic quantification of the extent of discrimination against agriculture has been lacking, observers of the development process have long been aware of the fact that developing countries directly intervene systematically and extensively in pricing of agricultural commodities.

Many of the economic concepts developed over the years can be used to develop an approach to the analysis and evaluation of agricultural policies. The approach advocated here is the policy analysis matrix

(PAM). Its most effective contribution is the analytical process itself: the careful thinking through of complex problems within a consistent framework. The PAM approach to agricultural policy analysis provides decision-makers and analysts with both a helpful conceptual constructs for understanding the effects of policy and a useful technique for measuring the magnitude of policy transfers. The PAM examines the objectives-constraints-policies frameworks in an operational context. The objectives-constraints-policies framework applies to macro-economic policy as well as to price policy.

The Policy Analysis Matrix (PAM) brings together the interactions of macro-economic and agricultural sector policies so that the true (micro-economic) effect of such policies on the economy and private sector activities can be estimated. The PAM essentially is designed to measure the competitiveness, efficiency and effect of policy-induced changes by comparing private (actual) and economic (social) income (profits) of different policy interventions.

The PAM measures three related dimensions of agricultural policy simultaneously: agricultural (farm or firm) income or profit; agriculture's contribution to national income or GDP; and income transfers as a result of commodity, sector or macro-economic policies. The three dimensions are expressed in terms of:

1. Private (finacial) prices for farm (or firm) income or profit.

2. Social (economic) prices contributing to the efficient growth of national income/GDP.

3. Effects of policy intervention and market failure (income transfers) expressed as the difference between private and social prices.

In what follows, we first provide an overview of farm enterprise data and uses; then policy analysis, as well as the policy analysis matrix framework and its assumptions are elaborated in applied context. We then provide a comparative analysis of agricultural policy in five selected countries. Lastly, the PAM model, its strengths and its limitations are discussed in the context of improving food and agricultural policy.

II. FARM ENTERPRISE DATA: AN OVERVIEW

The quantitative analysis began with and is largely based on field data collection exercises carried out for the preparation of Farm Data Handbooks for Jordan, the Syrian Arab Republic, the Palestinian Territories and Lebanon. This was supplemented with by secondary data for Egypt.

The primary objective of preparing the Farm Data Handbooks, among other things, is to derive a set of indicative activity or enterprise budgets that will reasonably reflect well on actual farming conditions of the countries under review to the best extent possible.

It is expected that the Farm Data Handbooks will facilitate the use of farm enterprise data for planning, policy analysis and project design. The Handbooks contain basic crop and livestock standard input/output data categorized by agro-ecological zones in each selected country. The Handbooks have not been designed for use in planning individual farms. The input/output data contained in the handbooks is too generalized to be used for planning and managing individual farms or devising specific extension recommendations, which should ideally be based on more detailed data of the specific nature of a site or farming systems. However, there are still numerous potential uses of such data contained in the Handbooks, the most important of which are:

- Agricultural policy analysis
- Agricultural sector planning
- Regional rural development planning
- Preparation of agricultural projects
- Planning of agricultural support services and
- Teaching and training

The computerized database constructed for the preparation of the Handbooks actually provided the most fundamental data in the form of activity or enterprise budgets which constituted the building block of the private profitability analysis for the major crops in the four selected countries as well as in the Palestinian Territories, in the context of the evaluation of the agricultural policies.

Detailed discussion on this subject is provided in parts III and IV, which elaborate on the Policy Analysis Matrix (PAM) and its applications. There the farm enterprise data is supplemented by social prices in order to ensure a more structured and focused policy impact analysis of agriculture at the commodity levels.

In what follows, an attempt is made to discuss in general the importance and uses of farm enterprise budgets and the associated basic indicators which serve multipurpose objectives and analysis. Discussion on the methodological issue related to the construction of the farm enterprise budgets is beyond the scope of this part. However, it is pertinent to mention that the database for the Handbooks is constructed in a spreadsheet format utilizing the facilities of Microsoft Excel. This facilitates the updating of data, calculation of relevant indicators as well as sensitivity analysis.

Tables 1, 2, and 3 contain a number of selected indicators of cost and return that could be used in farm enterprise and policy impact analysis. These indicators are derived from farm enterprise budgets, which have been constructed for the Farm Data Handbooks. Before glancing through the tables, it is helpful to first shed some light on the importance and multipurpose uses of farm enterprise budgets and then to elaborate on some of the most widely used indicators such as enterprise profitability, gross margin (returns to major factors of production including land, labor, and water), and breakeven yields and prices as well as cost of production.

Enterprise profitability can be measured at various stages; namely, gross output, net output, gross margin, and profit, each of which successively takes into account more elements of cost leading to the construction of a complete farm enterprise budget. Budgets normally show costs and returns from farming enterprises. The farm enterprise budget is of interest in itself and also is a basic building block for analysis of

comparative advantage, economies of scale, farm/firm impacts of policies, and for other tools such as linear programming and policy analysis matrices (PAMs).

Many countries will desire to have a set of budgets for typical farms covering major resource situations for the country. Microcomputer programs can be used conveniently to update prices, yields and other elements in these budgets as conditions change. Such budgets for individual farm enterprises are widely used as planning devices for determining how inputs should be allocated between enterprises.

Formal treatise on methods of agricultural policy analysis makes extensive reference to the role of farm enterprise budgets. These budgets can be used in a variety of analytical exercises, both simple and involved. Computationally, enterprise budgets are not complicated. They are estimates of costs and returns expected from farm enterprises. Those making decisions about farm operations, normally, will need to know the profitability of alternatives. As such, enterprise budgets have many alternative uses as well as users. Lenders can use enterprise budgets to elaborate on the viability of proposed farm investments. Farm policy analysts can use the information to determine expected impacts of policy alternatives. All those interested in long range planning for a country can use the estimates to determine comparative advantage. Moreover, enterprise budgets provide critical inputs for other analytical tools such as linear programming and PAM. The diverse uses of enterprise budgets prompt several different approaches to their construction.

In Part IV, the alternative use of enterprise budgets is detailed in relation to policy analysis matrices. Generally an enterprise budget and the calculations performed to derive indicators and to obtain specific results have several potential uses:

- Calculation of the rates of returns to investment projects, via assumptions on the post project-cropping pattern in the region and the net income coefficients per crop from the budgets.
- Calculation of the first order effects on farm profitability of specified changes in input and output prices.
- Calculation of rates of economic protection.
- Development of estimates of region wide or sector-wide supply response and the incidence of policy, via linear programming models.
- Analysis of the monthly requirements for irrigation water of alternative cropping patterns, for farm planning water release in irrigation districts.
- Analysis of the requirements of other inputs that are associated with changes in cropping patterns for planning input deliveries.
- Analysis of the rate of employment and underemployment in agriculture.

Farm enterprise budget is the most basic source of information for any analysis concerned with costs of agriculture production or the role of inputs. Enterprise budgets are used as well for the evaluation of the economic feasibility of new techniques of production that emerge from the experiment station. In these cases, it is important to supplement the budgets with information on the riskiness of the old and new technologies. For that purpose, more specialized statistical techniques are needed. A related exercise that can be conducted is to calculate the rate of return to short-term credit that enables the farmer to adopt the new technologies. The difference in total costs between the new and old technologies can be obtained immediately from the budgets along with the difference in input levels. Enterprise budgets can also be used to determine the maximum rental rate that can be paid for rented land. Suppose a crop enterprise budget is prepared omitting the land charge. The resulting estimated per acre profit is the maximum rent that can be paid to just break even on producing the crop. Including this amount as land charge could then result in an estimated profit of zero.

In brief, it is important to emphasize that farm enterprise budgets are one of the simplest yet most widely used techniques in economic analysis. They are building blocks for some of the most powerful analytical tools used in agricultural economics research. Enterprise budgets will enable one to evaluate cost and returns of production processes. Comparing relative profitability of new technologies with the existing farm technologies helps to show how the farm business can be more profitable. Enterprise budgets are also used to compare possible new cropping patterns or crops with existing production patterns.

Enterprise analysis is essential for the purposes of management as well as planning of a successful farm business. It helps to explain the internal structure of the farm business by showing the relative contribution of each enterprise to the farm business as a whole. As such, enterprise analysis is very important for farm income, profitability, and relative efficiency analysis. It also provides a basis for making rational decisions about the kind and size of enterprise for calculating the cost of production and for fixing the price of farm produces.

A. GROSS MARGIN ANALYSIS

The gross margin of an enterprise or farm activity is the difference between the gross income earned and the variable costs incurred. It is probably the most commonly used measure in farm analysis and planning, and also is now widely used in extension circles. For a farm on which different activities are carried out, the total gross margin is the sum of gross margin from each activity. In any one-year, total gross margins should not be less than total overheads if the farm is to avoid extra borrowing, or the sale of some of its assets and /or use of its cash savings. Gross income minus variable cost is a straightforward calculation in deriving activity gross margins. There are, however, some slightly different methods used to work it out. There can be problems when measuring gross income. The simplest way to calculate gross income, where gross margins are being used for planning and for comparing alternative future activities is to assume that all of the product from the enterprise/activity is sold and all the income is received at once. This gets over the problem of whether it is sold, eaten, or not fully paid up for years. When using gross margins for analyzing the existing activities on a farm then it is necessary to define activity gross income more completely and precisely. The gross margins per hectare of crop and per head of livestock are widely used in planning for comparative analysis of activities on one farm and between farms in similar environments. Valid comparison can only be made in terms of a production unit common to all of the farms or activities being compared. This unit can be the land area, if the land used by each activity is equally suitable. It could also be per unit of labor per dollar of capital invested, per unit of water used, or per breeder unit or per head of livestock. Gross margin technique normally assumes a linear relationship when the activity or enterprise is expanded. This is not always so, as there can be diminishing returns effects as the enterprise/activity is expanded. While in many cases it is reasonable to assume a linear relationship when planning to increase the area, the farm advisors should keep the possibility of diminishing returns in mind as the activity is expanded. The same is true for labor and water use efficiency. Gross margins are also a useful first step in deciding on the best combinations of activities on a farm. The procedure here is to select the highest gross margin per unit of the most common limiting resources (hectare of land, unit of capital, man-hour, and unit of water) and expand it until some other restraint is met. Then the activity with the highest gross margin of all remaining available activities is introduced until it too meets a restraint, and so on. As was noted earlier, the use of gross margin is a useful first step in planning the best combination of activities on a farm. In practice it is probably the most commonly used technique for planning activity mixes. A more sophisticated approach is to use substitution ratios. Using gross margins is a simple and quick way to plan changes in activities, activity mixes, or to analyze a farm business. There is usually no need to consider overheads and the sensitivity of the proposed change to possible variations in yield, prices or costs can be readily tested.

Calculation of gross margins is a simple and direct technique and a useful first step in any form of farm budgeting and planning. A farm advisor needs only to identify production and planning constraints and to budget incomes and variable costs for each activity. However, some care needs to be taken when using gross margins as a basis for planning. There are obvious physical and financial limits to expansion such as availability of suitable land, shortage of both labor in peak periods and credit. It is very important to investigate the technical efficiency of present practices before gross margins are used as a basis for making changes. Other circumstances under which it would not be wise to adopt the activity with the highest gross margin would be where suitable labor to handle the activity was not available or where capital was limited. Thus, it is useful to consider both the gross margin and the capital needed per hectare before deciding which activity to choose. Gross margin analysis has limitations. Intermediate activities cannot be included separately in the analysis. Also, it arrives at a plan which gives highest returns to the assumed most limiting resources, in fact, that resources may not be the most limiting one. There are some more sophisticated farm planning techniques, such as linear programming, which could overcome the limitations that cannot be handled by simple gross margin analysis. Linear programming uses returns to all resources in the analysis and for choosing between activities, based on the principle of substitution.

Ranking of the gross margins also facilitates comparative enterprise analyses. The direction of changes in resource use can be depicted by the gross margin analysis. Also, looking at the gross margins from different angles, they reflect assessment of returns to land, water, and labor. If additional information on constraints to farming and size of farm could be collected, then gross margins could be used easily in linear programming models and optimal levels of resource use and profit for various enterprise combinations could be obtained.

B. Break-Even Analysis

Enterprise budgets can be used to perform a break-even analysis for either prices or yields. Break-even yield is derived by the division of the total cost over the output price. This is the yield necessary to just cover all costs at a given output price. Since the output price is only an estimate of the expected price, the break-even yield can be calculated for a range of possible prices. The break-even price, or the price necessary to cover all costs at a given yield level, is derived by the division of total cost over expected yield. The breakeven price can also be calculated for a range of possible yields.

By studying the various combinations of break-even prices and yields, planners and managers can form their own expectations about the probability of obtaining a price and yield combination which would just cover total costs. Break-even prices and yields can also be calculated based on total variable costs. The results can help managers make the type of decision on whether to produce or not in order to minimize losses in the short run.

Cost of production is a term used to describe the average cost of producing one unit of a given product. It is equivalent to the concept of average total cost, provided that the same costs and yields are used to calculate each. The estimated cost of production is found by dividing the total cost per acre by the estimated yield. It is to be noted that the cost of production is the same as the break-even prices.

As with the break-even price, the cost of production will change not only with changes in the estimated cost but with changes in yield also. While cost of production is becoming a widely used concept, any value is only as good as the cost and yield estimates used in its computation. Because of many differences in costs and yields, the actual cost of production for any crop is likely to be different between farms, regions, and countries. The cost of production is often used as one way to help set price support levels for government farm programs. The concept is also useful in marketing the product. Whenever the current market price is above the cost of production, a profit can be made. This can be used as a signal to sell at least part of the products perhaps even before harvest since a profit is assured on the amount sold.

Break-even budget is normally used to estimate the maximum acceptable level of an item of cost given an estimated level of benefit, or the minimum acceptable level of an item of benefit given an estimated level of cost. In preparing a break-even budget the value of an important variable is unknown, and the purpose of the budget is to calculate the breakeven value of that variable. For instance, a farmer might be interested in substituting one variety of crops with another, but the productive potential of the new variety is unknown. In this case, the break- even budget could indicate the minimum yield that would have to be achieved to make the change economically feasible. To this price should be added an additional amount to compensate the farmer for taking the risk of making the change. The amount of this compensation depends upon the farmer, the incentives offered, and the confidence he has in surpassing the break-even yield.

The above elaborations were intended to highlight the importance of farm enterprise data as well as Farm Data Handbooks and their multipurpose uses. The most important lesson and insight that could be emphasized here is that countries of the region should always facilitate the timely conduct of farm surveys, the construction of enterprise budgets and their publication in the form of Farm Data Handbooks that provide inputs to many analytical techniques and result oriented studies. This data when complemented by farm-gate export and import parity prices, and shadow prices of factors of production facilitates the construction of social budgets and enables analysts to conduct pertinent policy impact analysis.

TABLE 1. SELECTED INDICATORS OF COST AND RETURN FOR VEGETABLES AND TREE CROPS GROWN IN THE WEST BANK

CROP	PRICE (NIS)	YIELD (KG)	REVENUE (NIS)	VARIABLE COST (NIS)	FIXED COST (NIS)	TOTAL COST (NIS)	GM (NIS)	NET INCOME (NIS)	RETURN TO LABOR (PER HOUR)	RETURN TO WATER (PER M^3)	BREAK-EVEN YIELD	BREAK-EVEN PRICE	COST OF PRODUCTION
Squash (S)	0.5	3000	1500	697.7	107.9	805.6	802.3	694.4	4.46	2.01	1611.2	0.269	0.269
Squash (A)	1.3	2100	2730	869	113.1	982.1	1861	1747.9	10.11	3.8	755.46	0.477	0.477
String Bean (A)	2.5	800	2000	699.8	108	807.8	1300.2	1192.2	8.8	2.65	323.12	1.01	1.01
String Bean (S)	1.5	1200	1800	556.9	103.7	660.6	1243.1	1139.4	7.97	2.96	440.4	0.551	0.551
Broad Bean (S)	4.8	610	2928	429.3	99.9	629.2	2498.7	2298.8	24.99	5.32	131.08	1.032	1.032
Jew's-Mallow (S)	1.5	1600	2400	540.8	103.5	644.3	1859.2	1755.7	22.13	3.87	429.53	0.403	0.403
Early Tomatoes (A)	1.1	3800	4180	1286.1	125.6	1411.7	2893.9	2768.3	10.8	4.45	1283.36	0.372	0.372
Tomatoes (A)	0.6	5200	3120	1282.1	125.6	1407.7	1837.9	1712.3	7.5	3.17	2346.17	0.271	0.271
Tomatoes (S)	0.3	7200	2160	808.2	111.2	919.4	1351.8	1240.6	5.28	2.5	3064.67	0.128	0.128
Tomatoes (GH)	1.2	16000	19200	3588.1	9260	12848.1	15611.9	6351.9	13.14	14.06	10706.75	0.893	0.893
Pepper	1.6	2000	3200	1142.9	242.6	1385.5	2057.1	1814.5	8.5	2.64	865.94	0.693	0.693
Pepper (GH)	1.6	8000	12800	2254.76	3224	5478.76	10545.24	7321.24	15.23	12.71	3424.23	0.685	0.685
Eggplant	1.2	4300	5160	1330.2	253.8	1584	3829.8	3576	11.4	4.4	1320	0.368	0.368
Potatoes	0.8	2500	2000	1236.2	124	1359.2	764.8	640.8	4.97	1.5	1699	0.544	0.544
Potatoes (A)	1.1	3000	3300	844.2	112.3	956.5	2455.8	2343.5	18.89	12.28	869.55	0.32	0.32
Citrus	0.8	3500	2800	708.5	429	1137.5	2091.5	1662.5	13.07	1.4	1421.88	0.325	0.325
Seedless Grapes	2.5	2500	6250	1880.5	1227.3	3107.8	4369.5	3142.2	16.66	3.3	1243.12	1.243	1.243
Bananas Tissue Culture	1.4	7300	10220	1423.6	927.2	2350.8	8796.4	7869.2	72.1	2.93	1679.14	0.322	0.322
Bananas Williams	1.4	5300	7420	1343.6	533.8	1877.4	6076.4	5542.6	21.4	2.03	1341	0.354	0.354
Bananas Usual	1.4	3500	4900	1202.5	486.5	1689	3697.5	3211	15.41	1.23	1206.43	0.483	0.483
Olive (Modern Planting)	3.5	140	490	197	66.3	263.3	293	226.23	6.23	-	75.23	1.881	1.881
Olive (Traditional Planting)	4	100	400	152	36.1	188.1	248	211.90	4	-	47.03	1.881	1.881

TABLE 2. SELECTED INDICATORS OF COST AND RETURN FOR VEGETABLES AND TREE CROPSGROWN IN THE GAZA STRIP

CROP	PRICE (NIS)	YIELD (KG)	REVENUE (NIS)	VARIABLE COST (NIS)	FIXED COST (NIS)	TOTAL COST (NIS)	GM (NIS)	NET INCOME (NIS)	RETURN TO LABOR (PER HOUR)	RETURN TO WATER (PER M^3)	BREAK-EVEN YIELD	BREAK-EVEN PRICE	COST OF PRODUCTION
Tomatoes (GH)	1.2	15000	18000	2169.25	3805	11974.25	9830.75	6025.75	12.29	12.29	9978.54	0.798	0.798
Pepper (A)	2	2500	5000	2575.25	751	3326.25	2424.75	1673.75	8.419	3.46	1663.125	1.3305	1.3305
Squash (S)	1.3	3000	3900	3046	490	3526	854	364	2.321	1.42	2712.308	1.175	1.175
Cucumbers (GH)	1	12000	12000	6201.5	490	6691.5	6798.6	5308.5	14.652	8.498	6691.5	0.558	0.558
Potatoes (S)	1	3500	3500	3009.5	470	3479.5	490.5	20.5	3.066	0.818	3479.5	0.994	0.994
Cut Flowers (GH)	0.25	120000	30000	23218.15	6486	29704.1	6781.85	295.85	2.83	3.77	118816.6	0.248	0.248
Eggplant	0.8	6500	5200	3744.5	1299	5043.5	1455.5	156.5	4.79	2.08	6304.38	0.776	0.776
Tomatoes (Trellis)	1.1	6000	6600	5404.75	3805	9209.75	1195.25	2609.75	2.99	1.39	8372.5	1.535	1.535
Cauliflower	0.8	3000	2400	1373	575	1948	1027	452	6.42	2.05	2435	0.649	0.649
Strawberry	4	3000	12000	8129.5	2040	10169.5	3870.5	1830.5	4.21	3.87	2542.4	3.39	-
Olive Rainfed	5	250	1250	304	38	342	946	908	16.893	-	68.4	1.368	1.368
Olive Irrigated	5	350	1750	619	263	882	1131	868	16.64	6.66	176.4	2.52	2.52
Citrus Irrigated	0.4	3000	1200	717	282	999	483	201	3.773	0.604	2497.5	0.333	0.333
Mango Irrigated	3	1500	4500	1845	421	2266	2655	2234	5.72	2.665	755.33	1.511	1.511

TABLE 3. SELECTED INDICATORS OF COST AND RETURN FOR VEGETABLES AND TREE CROPS GROWN IN LEBANON

Prices in 1000 LBP

CROP	PRICE (LBP)	YIELD (KG)	REVENUE (LBP)	VARIABLE COST (LBP)	FIXED COST (LBP)	TOTAL COST (LBP)	GM (LBP)	NET INCOME (LBP)	RETURN TO LABOR (PER HOUR)	RETURN TO WATER (PER M^3)	BREAK-EVEN YIELD (KG)	BREAK-EVEN PRICE (LBP)	COST OF PRODUCTION (LBP)
Apple (Z1)	0.5	8000	4000	2101	855	2956	1899	1044	9.2	4.2	5912.000	0.370	0.370
Apple (Z6)	0.4	5000	2000	1225	384	1609	775	391	2.2	3.1	4022.500	0.322	0.322
Apple (Z7)	0.6	4000	2400	786	368	1154	1614	1246	31	4	1923.333	0.289	0.289
Avocado (Z5)	2	1000	2000	833	755	1738	1167	262	9.4	1.5	869.000	1.738	1.738
Banana (Z5)	1	3700	3700	1182	602	1784	2518	1916	33.6	2.3	1784.000	0.482	0.482
Banana Gh (Z5)	1.4	8400	11760	4612	2866	7765	7149	3995	55.3	6.1	5546.429	0.924	0.924
Carnations (Z4)	0.075	280000	21000	14749	2956	17705	6251	3295	2.2	9.6	236066.667	0.063	0.063
Carrot (Z2)	0.25	3500	875	436	185	620	440	255	7	4.4	2480.000	0.177	0.177
Citrus (Mixed) (Z5)	0.5	4620	2310	1000	800	1800	1310	510	5.4	1.3	3600.000	0.390	0.390
Citrus (Lemon) (Z5)	0.65	3600	2340	853	673	1526	1487	814	7.5	1.2	2347.692	0.424	0.424
Citrus (Orange) (Z2)	0.4	3700	1480	682	312	994	798	486	5.2	1.6	2485.000	0.269	0.269
Citrus (Orange) (Z5)	0.4	3000	1200	1012	682	1736	188	-536	1.3	0.3	4340.000	0.579	0.579
Citrus (Tangarine)	0.35	3500	1225	845	692	1536	380	-311	1.8	0.5	4388.571	0.439	0.439
Citrus (Valencia)	0.55	4500	2475	946	398	1344	1529	1131	7.9	1.9	2443.636	0.299	0.299
Citrus (Valencia)	0.6	4200	2520	729	559	1413	1792	1107	13.9	8.5	2355.000	0.336	0.336
Cucumber (Z4)	0.47	15000	7050	3513	1032	4546	3537	2504	6.5	10.3	9672.340	0.303	0.303
Cucumber (Z3)	0.5	12000	6000	5559	1982	7541	441	-1541	0.5	0.9	15082.000	0.628	0.628
Cucumber (Z2)	0.6	18000	10800	3061	880	3941	7739	6859	12	15.5	6568.333	0.219	0.219
Cucumber (Z5)	0.78	9000	7047	4403	1530	5933	2645	1114	2	9.6	7606.410	0.659	0.659
Cucumber (Z7)	0.4	25000	10000	4414	1787	6201	5586	3799	3.6	14	15502.500	0.248	0.248
Cucumber (Z6)	0.33	25000	8125	2351	1060	3601	5774	4524	12.9	7.2	10912.121	0.144	0.144
Eggplant (Z2)	0.2	7000	1400	1120	238	1358	280	42	3.7	1.1	6790.000	0.194	0.194
Gerberas (Z4)	0.1	150000	15000	11252	2948	14199	3749	801	1.9	9.4	141990.000	0.095	0.095
Gerberas (Z5)	0.09	242000	21780	7840	2413	10703	13940	11077	19	34.9	118922.222	0.044	0.044
Grapes (Z6)	0.5	1500	750	374	166	540	376	210	2.8		1080.000	0.360	0.360
Grapes (Z2)	0.25	2500	615	340	211	550	276	65	3.8		2200.000	0.220	0.220
Grapes (Z7)	0.65	1500	975	541	404	945	434	30	15.3	2.7	1453.846	0.630	0.630
Lettuce (Z6)	0.3	8000	2400	465	175	640	1935	1760	46.1	2.8	2133.333	0.080	0.080
Melon (Z6)	0.3	4000	1200	733	175	908	467	292	7	0.8	3026.667	0.227	0.227
Melon (Tunnel) (Z8)	0.5	3000	1500	558	242	800	942	700	11	1	1600.000	0.267	0.267

TABLE 3 (CNT'D). SELECTED INDICATORS OF COST AND RETURN FOR VEGETABLES AND TREE CROPS GROWN IN LEBANON

Prices in 1000 LBP

CROP	PRICE (LBP)	YIELD (KG)	REVENUE (LBP)	VARIABLE COST (LBP)	FIXED COST (LBP)	TOTAL COST (LBP)	GM (LBP)	NET INCOME (LBP)	RETURN TO LABOR (PER HOUR)	RETURN TO WATER (PER M^3)	BREAK-EVEN YIELD (KG)	BREAK-EVEN PRICE (LBP)	COST OF PRODUCTION (LBP)
Olives (Z3)	1.8	500	900	488	130	618	412	282	4		343.333	1.236	1.236
Olives (Z4)	3	700	2100	475	246	721	1625	1379	21.4		240.333	1.030	1.030
Olives (Z9)	1.5	1500	2250	525	179	704	1725	1546	34.5		469.333	0.469	0.469
Peanuts (Z2)	1	325	325	205	118	323	120	1.94	6.7	3	323.000	0.994	0.994
Pear (Z1)	0.6	1900	1140	355	110	465	785	675	21.2	19.6	775.000	0.245	0.245
Potatoes (Z2)	0.4	2500	1000	669	215	884	331	116	3.7	1.2	2210.000	0.354	0.354
Potatoes (Z6)	0.3	3000	900	738	231	969	162	-69	2.7	0.27	3230.000	0.323	0.323
Potatoes (Z7)	0.2	3400	680	656	254	911	24	-231	0.2	0.04	4555.000	0.268	0.268
Roses (Z4)	0.28	120000	33000	13627	3117	16744	19373	16256	7.9	38.8	59800.000	0.140	0.140
Roses (Z5)	0.18	125000	21875	8208	1966	10624	13667	11251	9.7	22.8	59022.222	0.085	0.085
Squash (Z2)	0.7	2700	1890	710	393	1103	1180	787	7.7	4	1575.714	0.409	0.409
Strawberries (Z4)	2.45	9200	22540	9600	1220	10819	12941	11721	6.4	9	4415.918	1.176	1.176
Sugarbeet (Z6)	0.12	8000	960	703	219	922	258	38.5	2.2	0.6	7683.333	0.115	0.115
Sugarbeet (Z7)	0.13	8000	1040	418	287	705	622	335	5	0.4	5423.077	0.088	0.088
Tobacco (Z2)	9	125	1125	629	221	850	496	275	2	2	94.444	6.800	6.800
Tobacco (Z7)	10	100	1000	503	142	645	497	355	2.3	2.5	64.500	6.450	6.450
Tobacco (Z9)	10	150	1500	645	273	918	855	582	2.4	42.8	91.800	6.120	6.120
Tomatoes Gh (Z4)	0.56	23000	12880	3646	1358	5004	9234	7876	11.6	22	8935.714	0.218	0.218
Tomatoes Gh (Z5)	0.4	18000	7200	4087	907	4994	3113	2206	3	8.9	12485.000	0.277	0.277
Tomatoes Gh (Z2)	0.6	17000	10200	3106	883	3989	7094	6211	9.2	17.8	6648.333	0.235	0.235
Tomatoes Gh (Z3)	0.5	20000	10000	4158	1862	6020	5842	3980	7.4	19.5	12040.000	0.301	0.301
Tomatoes (Z8)	0.2	8000	1600	585	169	754	1015	846	8.9	0.85	3770.000	0.094	0.094
Tomatoes (Z6)	0.3	8000	2400	1534	235	1769	866	1.36	6.3	0.87	5896.667	0.221	0.221
Watermelon (Z6)	0.2	4000	800	582	164	746	218	54	4.5	0.55	3730.000	0.187	0.187
Watermelon (Z8)	0.4	4000	1600	413	231	644	1187	956	20.5	1.32	1610.000	0.161	0.161
Wheat (Z2)	0.5	420	210										
Wheat (Straw) (Z2)	0.12	530	636										
Wheat (Total) (Z2)			846	100	116	216	746	630	93		432.000	0.514	0.514
Wheat (Z6)	0.4	400	160	91	33	124	69	36	9.2	1.7	310.000	0.310	0.310
Wheat (Z9)	0.4	550	220										
Wheat (Straw) (Z9)	0.18	500	90										
Wheat (Total) (Z9)			310	126	159	285	184	25			712.500	0.518	0.518

III. THE POLICY ANALYSIS

A. OBJECTIVES OF THE POLICY ANALYSIS

The economic potential of agriculture is not fully exploited in many developing countries. Despite the fact that technological possibilities have become increasingly more favorable, the economic environment available to farmers in these countries to make best use of this potential is still far from favorable. Until recently, the development literature gave scant attention to the effect of trade and macroeconomic policies on agricultural production and producers. One reason for this is the narrow sector specific orientation of past agricultural policy analysis; another is the widespread misconception that agriculture plays a limited role in economic development.

Development policies in most developing countries have been tilted towards supporting rapid industrialization. In their pursuit to promote domestic industries, however, many of these countries distorted price incentives against agriculture. These measures substantially diminished the positive effects of public investment policies that were intended to support agricultural research and extension, the development of rural infrastructure and the marketing of agricultural exports. As a result, the agricultural output of these countries has been lower than it would have been under a more neutral incentive structure; the real purchasing power of the rural population has declined, and many of these countries have experienced a significant demand side constraint on economic growth.

In an open economy, Price mechanism and markets play a significant role in resource allocation and production. Nevertheless, the public sector plays an equally important role in strengthening markets by: 1) providing the necessary infrastructure such as roads, irrigation systems and market places; 2) providing marketing information, research and extension; 3) enforcing macroeconomic policies that avoid high rate of inflation and overvaluation of the exchange rate; and 4) creating suitable environment for competition.

Policy is concerned with using specific interventions in the economy, called policy instruments, to change resource allocations for the purpose of achieving certain policy objectives. In order to analyze policy options, it is necessary to have a conceptual framework that helps explain how policy instruments work.

Governments use policy instruments in order to influence economic resource allocations, such as the level of crop production, the distribution of income, the earning and expenditure of foreign exchange, and the demand for goods and services. While some of these objectives can be influenced directly by government expenditure, administrative action, and legal restrictions, policies that influence price levels and the change in relative prices also have powerful effects on the way individuals, families, and firms utilize resources.

Since policy decisions are aimed at changing resource allocations in the economy, a first step in policy analysis is to have a clear understanding of the current design of policy, particularly pricing policy, and the pattern of resource utilization and productivity. Policy instruments are utilized to move the economy from one resource allocation position to another. We need to understand where we are in order to understand how to go somewhere else. This understanding involves using the conceptual framework to work out the current supply, demand, and price relationships, which are relevant to the policy problem in question. This is called a baseline policy description. This baseline description is substantially more than a series of facts about the economy. The conceptual framework enables the analyst to put together simple facts so that they tell a story about current policy impact, resource allocation, and efficiency in the economy.

In agricultural policy analysis, developing the baseline description usually involves analyzing the current economic environment of a specific commodity or commodity system. Analysis of policy options involves measuring the impact of policy instruments on policy objectives. Governments may use policy instruments to achieve many objectives. Some objectives relate to overall economic efficiency and economic growth, others reflect a concern for the distribution of consumption and production resources, still others derive from the fact that government cannot spend limitlessly and needs to be supported by taxes and other sources of revenue. Given the scarcity of resources in the economy, policy instruments aimed at achieving one objective often draw resources away from other objectives. The art of designing policy involves recognizing these trade-offs and finding the most efficient and politically feasible way of accommodating them. It is helpful to think about this problem in terms of a matrix of policy objectives and a

corresponding set of production and consumption activities, which translate scarce resources into outputs having impact, both positive and negative, on these objectives.

Agricultural pricing policy usually deals with specific, direct interventions in agricultural markets, such as tax on commodity exports, restrictions on input marketing, or a producer or consumer subsidy. Recent analysis from many countries shows, however, that macroeconomic policies often have a greater impact on agricultural sector resources than the more direct market interventions, which are normally associated with pricing policy. Both the influence of the exchange rate policy on import and export prices and that of the aggregate demand on the relative price levels of tradable and non-tradable commodities in the economy have important ramifications for the agriculture sector. Framer and consumer choices about which crops to produce or foods to consume are usually not made in isolation from the economic terms associated with other commodities that are close substitutes or complements in production and consumption. A price policy that encourages the production of one commodity may accomplish its objective by drawing resources away from the production of a close substitute commodity. In other words, to understand the market for one commodity requires an understanding of the market for close substitute and complement commodities.

Analysts are often called upon to review conditions, problems, and progress in the overall food and agricultural sector. Policy-making is often done by fragmented bureaucracies that making uncoordinated decisions. These decisions usually reflect a narrow commodity or issue focus. Over time, economic conditions change and policies that earlier were effective in a particular way may now have undesirable consequences and unintended spill over effects. In this context an agricultural sector analysis provides an opportunity to review the economic conditions of the sector and call attention to emerging issues.

In a nutshell, a policy may be characterized as consisting of a set of objectives, instruments for achieving those objectives, and rules for operating the instruments. The rules of policy determine precisely how, where and when an instrument functions, and they could control the impact of the instrument.

Agricultural policy extensively employs instruments that intervene in markets through subsidies, taxes or quantitative controls. Such instruments typically affect many parameters of the market, not only those that are the focus of policy objectives. The theory of markets combined with welfare economics provides a valuable framework within which the major effects of agricultural policies can be evaluated. Among the effects that can be measured are the welfare losses and gains arising from policy. In empirical policy analysis the effects of many instruments can be analyzed simultaneously by means of a mathematical model of the relevant agricultural system and markets.

Because of the weighing scheme adopted whereby a dollar gained by one party is assumed to be exactly cancelled by a dollar lost by another party, all market intervention policies are shown as resulting in net welfare losses to society. Giving higher weights to dollars gained than to dollars lost could reverse this result, but economists cannot impose decisions about such weights, they are the matter of politics. Economic analysis directs policy maker's attention to effects of policy, which might otherwise be overlooked, and facilitates attempts to quantify these.

Farm-household and micro level commodity models making use of partial equilibrium techniques play a sizeable role in the agricultural policy analysis as well as that of agricultural policy decisions of developing countries at large. For instance, the majority of developing countries utilize simple commodity budgets in marketing boards and agricultural ministries to develop recommendations for setting output and input prices. Such techniques normally provide the background against which planners evaluate the consistency of farmer incentives and production targets. They are also important in judging the extent to which prices are sufficient to meet political or socially determined income objectives.

In addition to being computationally simple, budgeting techniques are also popular because their data requirements are modest. Computations are usually based on averages taken from readily available sources such as cost and return surveys or estimates made by extension agents and other knowledgeable agriculturists.

In recent years analysts in some developing countries have begun to supplement their private profitability calculations with estimates of the impact of government policies on commodity prices. The initial focus has been on the degree to which output prices differ from prices established in international markets, specifically on the extent of "nominal protection". The more comprehensive studies have sought to establish how the domestic prices of traded inputs differ from world market prices, a calculation that, when combined with nominal protection rates, leads to an estimate of a commodity's "effective protection".

Partial equilibrium techniques are also being used more frequently to investigate comparative advantage. Once domestic currency equivalents for international prices have been established, that is export and import parity prices have been computed, calculation of the so-called "domestic resource cost" coefficient is relatively straightforward. Shadow prices for domestic resource costs (land, labor and capital) are sometimes difficult to obtain. But when estimates of these costs are less than the value added by the commodity at international prices the analyst can recommend that expanding its production would improve the efficiency of the agricultural sector.

The partial equilibrium analyses of policy intervention described above are popular because they mirror the customary financial calculations. The major revisions required are the substitution of world market prices for domestic prices and the evaluation of domestic resources such as land, labor and capital at their opportunity cost to the economy. The required arithmetic is conceptually sophisticated, but the actual computations are relatively easy and can be implemented by analysts with a minimum of modeling background. Moreover, officials in charge of setting prices and making investment choices usually find the comparison of private and social prices at the commodity level easy to understand. In part, this is because the arithmetic is easy to grasp. But the use of familiar commodity budgets also provides a way for policy makers with a substantive background in agriculture to use their intuitions in evaluating results. Partial equilibrium micro level methods are also widely used because they are consistent with a policy setting process that emphasizes individual commodities.

The limitations of partial methods based on budgeting techniques are well known. While much valuable information can be gained about the transfer effects of government intervention on individual output and input markets by looking at international prices, when budgets are standardized on a single unit of the resource uniquely fixed to the agricultural sector, it is difficult to say much about the likely response to government policy reforms. The assumption that widespread markets exist for non-traded services such as animal power, machine power and family labor is also problematic. Nevertheless, in situations requiring quick and meaningful policy recommendations when only minimum amounts of data available, the partial budgeting methods described are an important part of the policy analyst's toolkit.

Policies are the instruments of action that governments employ to affect change. Three types of policies, among other things could be identified:

- Agricultural price policy represented by quotas, tariffs or subsidies on exports and imports, that is trade policy and domestic taxes and subsidies that create transfers between producers, consumers and the government treasury;

- Macroeconomic fiscal (taxes and expenditures), monetary (money supply) and exchange rate policies; and

- Public investment policies (agricultural research, infrastructure, extension, credit, etc.).

Policy makers enact policies (prices, macro or investment) to further government objectives (efficiency, equity, or food security) in the face of economic constraints (supply, demand and world prices). Policy analysis consists of evaluating prices, macro, or investment policy instruments by quantifying the constraints and by estimating the likely impact of policy on objectives. Analysts can thus identify tradeoffs between objectives and attempt to measure their magnitudes. Policy makers can then better exercise their value judgments about what is desirable policy.

An attempt was made to assess and evaluate the impact of development policies and the incentive structures under which agriculture is practiced. Crop budgets prepared by ESCWA were used to build several accounting matrices known as Policy Analysis Matrix (PAM). These matrices were designed to assist in understanding the interactions of many policies that influence agricultural incentives and help illuminate the tradeoffs (if any) between policy objectives and the consequences of market failures and policies used to correct for them.

To compare the return of perennial crops (tree crops) with annual crops, the cost and return streams of cash flow should first be discounted (to find their present value) and then annualized. The rate of discount is of major importance in determining the present value of a stream of future benefits and cost from an investment venture. Discount rates of 12 percent and 6 percent are typically used for the calculation of the present values in private budgets and social budgets, respectively. This discounting, however, was used for Jordan, but annual tree crops were treated as if they were the steady-state output of trees for Lebanon and Palestine. In what follows, an attempt is made to exemplify on how the features of spreadsheets can be used to analyze agricultural policy and to identify and clarify policy options for decision makers. The exposition is based on the Policy Analysis Matrix, in short known as the PAM. The PAM provides a concise statement, not only of the impact of agricultural policy, but of the sources of policy-induced distortions as well.

B. Constructing a Policy Analysis Matrix (PAM)

1. *Empirical Model*

The methodology for a solid agricultural policy analysis framework must first be rigorous and second practical. The first requirement prescribes that it be firmly grounded in the economic theory, and the second that it should reflect the realities of data availability and computational skills of analysts in developing countries. The design of a policy analysis matrix (PAM) –an accounting matrix- for the assessment of each agricultural commodity system is the right solution for meeting the above requirements. In it, data compiled from budgets that reflect farming enterprises; farm-to-processor marketing; processing; and processor-to-wholesale transportation, are organized in such a way that a comprehensive picture of the policy environment emerges.

The policy analysis matrix (PAM) is a product of two accounting identities, one defining profitability as the difference between revenues and costs, and the other measuring the effects of divergences (distorting policies and market failures) as the difference between observed parameters and parameter levels that might exist if the divergences were removed. By preparing a policy analysis matrix for an agricultural system, an analyst can simultaneously measure both the extent of the transfers occasioned by the entire set of policies acting on the system and the degree of economic efficiency of the system.

The policy analysis matrix essentially focuses on the concept of profit. Profit is basically defined as the difference between the value of output (revenues) and the costs of all input (costs).

TABLE 4. THE POLICY ANALYSIS MATRIX

Item	Revenues	Costs of		Profits
		Tradable Inputs	Domestic Factors	
Private Prices	A	B	C	D
Social Prices	E	F	G	H
Effects of Policy and other Divergences	I	J	K	L

The symbols (capital letters) are defined as follows:

A Revenue in private prices (prevailing market prices, also called financial prices).
B Costs of tradable inputs (such as fertilizers, seeds, plastic mulch, etc.) in private prices.
C Costs of domestic factors (such as labor, capital, etc.) in private prices.
D Private profit.
E Revenues in social prices, also called economic or efficiency prices.
F Costs of tradable inputs (such as fertilizers, seeds, plastic mulch, etc.) in social prices.
G Costs of domestic factors such as (labor, capital, etc.) in social prices.
H Social profits.

** Private Profits (D) D= A-B-C
** Social Profits (H) H= E-F-G
** Output Transfers (I) I= A-E
** Input Transfers (J) J= B-F
** Factor Transfers (K) K= C-G
** Net Transfers (L) L= D-H or L= I-J-K

Table 4, shows the PAM model. Private profits are defined in the first row as D=A-B-C. The letter A is used to define the private revenues (the revenues at the prevailing market prices). Costs are divided into two components. Costs of tradable input (inputs which are traded in the world markets) such as fertilizers, pesticides, and seeds are included in the second column. In the first row, second column, the value of tradable inputs at the prevailing market prices (private prices) are recorded and denoted by the letter B. Tradable inputs can be imported from or exported to other countries.

The third column of the matrix includes domestic factors, the second component of costs. Costs of domestic factor in private prices are denoted by the letter C. Domestic factors such as land, water, labor, and capital are also called non-tradable inputs because there is no international market for these inputs.

Column four in the matrix is labeled as profits. Private profits, denoted as D in the matrix, are included in the first row of the fourth column. Profits are defined as revenues minus costs. Positive profits at prevailing market prices confirm the profitability of the business. Positive profits also provide stimulus for existing firms to increase output and expand the business. Expansion of existing firms as well as entry of new firms in the market stimulates economic growth. When the market prices of inputs or outputs are distorted by taxes or subsidies, then private profits alone could provide misleading signals.

The second row of the PAM is used to calculate social profits, H=(E-F-G). Social profits are those profits calculated at efficiency prices. The letter E portrays the revenues valued at efficiency prices (social prices) and F and G indicate the efficiency values of tradable inputs and domestic factors, respectively. Positive social profits (H) indicate incentive for expansion of the activities under consideration and result in apparent growth of national income.

The third row of the matrix shows the divergences or differences between the first row (private valuation) and second row (social valuation). If market failure does not exist, then distorting policies cause all divergences between private and social prices of tradable outputs and inputs. Policies that may cause divergences include subsidies, taxes and quantitative controls applied to domestic production or trade of the commodity. Price policies may also cause distortions.

In the third row, if the value of I, defined as output transfer, is positive then private revenues exceed social revenues. This indicates that the Government is subsidizing output prices. That is, the Government is purchasing production in prices greater than international market prices. The value of the difference is a transfer from the treasury to the producers of that commodity. If the value of I is negative, then social revenues are greater than the private revenues. This means that the Government is taxing producers. In other words, the Government is purchasing production in prices lower than those prevailing in international markets. The tax in this case is a transfer from producers to the treasury.

The letter J represents the differences between the private costs and social costs of tradable inputs. If J is negative, the private costs of tradable inputs are lower than the social costs. This means that the Government is subsidizing the costs of inputs, as these inputs are sold at prices lower than those prevailing in the international markets. On the other hand, if J is positive, then private cost of inputs are greater than the social costs. This indicates that the Government is taxing the price of inputs used by farmers. The net effect is that prices paid by farmers are greater than the world market prices.

The letter K portrays the divergences in domestic factors. The Government can affect the prices of domestic factors such as capital or land. When any factor of production is subsidized, the private cost of a domestic factor will be less than the social costs and K will have a negative value. But, if the Government taxes domestic factors, which rarely is the case in developing countries, K will have a positive value.

Commodity-specific policies on taxes and subsidies directly affect the prices of outputs or inputs. Governments may use indirect policies such as the manipulation of the exchange rate of the country's currency to affect commodity prices. Since in PAM, accounting is done in domestic currency and world prices are reported in international currencies, hence an exchange rate is required to express international prices in their domestic equivalents.

The effect of exchange rate manipulation depends upon whether the policy results in over or under valuation. An overvalued exchange rate occurs if there is an excess demand for foreign currencies, which results in extra foreign borrowing, excessive drawing down of exchange reserves, or rationing of foreign exchange among domestic users. "An undervalued exchange rate reflects an excess supply of foreign exchange that is accumulating as excessive reserves and reducing potential income"[1]. An overvalued exchange rate inflicts an implicit tax on producers of tradable exportable goods. Overvaluation reduces the competitiveness of the local producers in international markets because they are practically being taxed. Undervalued exchange rate exerts the opposite effects.

The official exchange rate may differ from the social exchange rate. In the PAM approach, this distortion in the exchange rate is actually corrected once border prices are converted to domestic prices at the social exchange rate rather than at the official rate.

1. Eric A. Monke and Scott R. Pearson, The Policy Analysis Matrix for Agricultural Development, Cornell University Press (Ithaca, New York, U.S.A., 1989), p. 24.

The letter L denotes the net effect of all policies on the commodity system. If the overall effect of all policies on input and output prices is in favor of the producers (in the short run), L will have a positive value. Alternatively, L will have a negative value, if the policies work to the detriment of the producers.

2. Measures of protection

Standard ratios reflecting the degree of price distortions are normally calculated to compare profitability and efficiency of different crops. These ratios facilitate comparisons among activities, particularly when the production process and outputs are dissimilar. The ratios can also be used to rank alternatives according to different policy objectives. A number of protection coefficients could be calculated in a standard PAM. The most commonly used protection coefficients are Nominal Protection Coefficients (NPC) and Effective Protection Coefficient (EPC).

The objective of calculating NPC is to measure the actual divergences or distortions between domestic prices and international or border prices of output[2]. The NPC is calculated by dividing the revenue in private prices (A) by the revenue in social prices (E). If NPC is less than one it confirms the presence of taxes on outputs. An NPC greater than one shows the presence of subsidies. An NPC equal to one (in the absence of market failures) reveals the absence of intervention, a property desired by most international donor agencies.

The EPC is another measure of incentives to farmers[3]. It is defined as the ratio of value added in private prices (A-B) to value added in social prices (E-F). This coefficient indicates the combined effects of policies on tradable commodities (inputs and outputs). The EPC is a useful indicator that measures the whole structure of incentives/disincentives which may exist with respect to a given production process. An EPC less than one indicate negative effects of policy (a tax), whereas an EPC greater than one indicates positive effects of policy (a subsidy).

The Profitability Coefficient (PC) measures the incentive effects of all policies affecting the production of the selected products. The PC can be used as a proxy for the net policy transfer (L). However, its use is limited when either private or social profits are negative.

The Private Cost Ratio (PCR) explains the ratio of domestic factor costs (C) to value added in private prices (A-B). This ratio demonstrates the ability of the production system to cover the cost of the domestic factors and continue to be competitive. This ratio is important for investors because they can maximize their profits by minimizing the cost of tradable inputs and factors.

3. Measures of comparative advantage

Comparative advantage could be measured by the Domestic Resource Cost (DRC) ratio. DRC determines whether the production of a specific crop makes efficient use of the domestic resources. The same set of data used to estimate the protection coefficients could also be utilized to estimate the comparative advantage of a specific crop in a particular region.

The DRC, as a measure of efficiency or comparative advantage, is calculated by dividing the factor cost in social prices (G) by the value added in social prices (E-F)[4]. A DRC greater than one indicates that the cost of domestic resources used to produce the commodity is greater than the contribution of its value added at social prices meaning a comparative disadvantage. A DRC less than one indicates that the country has a comparative advantage in producing that commodity, or that the commodity is making efficient use of the domestic resources.

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2. Food and Agriculture Organisation of the United Nations, "Comparative Advantage of Agricultural Production Systems and its Policy Implications in Pakistan", FAO Economic and Social Development Paper (68), (Rome, 1987), p. 2.

3. R. Naylor and C. Gotsch, "Agricultural Policy Analysis Course-Computer Exercises", Food Research Institute, Stanford University, Palo Alto, CA, USA (July 1989).

4. R. Naylor and C. Gotsch, "Agricultural Policy Analysis Course-Computer Exercises", Food Research Institute, Stanford University, Palo Alto, CA, USA (July 1989).

4. Modeling assumptions

(a) Selection of commodity systems

Major crops produced in Egypt, Jordan, Lebanon, Syria and the Palestinian Territories were selected for the policy analysis. The main objective of constructing the Policy Analysis Matrix (PAM) for these crops was to estimate indicators of policy incentives, efficiencies, and profitability.

(b) Social valuation of tradables and non-tradables

A major task in the construction process of the Policy Analysis Matrix (PAM) is the social valuation of outputs and inputs. Social prices in the PAM are also referred to as efficiency prices. Social or efficiency prices demonstrate the opportunity costs of consumption. World prices of inputs and outputs are the cornerstone for estimating the efficiency prices.

The social prices can be calculated by adjusting the international market prices for exchange rate, insurance, handling, losses, domestic marketing and transport costs to the farm level. Different assumptions could be used for adjusting the prices of different inputs and outputs.

The tradable products should be identified before performing the social valuation. The products then can be classified into exportable and importable categories. Exportables are local products that could be exported. Importables are imported or locally produced import substitutes. Other importables include seeds, machinery, chemicals, and fertilizers. Non-tradables include land, water, domestic transportation, fixed capital, and labor.

(c) *Equilibrium exchange rate*

Equilibrium exchange rate is an essential component of deriving efficiency prices for tradable commodities. It could be derived by several approaches. There are five major approaches to determining the future market value of an exchange rate. These approaches range from the simple and often wrong approach predicated on the random walk hypothesis to the more sophisticated intermediate-term model-based equilibrium exchange rate. These approaches have had a mixed predictive power, but some have done better than others.[5]

First, there is the Random Walk Hypothesis, which states that the probability of a rise in the exchange rate is equal to the probability of a fall. In general this theory suggests that the exchange rate today is a good predictor of its future value.

Second, is an approach that begins by assuming financial markets to be efficient. Any difference in rates of returns on similar assets in different markets will be eliminated. Suppose there exists a safe dollar-denominated bond that pays 10% a year, and a similarly safe Yen-denominated bond pays 5% a year. The market will ensure that the dollar (Yen) returns on both bonds will be the same. If not, the interest rate on the bond, which is expected to earn less, after allowing for changes in the exchange rates, would rise to compensate. Implicitly, then the market would expect the dollar to depreciate against the Yen by 5% a year—sufficient to equalize the total returns. This is the same as suggesting that the exchange rates will change to achieve Uncovered Interest Parity (UIP).

Third, is an approach that calculates the exchange rate that will allow the balance of payment to stay in equilibrium. The exchange rate that produces equilibrium in the balance of payment (or forces the excess demand for foreign exchange to zero) is known as the Fundamental Equilibrium Exchange Rate (FEER).

Fourth, is an approach that suggests that exchange rates move in such a way as to equalize prices in different currency areas. This approach targets the establishment of parity in purchasing power (PPP) rather

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5. P. Krugman and M. Obstfeld, "*International Economics: Theory and Policy*", (New York: Addison-Wesley), PP. 331-367. 1995

than in the returns on financial assets. One may expect this to work in the long run but cannot be used to determine exchange rates over a short or medium term period.

Fifth, a new approach has emerged that combines the UIP and FEER approaches. The new approach suggests that exchange rates changes are governed by interest rate differentials plus a risk premium. The latter is influenced by variables that FEER proponents use in their models. The intermediate-term model-based equilibrium exchange rate (ITMEER) approach can generate exchange rate predictions that are not significantly different from those of the UIP and FEER when those are special cases.

EQUATION 1 EQUILIBRIUM EXCHANGE RATE (EER) CALCULATION

$$SCF = \frac{EXPORTS + IMPORTS}{EXPORTS + IMPORTS + TAXES + DUTIES}$$

$$EER = \frac{1}{SCF} * OER$$

Where:

EER	=	Equilibrium Exchange Rate;
SCF	=	Standard Conversion Factor; and
OER	=	Official Exchange Rate.

The study prediction of the equilibrium exchange rate for Lebanon was a synthetic prediction that calculated the FEER and confirmed it with an UIP calculation. The equilibrium exchange rate was estimated by running regression equations for the import and export functions with respect to the exchange rate. The equilibrium rate was considered as the one that equates the two functions. It may be claimed that the equilibrium exchange rate should be determined from the entire balance of payments account. However, this would bias the exchange rate towards the capital account. We were more interested in an exchange rate that would balance the trade account.[6] For Egypt, Jordan and Syria, the studies used the Standard Conversion Facto (SCF) method to derive equilibrium exchange rates, as per equation 1.

(d) Social prices of tradables

Farm gate level social prices of importables (and import substitute) commodities were derived by using the import parity prices, as per equation 2. Farm gate level social prices of exportable commodities were derived by using the export parity prices, as per equation 3.

Farm gate level social prices of some fertilizers, chemicals and seeds on the other hand, were derived differently. In this context, the farm gate level private prices in local currencies for those items were first converted into US$ by the official exchange rate. Then, those US$ prices were reconverted by the equilibrium exchange rate in local currencies. After this process, tariffs and other tax related changes were deducted to arrive at farm gate level social prices for the said categories. The farm gate level social prices for machinery were also adjusted for the exchange rate differential.

6. The export regression equation is as follows: 2332 – 0.997476 ER. With an R^2 of 0.68 and the import regression equation 46315 – 24.86825 ER with an R^2 of 0.844. Solving for ER (exchange rate) we got 1,842.5 LB per Dollar.

EQUATION 2. IMPORT PARITY PRICE

Where:

IPP	=	Import Parity Price;
OPP_{cif}	=	Observed Port of Entry Price;
EER	=	Equilibrium Exchange Rate
HCP	=	Handling Costs at Port of Entry;
TCBM	=	Transport Cost from Border to Market;.
MC	=	Marketing Costs;
TCFM	=	Transport Costs from Farm to Market, and
TPC	=	Total Processing Cost at the Factory.

EQUATION 3. EXPORT PARITY PRICE

Where:

EPP	=	Export Parity Price;
OPP_{fob}	=	Observed Port of Entry Price;
EER	=	Equilibrium Exchange Rate
HCP	=	Handling Costs at Port of Entry;
TCBM	=	Transport Cost from Border to Market;.
MC	=	Marketing Costs;
TPC	=	Total Processing Cost at the Factory, and
TCFM	=	Transport Costs from Farm to Market.

(e) Social prices of non-tradables

Domestic factors not traded internationally are referred to as "non-tradable inputs", meaning that there are no international prices for these factors. The social prices of domestic factors such as land, water, capital, and labor, are determined in the domestic economy of the country.

Various approaches may be used to estimate the social prices of these resources. One approach is to use the outputs of a general equilibrium model, as estimates for the social prices of domestic factors. However, a general equilibrium model was not available for most countries, thus, alternative approaches were used to estimate the social prices of each factor.

(i) *Social (Shadow) Price of Water*

Can we put a price tag on water? We can at least consider the replacement cost or its marginal cost of production and delivery. This cost is free of any subsidies or delivery costs. It simply measures the average shadow price in an area that is relatively endowed with water.

Typically the profit-maximizing farmer employs more of an input as long as its marginal value is greater than its cost. The farmer's demand for water is derived from the value of its use in crop production (value of marginal physical product, which is the marginal physical product multiplied by the output price). Two basic methodologies are used in estimating water values. These include crop water production function analyses and farm crop budget analyses.[7] Both make heavy use of linear programming techniques.

The relationship between inputs and outputs of crop production can be expressed mathematically as the crop production function. If all other inputs are held constant, the marginal physical productivity of water for each acre-inch of water used on the crop can be calculated. The marginal value of each acre-inch is the marginal product times the crop price. This procedure relies on the assumption that applications of different

7. Diana. C. Gibbons, *"The Economic Value of Water"*, (Washington, D.C.: Resources for the Future). 1986

amounts of water require the same labor, fertilizer and other non-water input costs. Most crop-water production functions are determined from data collected during controlled experiments, where plots of crops are grown with water as the only variable input. Crop water production functions have also been estimated from aggregate farm data. However, these functions have not been crop specific, and in addition suffer from statistical problems arising from interrelationships among the variables.

In most places and for most crops, the actual physical productivity of water is not known. Nonetheless, representative farm crop budgets can be used to estimate the maximum revenue share of the water input, thus bypassing the need for a physical productivity measure. The total crop revenue less non-water input costs are a residual, the maximum amount the farmer could pay for water and still cover costs of production. This value, divided by the total quantity of water used on the crop, determines a maximum average value, or willingness to pay for water for that crop. An alternative way will use Linear Programming analysis from representative farms to determine irrigation water values. For the calculation of water values in irrigation, the LP objective function is to maximize net returns for a farm of specified acreage, subject to the constraints that may be economic, technological, financial or physical. Average water values by crop are estimated by deriving a series of LP solutions for a range of water costs, all other constraints on the representative farm remaining static. The set of solutions is a water demand schedule for the farm. The best alternative use method was used in most cases to derive efficiency or social prices for water.

(ii) *Capital*

The market interest rates adjusted for distortions, if any, and inflation rates were considered to represent the real interest rates for countries concerned and were therefore used for social valuation of capital.

(iii) *Labor and Land*

The market prices of land and labor when considered to reflect opportunity costs were therefore taken for deriving social prices of land and labor in most countries. Land rents, and labor wages actually reflect market forces and competing alternatives. However, when this was not so, we resorted to the best alternative use approach to derive efficiency or social prices of land and labor.

IV. A COMPARATIVE ANALYSIS OF AGRICULTURE POLICIES IN FIVE ESCWA MEMBER COUNTRIES

An attempt is made in this part to focus the analysis on the impact of public policies such as input and output prices, factor prices, credit and that of the exchange rate on the competitiveness and efficiency of selected crops grown in Egypt, Jordan, Lebanon, Syria and the Palestinian Territories. The evaluation of these policies among other things, is made possible via the construction of detailed crop activity or enterprise budgets at both private and social prices and that of policy analysis matrices. Coefficients of protection and comparative advantage were also calculated from the matrices in order to determine the levels of policy distortions or divergences and that of the efficiency with which the selected crops are produced in these countries.

The information on indicators obtained through this process, as expected, provides relevant insight to policy makers in the design of future price and trade policies, as it correctly reveal the extent of price distortions in agriculture and shed the light on the comparative advantage of each selected crop as well as the efficiency of resource use.

On the onset, prior to deriving any policy options, it must be emphasized here that the countries under review have commenced on a number of policy reforms and measures to liberalize the pricing systems and trading regimes. Particularly, the agriculture sector in most of the countries has entered a period of transition with action on some policy measures having been completed and some initiated, whereas others in the process of initiation. Most of the reforms are aimed at improving efficiency, sustainability and market led agricultural development. Two of the countries under review have already been qualified for joining the World Trade Organization (WTO).

The reform process is an ongoing endeavor and many of the changes introduced thusfar may not be captured by one try analysis because of the time lag in the production process of the agricultural produce the outcome of which will take a longer time to materialize. As such, the analysis and important findings in this part just represent an exercise of a base case scenario and the consequences of the changes introduced by the reform process and their monitoring and evaluation at regular intervals should be analyzed by other periodic studies. Besides, the studies under review for the five countries alluded to earlier were conducted in different time frames and thus in this context, the comparative analysis reported henceforth is not that robust. Our focus henceforward is on the development of agriculture on a sustainable basis by encouraging countries to pursue policy options that will enhance efficiency and sustainable use of resources as well as improve agricultural productivity through the adoption of improved technologies.

However, it has to be emphasized that despite the limitations of the data that cannot be used for vigorous comparative analysis due to the reason referred to earlier, the findings for each individual country at a time were sound and relevant for determining the base case scenarios. Hence, hereafter an attempt is made to reflect on the application of the policy analysis matrices (PAMs) in the case of the five countries and to restrict the elaboration to the interpretations of the most commonly used protection coefficients such as the Nominal Protection Coefficient (NPC) and the Effective Protection Coefficient (EPC) and then to elaborate on the derivation of the Domestic Resource Cost (DRC) which measures comparative advantage.

Economic protection the degree to which domestic prices are sustained above the world market prices is a subject close to the heart of many discussions concerning agricultural policy. At least some agricultural commodity prices deviate from international levels in all countries developed and developing alike. Protection can be positive reflecting incentive to farmers or else it can be negative, to the detriment of farmers.

In policy debates, the general presumption is that high positive protection is prejudicial to economic welfare in the long run. It penalizes the country's consumers (in the short run as well) through higher commodity prices; it distorts the allocation of resources away from more efficient patterns that could be achieved through greater reliance on the mechanism of international trade; and it diminishes economic welfare in other countries as well through reducing the opportunities to participate in international trade. There also is a presumption that uneven rates of protection across products are inimical to the attainment of maximal economic efficiency, for they also affect the pattern of resource allocation.

These concerns are equally relevant to agricultural policy analysis, but there are other concerns as well. First, as stated earlier protection rates can be negative, with unfortunate consequences for farm income and for incentives to adopt improved techniques of production. Second, the presence of macroeconomic distortions in the economy (overvalued exchange rates, protection to the industrial sector, etc.) can impose an implicit tax on agriculture, and in the absence of economic reform policy makers may wish to maintain modest rates of protection in agriculture as a compensating measure. Third, there is growing recognition of the influence on international markets of agricultural subsidies in industrialized nations and consequently arguments for compensatory protection on the part of developing countries are gaining acceptance. For these reasons, the optimal or desirable rate of protection is not always immediately obvious, but it is clear that protection that is excessively high, strongly negative, or shapely uneven over products has negative net economic effects.

Thus it is hard to exaggerate the usefulness of measures of economic protection for obtaining an economic overview of agriculture and assessing its performance. Three of the most basic tools of analysis for starting a review of the supply side of the sector's performance are a production index, an index of real farm gate prices, and a set of protection coefficients.

Protection coefficients are important analytical tools for monitoring the performance of the sector over time. Protection rates can vary substantially in short periods of time, mainly, because they are measured against international prices that vary considerably from year to year. Thus the same domestic price can be highly protectionist one year and negatively protectionist the next.

The simplest measure of protection, the Nominal Protection Coefficient (NPC) is a ratio that involves a comparison of a product's domestic prices with its international counterpart after converting to common currency units via the exchange rate.

The combined effects of incentives/disincentives on prices of tradable inputs and outputs could be measured directly or accounted for by the Effective Protection Coefficient (EPC). In concept, it is the ratio of value added (in producing the given output), computed at prevailing farm gate prices to that same value added computed at comparable international or border prices. By international prices are meant equilibrium prices, without any element of subsidy or tax, explicit or implicit.

Nevertheless, NPCs and EPCs normally do not reveal much about the comparative advantage of domestic products in international markets, for a high rate of protection does not necessarily mean that producers would not still produce at a lower or negative rate of protection. However, a high rate of protection is incompatible when competing against imports or entering export markets and protection in some cases simply conceals an ability to compete. To make a proper assessment of comparative advantage, it is necessary to distinguish between costs and economic rents, or excess profits. This can be done by estimate of cost based coefficients of competitiveness such as the Domestic Resource Cost Coefficients or DRC.

The ability of an agricultural system to compete without distorting policies could be strengthened or eroded by changes in economic conditions. The protection coefficients such as NPCs and EPCs are measures of relative incentives, which have some implications for efficiency. Coefficients of comparative advantage (DRCs) on the other hand are measures of relative efficiency, which have implications for incentives. As such, the information content of coefficients of protection and that of coefficients of comparative advantage is complementary, because policy making combines consideration of both. Thus, efficient production of tradable goods-export and import substitution-is an important policy consideration for planning and investment purposes. An economy has said to have a comparative advantage in the production of a tradable commodity if that production is efficient; if not, it has a comparative disadvantage. The DRC coefficients specifically measure comparative advantage.

Information on the indicators of protection such as NPCs and EPCs as well as the DRCs derived from the policy analysis matrices for selected crops related to the five countries is depicted in tables 5, 6 and 7. In what follows, a comparative analysis by crop is conducted in order to highlight the current status of agriculture with regards to the incentive structures and the efficiency of resource use in the countries concerned.

A. CEREALS AND PULSES

Wheat is produced in both irrigated and rainfed areas of the countries under review. Syrian Arab Republic is close to self-sufficiency and imports small amounts of wheat. On the other hand, Egypt, Jordan, Lebanon and the Palestinian Territories import large quantities of wheat. Large quantities of barley, maize and rice are also imported by most of the countries under review. However, most of these countries are close to self-sufficieny in the production of pulses.

All countries but Egypt support the production of most cereals by high levels of subsidies with the exception of maize. The fact is discernable from the coefficients of nominal protection (NPC) and that of effective protection (EPC) depicted in tables 5 and 6.

TABLE 5. NOMINAL PROTECTION COEFFICIENT (NPC) CALCULATED FOR SELECTED CROPS IN EGYPT, JORDAN, LEBANON, SYRIA AND THE PALESTINIAN TERRITORIES

CROPS	EGYPT	JORDAN	LEBANON	SYRIA	PALESTINIAN TERRITORIES
Wheat	0.80	1.08	1.25	1.29	_
Barley	_	1.01	_	1.04	_
Maize	0.85	_	_	0.70	_
Rice	0.81	_	_	_	_
Cotton	1.06	_	_	1.03	_
Sugarbeet	_	_	1.21	1.73	_
Tobacco	_	_	1.54	_	_
Potatoes	0.91	0.98	0.75	_	0.91
Pulses	0.72	0.53	_	0.84	0.91
Cucumbers	_	0.68	0.60	_	0.91
Eggplants	_	0.51	0.30	_	0.91
Tomatoes	_	0.53	0.96	_	0.91
Bananas	_	0.93	0.94	_	0.91
Grapes	_	0.98	0.45	_	0.91
Apples	_	_	0.54	_	_
Citrus	_	0.92	0.55	_	0.91
Watermelon	_	0.98	0.57	_	_
Olives	_	1.09	1.00	_	_

TABLE 6. EFFECTIVE PROTECTION COEFFICIENT (EPC) CALCULATED FOR SELECTED CROPS IN EGYPT, JORDAN, LEBANON, SYRIA AND THE PALESTINIAN TERRITORIES

CROPS	EGYPT	JORDAN	LEBANON	SYRIA	PALESTINIAN TERRITORIES
Wheat	0.79	1.59	1.51	1.99	_
Barley	_	1.14	_	1.57	_
Maize	0.88	_		0.44	_
Rice	0.79	_	_	_	_
Cotton	1.09	_		0.96	_
Sugarbeet	_	_	1.46	2.95	_
Tobacco	_	_	1.67	_	_
Potatoes	0.88	1.47	0.62	_	0.87
Pulses	0.69	0.48	_	0.99	0.89
Cucumbers	_	0.63	0.52	_	0.88
Eggplants	_	0.43	0.18	_	0.83
Tomatoes	_	0.49	0.95	_	0.89
Bananas	_	0.91	0.94	_	0.88
Grapes	_	0.99	0.40	_	0.70
Apples	_	_	0.48	_	_
Citrus	_	0.98	0.53	_	0.83
Watermelon	_	1.15	0.55	_	_
Olives	_	1.13	1.02	_	_

The production of cereals backed by high levels of protection is generating sizeable profits for farmers. This assertion is true even in the absence of protection.

Overall, the profitability of cereals is maintained by remunerative output prices along with affordable input prices, encouraged by government policies aiming at the expansion of cereal production. Wheat production significantly benefits from high positive protection. Barley production also enjoys significant protection. Maize, produced largely in Egypt and the Syrian Arab Republic, receives negative protection. The same applies to the production of rice in Egypt. Similarly, the production of pulses is negatively protected in almost all the countries under review.

When the situation in the absence of policy intervention is reviewed, still most of the major cereals grown in the countries under review, with the exception of Jordan and Lebanon, are still efficiently produced in most countries and generate significant profits for farming communities. This fact is further confirmed by the analysis of the coefficients of Domestic Resources Costs or DRCs that measure comparative advantage, calculated and depicted in table 7.

TABLE 7. DOMESTIC RESOURCE COST (DRC) CALCULATED FOR SELECTED CROPS IN EGYPT, JORDAN, LEBANON, SYRIA AND THE PALESTINIAN TERRITORIES

CROPS	EGYPT	JORDAN	LEBANON	SYRIA	PALESTINIAN TERRITORIES
Wheat	0.52	1.26	1.20	0.17	_
Barley	_	1.07	_	0.24	_
Maize	0.78	_	_	0.81	_
Rice	0.61	_	_	_	_
Cotton	0.55	_	_	0.65	_
Sugarbeet	_	_	0.95	1.87	_
Tobacco	_	_	0.87	_	_
Potatoes	0.71	1.08	0.47	_	0.25
Pulses	0.50	0.17	_	0.32	0.22
Cucumbers	_	0.13	0.22	_	0.30
Eggplants	_	0.23	0.11	_	0.59
Tomatoes	_	0.12	0.27	_	0.26
Bananas	_	0.79	0.32	_	0.12
Grapes	_	0.48	0.25	_	0.50
Apples	_	_	0.33	_	_
Citrus	_	0.48	0.29	_	0.52
Watermelon	_	0.45	0.25	_	_
Olives	_	0.70	0.60	_	_

In order of importance the Syrian Arab Republic has a significant comparative advantage in the production of wheat, barley, pulses and a moderate comparative advantage in the production of maize.

Egypt enjoys good comparative advantages in the production of pulses, wheat, rice and maize.

Jordan enjoys a significant comparative advantage in the production of pulses, but with significant comparative disadvantages in the production of wheat and to a lesser extent in the production of barley.

The Palestinian territories enjoy a significant comparative advantage in the production of pulses.

Lebanon does not enjoy any comparative advantage in the production of wheat and in the absence of significant positive protection offered to the producers, the production of wheat with the current level of technology cannot be sustained.

The above analysis on the status and assessment of comparative advantages of the various cereals and pulses grown in the countries under review reveals a very interesting point that is most countries do have significant comparative advantages in the production of different cereals and pulses. Through the coordination of agricultural policies and the sharing of information on cropping patterns and calendars, the countries under review would benefit a lot if they could sort out some arrangements under which specialization based on comparative advantages could be pursued. This will encourage the efficient use of resources in each country, and will also make it possible to gradually discontinue the production of inefficient crops.

B. Industrial Crops and Tubers

Cotton, sugarbeet and tobacco are the main industrial crops grown in some of the five countries under review. Egypt and the Syrian Arab Republic are the main producers and exporters of cotton among the five countries.

Analysis of the Nominal Protection Coefficients (NPCs) shows that both Egypt and the Syrian Arab Republic provide some positive protection to the producers of cotton in their respective countries. Analysis of the Effective Protection Coefficients (EPCs) depicts even high protection for cotton in Egypt. EPC for cotton in the Syrian Arab Republic is almost protection neutral.

Analysis of the coefficients of Domestic Resource Costs (DRCs) confirms a good comparative advantage in the production of cotton for both Egypt and the Syrian Arab Republic. In other words, the DRCs are confirming that both countries are efficient producers of cotton and further expansion of this crop through investment, research and introduction of new technologies is a viable and sound option.

Sugarbeet, on a commercial scale, is produced largely in the Syrian Arab Republic and Lebanon. Currently, the production of sugarbeet valued at market prices is profitable for growers; however, valued at social prices the production of sugarbeet generates very small profit in Lebanon and eventually a negative profit in the Syrian Arab Republic.

Assessment of the NPCs and EPCs indicates that both the Syrian Arab Republic and Lebanon provide sizeable positive protection to the growers of sugarbeet in order to maintain the current levels of production. Without such sizeable protections the current production levels for sugarbeet in both countries may not be sustained.

Assessment of the DRCs could shed some further lights on the above assertions. Lebanon has a minute comparative advantage in the production of sugarbeet. However, the Syrian Arab Republic has a significant comparative disadvantage in the production of sugarbeet. With the current levels of technologies employed, the production of sugarbeet in the Syrian Arab Republic and to a lesser extent in Lebanon is not viable and may lead to an inefficient use of precious resources in the future.

Of all the five countries under review data for the review of the tobacco enterprise is only available in Lebanon. Lebanon is a net exporter of tobacco. The production of tobacco in Lebanon is profitable valued at both market and social prices. Tobacco enjoys a 54 per cent positive protection on output prices as is revealed by NPC for this crop. The combined effects of protection on both tradable outputs and inputs, which is measured by EPC, shows an even higher level of positive protection for the tobacco growers, amounting to 67 per cent. This crop is produced in Lebanon with relative efficiency and the country enjoys some comparative advantage in the production of tobacco. The production of tobacco is also sustainable without effective protection, but with a lower margin of profit. Lebanon actually supports the production of tobacco with high prices due to some social considerations in the south and being a potential replacement to illicit crops in the Bekaa valley.

Potatoes, one of the main tubers, are produced in almost all of the five countries under review. This analysis does not include data on potatoes in the Syrain Arab Republic therefore, this review is restricted to Egypt, Jordan, Lebanon and the Palestinian Territories. The production of potatoes valued at market prices is highly profitable in all the four countries. Similarly, the potatoes production valued at social prices is profitable in Egypt, Lebanon and the Palestinian Territories. However the production of potatoes is not profitable at social prices in Jordan.

Analysis of the coefficient of nominal protection shows that the production of potatoes in Jordan is almost protection neutral. Nevertheless, Jordan offers the producers of potatoes a high positive effective protection. However, the same analysis (of NPCs and EPCs) reveals negative protection for the production of potatoes in Egypt, Lebanon and the Palestinian Territories.

Assessment of the Domestic Resource Costs or DRCs confirms a significant comparative advantage in the production of potatoes for the Palestinian Territories, followed by a good and moderate comparative advantage for Lebanon and Egypt respectively. The same assessment confirms some comparative disadvantage in the production of potatoes in Jordan at the current level of technology employed. This assessment reveals the fact that the prevailing structure of incentives available for the producers of potatoes in the four countries is somehow incompatible with the principles of efficiency. In the case of Jordan, excessive incentives or significant effective protection is provided to the production of potatoes which is inefficiently produced. On the other hand, in the case of the Palestinian Territories, Lebanon and Egypt, the negative protection confronted by the growers of potatoes practically discriminates against the increases in the production of an efficient crop. This situation is not conducive to a proper investment climate as well as to an efficient resource use in the long run.

C. VEGETABLES

The analysis in this part is limited to the case of Jordan, Lebanon and the Palestinian Territories as the studies conducted for Egypt and the Syrian Arab Republic did not include in their analysis vegetables. Three main vegetables, cucumbers, eggplants and tomatoes are the subject of discussion here, although most of these three countries also produce other vegetables. The production of cucumbers, eggplants and tomatoes valued at both market and social prices is highly profitable in Jordan, Lebanon and the Palestinian Territories respectively.

Analysis of the NPCs and EPCs for cucumbers, eggplants and tomatoes confirms significant negative protection for these crops in all of the three countries respectively. Despite these distortions in the incentive structures, farming of these vegetables as indicated earlier is a highly profitable business. Most of the production systems are able to cover the costs of production and continue to be competitive. This situation is encouraging for investors, for it can increase profit by minimizing the cost of tradable inputs and factors of production.

As alluded to earlier, NPCs and EPCs normally do not reveal much about the comparative advantage and competitiveness of domestic products in the international markets, because a high rate of protection does not necessarily imply that producers would still not expand production at a lower or negative rate of protection. However, both high positive and negative rates of protection are incompatible when competing against imports or entering export markets and protection in some cases simply conceals an ability to

compete fairly. However, NPCs and EPCs are measures of protection that have some implications for efficiency.

Assessment of the domestic resources cost coefficients or DRCs, which reflect on the competitiveness and comparative advantage of specific crops, reveals that Jordan, Lebanon and the Palestinian Territories are significantly efficient producers of cucumbers, eggplants and tomatoes respectively.

A reduction in the levels of distortion could encourage growers to further invest in the expansion of these crops and from the national points of view, an efficient use of resources could be secured.

D. FRUITS

Like in the case of vegetables, our analysis here is confined to three countries namely Jordan, Lebanon and the Palestinian Territories. Furthermore only bananas, grapes, apples, citrus, olives and watermelons are the subject of analysis under this heading. The three countries under review produce large quantities of the above mentioned fruits. The production of all these fruits, valued at both market and social prices is highly profitable in most of the countries under review.

The production of olives and watermelons is positively protected in Jordan. Lebanon also provides some positive protection to the production of olives. Overall, the production of all other fruits such as bananas, grapes, apples and citrus is negatively protected. Assessment of the NPCs and EPCs strongly confirms the above facts.

Lebanon, Jordan and the Palestinian Territories, wherever relevant, are very efficient producers of most of the above mentioned fruits. Lebanon enjoys a strong comparative advantage in the production of grapes, watermelons, bananas, apples and citrus. It also has a moderate comparative advantage in the production of olives.

Similarly, the Palestinian Territories have a significant comparative advantage in the production of bananas and a good comparative advantage in the production of grapes and citrus.

Likewise, Jordan has a good comparative advantage in the production of watermelons, grapes and citrus. It also has a moderate comparative advantage in the production of olives and bananas.

V. ESCWA EXPERIENCE: A REFLECTION ON THE STRENGHTS AND LIMITATIONS OF THE POLICY ANALYSIS MATRIX (PAM), A FRAMEWORK FOR AGRICULTURAL POLICY ANALYSIS

This part presents a framework for analyzing policy, which is known as the policy analysis matrix in short known as PAM. It focuses on the practical aspects of using the policy analysis framework and; therefore discuses the strengths and limitations of PAM in an applied context. As such, in the process of elaboration, some repetition is unavoidable. PAM is a powerful framework for agricultural policy analysis. Through the evaluation of private and social revenues and costs, the PAM method illuminates related issues of policy impact and agricultural policy analysis. The approach is particularly well suited to empirical analysis of agricultural price policy and farm incomes, public investment policy and efficiency, as well as agricultural research policy and technological change. The PAM approach to policy evaluation advocates a disaggregated view of efficiency effects (as measured by social profitability) and non-efficiency effects.

Furthermore, a fundamental issue that deserves careful consideration is to determine how government interventions in agriculture do advance policymakers' objectives. In this context, one needs a policy framework to evaluate and analyze agricultural policies. A policy framework is comprised of four components namely objectives, constraints, policies and strategies. Objectives represent desired goals of policy. Constraints reflect economic realities. Policies represent government instruments. Strategies signify a set of instruments. Strategies in other words consist of policies and policies work through constraints. Constraints further or impede objectives. Objectives permit evaluation of strategies.

Fundamental objectives of policy analysis include efficiency, equity and security. Efficiency implies maximization of income from variable resources. Equity signifies the distribution of income among preferred groups. And security entails the availability of food supplies at stable prices.

There exists trade-offs between policy objectives. For instance, objectives of efficiency versus security are often in conflict. Trade-offs entail gains from achieving one objective versus losses in another. Normally, policymakers –not economists- are responsible for weighing trade-offs. Constraints that limit agricultural policies include supply, demand and world prices. Supply is limited by resources, technology and input prices. Demand is limited by population, income, tastes and relative output prices. World prices affect quantities that can be imported and exported.

There are three categories of policies that have a major bearing on agriculture. They include agricultural price policies, macroeconomic policies and public investment policies. Agricultural price policy instruments include taxes and subsidies (transfers between public budget and producers and consumers), international trade restrictions (taxes and quotas; limiting imports and exports), and direct controls such as agricultural regulation of marketing margins. Macroeconomic policies that affect agriculture involve fiscal policy, foreign exchange policy, and natural resources and land use policies. Public investment policies that influence agriculture include infrastructure (such as transportation and irrigation), human capital (such as education and training), as well as research and technology (production and processing technologies).

Application of the policy framework in an empirical context will identify instances when certain policies depress commodity prices to producers in order to halt down the prices to consumers, while in other instances, some policies support producer prices to the detriment of consumers leading to major distortions in the economy. There are also instances where the policy impact is neutral. The framework could provide answers to queries such as:

- How are strategies being implemented?
- Which objectives are being furthered or impeded?
- Could the trade-offs between objectives be lessened by a different set of policies?

In order to be effective, an analyst must know which instruments incorporated in a policy design have which effects and what the corresponding impact will be on policy objectives.

Policy analysis matrix is a consistent policy framework that actually facilitates agricultural policy design and evaluation. The PAM helps in identifying policy conflicts and facilitates the design of policies that combine various policy instruments. Understanding the mechanics of how policy instruments work (the impact on economic environment), and the expected direction, or sign of impact or clearly stated policy objectives is an important first step in policy design and facilitates an orderly approach to a more quantitative measure of impact.

The policy analysis matrix is an accounting framework, which disaggregates the economics of a commodity system into its sources of private and social profitability. Most of the differences between these two measures of profitability are due to the influence of pricing policy. The PAM can also be used to conduct scenarios comparing the economics of alternative pricing policies, technologies, or investments in commodity systems.

The PAM as a policy analysis framework can deal effectively with measuring the impact of policy on the economics of production. Since policies can impact on both output markets as well as the markets for production inputs, the PAM is a useful framework that identifies sources of policy transfers and resource use efficiency and measure their cumulative effects on a commodity system. The PAM is based on a familiar equation: profit equals to revenues minus costs. The equation can be written in terms of actual market prices, or in terms of social (shadow) prices.

It is the difference in the results from this equation when the two different prices are used that provides useful measures of policy impact. The policy analysis matrix presents the results of such comparisons. The central purpose of PAM analysis is to measure the impact of government policy on the profitability of agricultural systems and on the efficiency of resource use.

Private profitability and competitiveness are likely to be most important in the minds of those concerned specifically with improving agricultural income. Social profitability and efficiency on the other hand are often most emphasized by economic planners whose concern is the allocation of resources among sectors and the growth of aggregate income in the economy. It is important to emphasize that both sets of issues ultimately focus on the incentive effects of policy (part of the difference between private and social profitability) and on how policy incentives might be altered. In order to construct a PAM, it is necessary to understand the pricing policies that have an impact at each stage in the commodity system.

A. STRENGHTS OF PAM

The PAM is designed to analyze market distortions and policy interventions in terms of their effects on a vertical commodity system. The PAM's main strength lies in its ability to analyze the effect of multiple policy instruments. PAM by providing information on efficiency and growth highlights the effects of policies on economy's efficiency and therefore helps to reduce the conflict between policy goals.

The PAM results help in ensuring consistency between policy objectives and instruments. PAM can be used to assess the efficiency issues and transfers caused by endogenous distortions such as market failures and externalities as well as to analyze the effects of government policy interventions such as exogenous distortions. The PAM model enables policy analysts to analyze a wide range of government interventions including commodity specific policies such as taxes/subsidies on outputs and inputs; factor market policies such as minimum wage policies; and macro-economic policies such as exchange rate, monetary, and fiscal policies. Its power as a policy analysis tool lies in its ability to examine the net effects of multiple policy instruments on all stages of a vertical commodity system from farmers to domestic wholesale or exports. The PAM is specifically designed to measure the divergence between actual market prices and efficiency prices.

The PAM as a consistency model is a powerful tool that enables measurement of the efficiency effects of government policy interventions on producers, consumers and the economy, at different stages of a vertical commodity chain.

PAM can be used by policy analysts to provide pertinent information on the impact of policy on competitiveness and efficiency of resource use. PAM provides information on the level of distortions and so on the efficiency and growth costs of government policy interventions. The PAM framework assists policy analysts to evaluate the relative efficiency effects of a range of policy instruments applied to achieve a specific target so that gains in equity, stability, self-sufficiency and others are achieved at the lowest possible efficiency cost. Through PAM a policy analyst can assess the spillover effects of policies so as to ensure maximum consistency between objectives and policies. PAM also enables a policy analyst to compare the efficiency and growth potential of different farming, processing and marketing systems for a given commodity and for different commodities. The efficiency effect of government interventions could be easily analyzed by the PAM's framework. When all of the data and computations are present on the spreadsheets, policy makers can ask for and receive answers to their "what if" queries in real time.

The PAM also has another important role to play in assisting policy-makers faced with competing policy objectives. In addition to helping to measure the trade-offs between efficiency and other objectives, it can also help the policy analyst to compare the efficiency effects of different policy instruments which could be used to achieve a given non-efficiency goal. Improved income distribution, for instance could be promoted by a cheap food policy. A variety of instruments could be employed to achieve cheap food policy.

Another possible use of PAM arises because policy-makers often introduce a policy instrument, which is targeted at a specific policy goal with regard to its effect on other goals.

There are many good reasons for using the PAM, which takes efficiency prices as a yardstick against which to judge existing market systems and policies. The PAM framework facilitates the conduct of "what if" analysis or sensitivity tests. Once the PAM model is constructed on a spreadsheet, then it is easy to conduct sensitivity tests in order to look at how the social efficiency and private profitability of key agricultural enterprises have changed over time. With the help of modern spreadsheet models, this type of analysis is not difficult to prepare and a system of spreadsheet models has already been established at ESCWA so that the analysis may be updated on an annual basis. This approach has the advantage of providing a better understanding of the dynamics of farm decision-making by showing how the returns to different crops may evolve over time as a result of policy decisions. Establishment of a similar spreadsheet system in ESCWA member countries could therefore be an important step towards an improved understanding of regional agricultural trade patterns and development issues.

Once a basic set of PAM spreadsheets has been prepared, sensitivity tests can be used readily as very powerful and persuasive tools in the process of policy formulation. Different types of sensitivity tests can help agricultural administrators and other policymakers to gain relevant insights to their particular areas of concern.

One especially important use of the PAM is to incorporate the analytical models as part of a database system for monitoring the returns and costs of agricultural production. By updating the analysis each year, it is possible to gain an impression of how economic liberalization continues to affect agricultural production and how the returns to different crop and livestock activities vary over time. Although the results presented in the studies looked exclusively at the impact of price developments, the system could be easily modified to account for variations in yield and input use.

Another useful area where the PAM could help is with the preparation of cost-benefit studies related to agricultural projects. In addition to using the PAM to quantify the cost of individual taxes, the basic spreadsheet models can help estimate the effects of a wide variety of other policies. Examples of this would include analysis of the effects of improved yields due to an extension program or the effects of higher prices that might result from improved marketing facilities. Although the PAM cannot be used to estimate the magnitude of change, it can easily show the impact of change once new production coefficients have been estimated. The improvement or loss of farm income could then be included as part of the cash flow stream used for cost-benefit analysis.

Again, care must be taken when using the PAM for estimating the effects of new policies since it is not a dynamic model of comparative advantage. Nevertheless, the results obtained through the PAM model,

and alternative ways of how the spreadsheet models could be used, will help policymakers to explore further ways of using PAM related to their particular area of work. In the absence of a well-defined methodology for assessing individual polices, sector planning can easily become an exercise in guesswork. The PAM is certainly not the right methodology for assessing all agricultural policies, but it can be a powerful tool when used correctly.

Information on gross margins, net income, return to labor, land and water as well as break-even yield and price and the cost of production could be easily derived from the private and social budgets that facilitate the construction of the policy analysis matrix. The matrix itself provides information on revenues, costs, private and social value added, private and social profits, output transfers, input transfers, factor transfers as well as net policy transfers. This information is critical for comparing the policy impacts on enterprises of similar nature.

In addition, the element of basic PAM can be utilized to derive frequently used coefficients which measure the impact of policy on prices and efficiency of resource use that could also facilitate comparison between different categories of dissimilar commodities. The most important of those indicators include, private cost ratio (PCR), domestic resource cost ratio (DRC), nominal protection coefficient (NPC), effective protection coefficient (EPC), profitability coefficient (PC), net transfer ratio (NTR), producer subsidy equivalent (PSE), and subsidy ratio to producers (SRP) and measure of total distortion (MTD). Since these measures are ratios, they can be used to compare the impact of policy on different commodity systems. These comparisons are important because they help show how policies, that were probably formulated on commodity system basis without regard to spillover impacts on other commodity systems actually change relative incentives to producers and draw resources out of some commodity systems and into others, with their associated impact on net social profitability. The DRC is particularly important, as it can be used by the policy analyst to examine the comparative efficiency and growth potentials of a range of activities. It can help to show for instance, whether the smallholder farming system is more efficient than the large-scale farm in producing a certain commodity in a certain area or it can compare the growth potential of different types of technical intervention.

B. LIMITATIONS OF PAM

While the PAM provides a great deal of information about agricultural production systems, it is important to note some of the things it does not tell the analyst as well as a few of the complications associated with its use. First, it is important to recognize that the PAM is not a behavioral model and cannot be used to calculate the new quantities of outputs and inputs that would follow from changes in national opportunity cost prices or from any other alternative prices (such as those resulting from sector development projects). The input-output physical budget is itself the product of past adjustments to actual market prices. At new national opportunity costs, the use of inputs and outputs would be further adjusted. The PAM tells only the relative incentive for change, without measuring the magnitude of change. Estimation of new input and output quantities requires more detailed behavioral models of supply and demand, specifying elasticity and resource constraints. PAM is frequently criticized as being static, whereas efficiency and comparative advantage are dynamic concepts. Dynamic comparative advantage refers to shifts in a system 's competitiveness that occur over time because of changes in three categories of economic parameters: long--run world prices of tradable outputs and inputs; social opportunity costs of domestic factors of production (labor, capital, and land); and production technologies used in farming or marketing. This weakness can be partially overcome through the construction of additional PAMs that utilize social prices for outputs and costs that approximate best guesses of expected future prices, and thus serve as proxies for long-run equilibrium levels. If the country's decision to buy or sell on the world markets will not have any measurable effect on world prices those prices can be considered exogenous and, once arrived at, taken as given for domestic agricultural activities. Likewise, with regard to technology, alternative production systems can be modeled to provide an indication of how competitiveness might change over time as a result of adopting improved farming practices. Finally, with the use of spreadsheet software, PAMs can be easily subjected to sensitivity analysis as a way of testing the effect of new prices assuming that input use remains constant.

Social factor price estimates necessarily are approximations of true values, and sensitivity analysis of the effects of changes in social factor prices is key element of the presentation of PAM results. By altering

the quantities of inputs and outputs from the values observed under private price incentives, the analyst can also simulate producer response (if any) to the social prices for outputs and inputs. Sensitivity analysis provides a way of assessing the impact of changed assumptions and errors in estimating profitability. It can be applied to both private and social estimations. In private estimations, it usually involves partial budgeting. In principle, all social parameters can be subjected to sensitivity analysis. However, the social estimates of long run world prices for output, the cost of labor, and the cost of capital are usually the most uncertain and hence receive the most attention in sensitivity analysis.

The PAM and its budget tables cannot tell us what distortions are causing tax and subsidy effects. To discover this we need to look carefully at the overall policy regime and at any endogenous market distortions. It is important to remember that not all of the price distortions, which the PAM has identified will be exogenous, that is policy induced. The PAM on its own cannot tell us whether or not price distortions and the associated transfers and efficiency costs are due to exogenous or endogenous market distortions. An apparent weakness of the PAM, at least at first sight is the fact that analysis is conducted in the light of a single policy objective, namely, the objective of maximizing allocative efficiency.

It is important to realize that although the PAM's role is to provide information, which will help on the making of policy decisions, it cannot provide the final answer. The PAM cannot tell us whether or not the efficiency sacrifice is worthwhile, or whether it is right or wrong. PAM can only tell us the effect and not the cause of price distortions; therefore, one must be cautious not to assume that all distortions are caused by government interventions or that all government interventions are distortions, which reduce allocative efficiency. Some interventions might be designed to correct endogenous distortions.

When PAM is used to prescribe policy or predict the future effects of policy, rather than diagnose past policies, its results are only as good as the data forecast used, that is they will depend on international commodity price forecasts, transport cost forecasts, forecast as to whether the commodity in question will be an importable or exportable. Under such circumstances, it is absolutely necessary to use sensitivity analysis to assess the extent to which alterations in the forecasts affect the results.

It is important to remember, especially when assessing government policy interventions, that we must compare the existing policy regime, not just with a perfect market system as in the PAM, but also with a counter-factual which involves multiple endogenous market distortions and imperfections, that is with the second best situation.

The PAM cannot be forthrightly used to prescribe free trade and border parity pricing for all agricultural outputs and inputs. Its use is to indicate efficiency losses caused by deviating from these principles but those losses may well be justified by other non-efficiency policy objectives. Thus, when using PAM we must always keep in mind the government's overall social welfare function.

The PAM is an accounting framework-not an economic model and does not contain behavioral relationships. It is essentially a static framework which takes behavioral relationships such as supply response to price changes as given. PAM's yardstick is static comparative advantage and one must always remember this when interpreting results. As such, PAM cannot deal with dynamic issues, such as the development of economies of scale and growth and efficiency enhancement via structural transformations of the economy. Structural transformations; however are the essence of long-term development. It may be wise for governments to intervene to create deviations from efficiency prices based on static comparative advantage to change the country's long-run comparative advantage. The infant industry argument, in which a newly developing industry or sector is protected in order to enable it to develop and benefit from economies of scale and technical innovations and thereby comparative advantage, is an example of such dynamic structural transformation.

Finally, it is important to note that an inherent problem with the PAM is its intensive use of data. Detailed information is needed on farm -level costs of production (including the value of family and hired labor), transportation costs, economic distortions, and international commodity prices. This means that the analyst is presented with many opportunities to utilize inaccurate price data and to make mistakes. Although great care has gone to ensure that the calculations and prices used for the studies are as accurate as possible

(or at least that best estimates of prices are applied consistently to the analysis of all crops), it is important for the reader to treat the conclusions obtained with some caution. At two decimal points, for instance, the DRC results may look accurate and convincing, but they are only as good as the many other numbers used for their derivation. Failure to adjust for an over-valued or under-valued exchange rate will seriously bias the PAM results.

Empirical estimation of social costs and returns is the most complicated analytical task in the construction of the PAM. The information requirements for exact calculation of social prices of outputs and inputs are so vast that empirical estimates will never be exact, even for the best-understood economies. The policy analyst is concerned with whether approximations of social costs and returns will be sufficiently close to their true values to allow useful insights into the motivation for existing policies and the potential gains from changes in policies.

Export and import parity prices and technologies are the cornerstone of social valuation and efficiency analysis of agricultural systems. The social prices for goods and factors are associated with the maximization of aggregate income of an economy operating with competitive markets for outputs and inputs. For tradable commodities, commodity-specific policy and market failures are the principal source of difference between private and social commodity prices. Unless the analyst requires results concerning short-run conditions, the economy-wide distortions of exchange rates will have a uniform impact on tradable-commodity systems. Some complications result from complex exchange management policies, but they are manageable in most circumstances. For social pricing of non-tradable commodities, however, the estimation problems are far more difficult. For these commodities, explicit considerations of domestic demand and exchange-rate policy become essential elements of the social pricing exercise.

For tradable inputs and outputs, social valuation entails calculation of world price equivalents for the domestic product and requires particular attention to the effects of variations in quality and in geographic location. For domestic factors, the social valuation process begins with observed market prices and then adjusts those prices for the effects of factor market divergences. Estimates of the other influences on factor prices-the interactions between output divergences and factor prices and between input substitution and factor prices-are often no more than informed guesses. These effects usually are assumed to be small in magnitude.

The social price for an agricultural commodity is a border price, the price at which foreign suppliers would deliver the commodity to the domestic market or the price that foreign consumers would pay domestic suppliers to deliver the commodity to their markets. But if the world price is to represent an expected social opportunity cost for the domestically produced commodity, it may require adjustment. Observed world prices may not reflect the impacts of the domestic country's market power. In the absence of actual imports or exports of the domestically produced commodity, world price equivalents must be estimated. These prices will usually be derived from some observed world price. But to be, truly equivalent, they must reflect the effects of international transport costs and differences in quality. Moreover, observed world prices may be different from those expected in the future. When direct world price information cannot be found, an alternative procedure is to estimate world prices indirectly, by removing the effects of distorting domestic policies.

The choice of social prices for outputs and inputs is subject to analytical imprecision in several areas. First, estimates of price-equivalent impacts of factor market divergences might not be much better than educated guesses, especially for rates of return to capital and short-run effects of distorted foreign exchange rates. Second, divergences additional to factor market divergences may influence domestic factor prices, and their impacts may not be well understood. For instance, widespread protection to outputs that are intensive in a particular factor will probably elevate that factor's price. Third, price response within the commodity system could cause the quantities of inputs employed under social prices to be different from those used in the estimation of private profits. If however, results appear robust following sensitivity analysis, efficiency gains or losses should be a significant element in policy decisions concerning the commodity system.

All social price calculations rely to some degree on the judgment of the analyst. Principles for the determination of appropriate world and domestic factor prices are relatively easy to establish, but their

implementation inevitably is limited by data availability. Some would argue that this problem provides sufficient grounds to avoid social price calculations altogether and to focus economic an analysis instead of only on issues that can be directly addressed by available data. Alternatively, the logic underlying social price calculations could be altered by the use of a new definition of optimality that associates optimal conditions with data that is easier to collect. An example is a type of second best approach that assumes that all divergences external to the commodity system are beyond the influence of policy-makers. Divergences in factor and tradable-input markets are ignored, and social input prices are assumed to be equal to private prices.

But such approaches are not especially helpful in most policy analyses. Economists do not determine the issues of economic policy, but policymakers and societal interest groups do, and policy-oriented empirical analysis are expected to address these issues as comprehensively as possible. Trying to conceal difficult to measure parameters under the cover of subjective definitions of optimality does little to clarify the economic impacts of governments on agricultural producers. Like economic theorists, empirical analysts desire to minimize the number of assumptions needed to generate results. But information is never perfect, and assumptions form an inevitable element of applied analysis. If analysts provide full descriptions of the procedures and assumptions they have used, subsequent researchers will have ample opportunity to improve upon results.

C. Concluding Remarks

Quantitative policy analysis plays a dynamic role in the policymaking process by ensuring that agricultural sector objectives, constraints, and policies remain consistent. The process of updating economic analyses allows policies to be altered in step with changes in the economy and in the priorities established for the agricultural sector. Particular objectives can become obsolete or inappropriate as economies grow and change. Low food prices become less important if consumer incomes increase; high producer prices may be unnecessary if farm incomes and production technologies change significantly. Constraints on objectives and policy implementation can alter as well. Developments in the transportation infrastructure, for instance, can change the potential for agro-industrial development and for the introduction of new cropping opportunities and can improve the efficacy of producer price support schemes. In addition to ensuring consistency, quantitative policy analysis can be a dynamic simulation tool to guide patterns of growth and technical change. The development of appropriate technologies has emerged as a growing concern in developing countries. Policy analysts can contribute to discussions on this topic by allowing specification of the changes in relative input requirements necessary for future production technologies. These new technologies reflect combinations of changes in yields through improved seeds and fertilizers, the introduction of new tools or machinery inputs, and changes in the relative use of labor and capital. Discussion with agricultural scientists and engineers can identify which, if any, of the alternatives are technically feasible.

Agricultural policy has been increasingly recognized as vitally important to the economic development of developing countries. Yet what constitutes good policy is highly controversial among policy analysts and policymakers. Although economic theory and techniques do not provide definitive answers that resolve the controversies, they can be used as effective tools to develop insights of great value to policymakers. Applied knowledge of basic techniques of economic analysis and tools could help a great deal in the design of effective policies and that of analyzing the economic impact of price policy on the agricultural sector as well as in judging the value and limitations of various policies.

Policies for agriculture consist of government decisions that influence the level and stability of output and input prices, public investments affecting agricultural revenues and costs, and the allocation of research funds to improve farming and processing technologies. Some of these policies are specific to agriculture (fertilizer subsidies and tariffs on wheat imports, for instance) whereas others, such as fiscal and exchange-rate policy affect all sectors of the economy. How can policy analysts interpret the effects on agriculture of such a variety of policies? The policy analysis matrix (PAM) has been developed as an organization framework to serve this need. The PAM allows policy analysts to analyse policies in terms of their impact on commodity systems (representative chains of farming, marketing, and processing activities that together produce a marketable product). Choice of a particular commodity system as the focal point of analysis is arbitrary. Alternative economic criteria, such as the provision of basic needs or employment and

wages in the labour market, could provide equally valid perspectives for measuring the impacts of policy on agriculture. But in most cases, policy-makers are vitally interested in the effects of policies on commodities, even when the policies are not formulated to further specific commodity objectives. Both the formulation of a theoretical rationale and the empirical implementation of policy analysis are easier when commodities serve as the organizational framework. The impact of policies on other elements, such as employment and wages, can then be pursued through the aggregation of commodity system results. The PAM is a compromise between the desire for a theoretical model to describe the economy in exacting detail and the need for insightful policy analysis that operates within the inevitable constraints of time and data availability. The theoretical basis for PAM is the simple general equilibrium model of international trade rather than some social welfare function, and the matrix focuses attention on the identification of efficient patterns of production and prices. Non-efficiency objectives are then considered as potential justifications for policies that support inefficient production systems. This restricted approach to the identification of the optimum policy set is more helpful to informed policy debate than are analyses based on a priori inferences about the "proper" roles for efficiency and non-efficiency objectives of agricultural policy. Policy debate most often arises because comparisons of the importance of various objectives are neither predetermined nor quantifiable. For empirical application of the PAM, emphasis is placed on budgets for costs and returns, which are chosen to represent commodity systems for different regions, types of farms, and technologies. Budgets easily accommodate the effects of direct policy interventions that alter the commodity and factor prices of the commodity system. However, the indirect impacts of policy distortions are less easily quantified. Indirect policy influences include the effect of all price distortions on the exchange rate, which in turn alters the prices of output and of some inputs of the commodity system; the effects of output price distortions on the prices of domestic factors (labour, capital, and land); and the effects of input substitution on factor prices. In the modification of private costs and returns to approximate social values, these indirect effects are ignored or are recognized only in a very approximate manner. In principle, econometric models could be used to calculate the impacts of these indirect effects. But in practice, information and resource constraints have often meant that such estimates are unreliable or ad hoc.

In order to make better use of the PAM framework for agricultural policy analysis it is necessary to pay greater attention to data for policy analysis, to conduct timely farm surveys; to improve methodology for deriving equilibrium exchange rate; to improve methodology for deriving farm-gate export & import parity prices, to improve methodology for deriving shadow prices of factors of production (capital, land, labour, and water); and to coordinate agricultural policies and opt for specialization based on comparative advantages.

ANNEX TABLES

TABLE A1: INDICATORS OF COMPETITIVENESS, EFFICIENCY AND POLICY IMPACTS CALCULATED FOR MAJOR CROPS GROWN IN EGYPT
(VALUES REPORTED IN EGYPTIAN POUND)

ITEMS	COTTON	RICE	WHEAT	MAIZE	SORGHUM	BROAD BEANS	NILI POTATOES	SHORT BERSEEM	LONG BERSEEM
Private Profit	1729.72	1063.35	657.15	356.37	213.05	473.01	520.01	278.87	948.95
Social Profit	1167.90	893.66	817.16	260.08	49.97	798.70	471.94	152.73	728.74
Private Value Added	2823.88	1807.8	1341.61	1059.87	893.2	1111.38	1417.98	696.18	1654.41
Social Value Added	2581.79	2283.54	1690.22	1203.08	983.13	1604.51	1605.66	691.25	1621.23
Output Transfer	170.71	-529.04	-435.60	-257.20	-132.08	-559.26	-331.45	0	0
Input Transfer	-71.38	-53.30	-86.99	-114.50	-42.08	-66.15	-143.78	-4.94	-33.19
Factor Transfer	-319.73	-645.42	-188.60	-238.99	-253.09	-167.43	-235.75	-121.20	-187.02
Net Transfer	561.82	169.69	-160.01	96.29	163.09	-325.69	48.07	126.14	220.20
PCR	0.39	0.41	0.51	0.66	0.76	0.57	0.63	0.60	0.43
DRC	0.55	0.61	0.52	0.78	0.95	0.50	0.71	0.78	0.60
NPCo	1.06	0.81	0.80	0.85	0.89	0.72	0.91	1.00	1.00
NPCi	0.83	0.91	0.80	0.76	0.84	0.83	0.93	0.95	0.80
PC	1.48	1.19	0.80	1.37	4.26	0.59	1.10	1.83	1.30
EPC	1.09	0.79	0.79	0.88	0.91	0.69	0.88	1.01	1.02
MTD	0.22	0.07	-0.09	0.08	0.17	-0.20	0.03	0.18	0.14

TABLE A2. INDICATORS OF COMPETITIVENESS, EFFICIENCY AND POLICY IMPACTS CALCULATED FOR MAJOR CROPS GROWN IN THE HIGHLANDS OF JORDAN (VALUES REPORTED IN JORDANIAN DINAR)

ITEMS	IRRIGATED WHEAT	RAINFED WHEAT	RAINFED BARLEY	TOMATOES	POTATOES	WATER-MELON	IRRIGATED OLIVES	RAINFED OLIVES	IRRIGATED GRAPES	RAINFED GRAPES
Private Profit	19.97	3.42	1.21	234.66	228.97	-49.94	56.26	18.44	717.97	47.82
Social Profit	-279.79	-2.25	-0.76	194.34	-74.10	19.33	-50.39	13.58	525.06	48.74
Private Value Added	59.88	13.93	11.72	557.15	556.81	129.18	140.97	51.51	832.71	92.90
Social Value Added	41.65	8.75	10.24	529.67	266.38	206.82	119.88	45.52	833.34	93.48
Output Transfer	5.37	1.72	0.26	13.25	266.58	-85.22	18.00	4.86	-12.16	-2.46
Input Transfer	-12.87	-3.46	-1.22	-14.23	-23.85	-7.57	-3.09	-1.14	-11.53	-1.89
Factor Transfer	-281.53	-0.49	-0.49	-12.83	-12.63	-8.37	-85.57	1.13	-193.54	0.35
Net Transfer	299.76	5.67	1.97	40.31	303.07	-69.27	106.66	4.86	192.91	-0.92
PCR	0.67	0.75	0.90	0.58	0.59	1.39	0.60	0.64	0.14	0.49
DRC	7.72	1.26	1.07	0.63	1.28	0.91	1.42	0.70	0.37	0.48
NPCo	1.07	1.08	1.01	1.02	1.60	0.64	1.12	1.09	0.99	0.98
NPCi	0.64	0.70	0.86	0.84	0.87	0.77	0.89	0.90	0.79	0.91
PC	-0.07	-1.52	-1.59	1.21	-3.09	-2.58	-1.12	1.36	1.37	0.98
EPC	1.44	1.59	1.14	1.05	2.09	0.62	1.18	1.13	1.00	0.99
MTD	7.20	0.65	0.19	0.08	1.14	-0.33	0.89	-0.11	0.23	-0.01

TABLE A3: INDICATORS OF COMPETITIVENESS, EFFICIENCY AND POLICY IMPACTS CALCULATED FOR MAJOR CROPS GROWN IN THE NORTHERN JORDAN RIFT VALLEY (ZONE 1, JRV)

(VALUES REPORTED IN JORDANIAN DINAR)

ITEMS	CUCUMBERS PLASTIC HOUSE	TOMATOES PLASTIC HOUSE	PEPPERS PLASTIC HOUSE	TOMATOES OPEN FIELD	ONIONS	GREENBEANS OPEN FIELD	EGGPLANTS OPEN FIELD	SQUASH OPEN FIELD	BANANAS	ORANGES
Private Profit	1695.46	1575.45	1240.76	273.17	239.57	224.60	77.32	38.62	184.69	252.89
Social Profit	2885.72	3154.49	2755.65	572.51	249.04	531.42	221.84	288.82	76.90	189.77
Private Value Added	2109.04	1989.03	1543.94	360.02	328.78	306.25	159.63	147.14	343.75	357.06
Social Value Added	3333.14	3619.97	3095.33	683.98	355.43	629.27	326.33	354.83	367.90	364.44
Output Transfer	-1388.75	-1742.39	-1651.87	-360.92	-52.24	-353.49	-203.82	-240.47	-42.86	-38.61
Input Transfer	-164.65	-111.45	-100.48	-36.96	-25.58	-30.47	-37.11	-32.79	-18.71	-31.23
Factor Transfer	-33.83	-51.90	-36.50	-24.62	-17.19	-16.21	-22.18	-17.49	-131.94	-70.50
Net Transfer	-1190.27	-1579.03	-1514.89	-299.34	-9.46	-309.81	-144.52	-190.20	107.79	63.12
PCR	0.20	0.21	0.20	0.24	0.27	0.27	0.52	0.74	0.46	0.29
DRC	0.13	0.13	0.11	0.16	0.30	0.16	0.32	0.36	0.79	0.48
NPCo	0.68	0.58	0.53	0.58	0.89	0.53	0.59	0.52	0.91	0.92
NPCi	0.83	0.78	0.75	0.78	0.74	0.75	0.79	0.77	0.81	0.79
PC	0.59	0.50	0.45	0.48	0.96	0.42	0.35	0.17	2.40	1.33
EPC	0.63	0.55	0.50	0.53	0.93	0.49	0.49	0.41	0.93	0.98
MTD	-0.36	-0.44	-0.49	-0.44	-0.03	-0.49	-0.44	-0.54	0.29	0.17

TABLE A4: INDICATORS OF COMPETITIVENESS, EFFICIENCY AND POLICY IMPACTS CALCULATED FOR MAJOR CROPS GROWN IN THE CENTRAL JORDAN RIFT VALLEY (ZONE 2, JRV)

(VALUES REPORTED IN JORDANIAN DINAR)

ITEMS	CUCUMBERS PLASTIC HOUSE	TOMATOES OPEN FIELD	PEPPERS PLASTIC HOUSE	GRAPES	POTATOES	GREENBEANS OPEN FIELD	EGGPLANTS OPEN FIELD	SQUASH OPEN FIELD	BANANAS	ORANGES
Private Profit	1262.48	1065.92	1217.50	183.82	61.92	323.81	93.93	61.15	568.44	38.61
Social Profit	2206.30	1985.29	2578.69	466.92	-7.99	730.46	350.52	214.99	491.25	-23.60
Private Value Added	1638.64	1222.94	1472.36	293.67	141.20	414.55	206.83	173.71	713.91	125.96
Social Value Added	2635.78	2181.40	2871.46	643.47	96.17	833.54	492.05	349.84	781.58	143.65
Output Transfer	-1166.55	-995.65	-1486.69	-367.63	-8.60	-449.90	-322.95	-210.49	-86.60	-22.39
Input Transfer	-169.41	-37.19	-87.59	-17.83	-53.63	-30.90	-37.74	-34.36	-18.93	-4.70
Factor Transfer	-53.32	-39.09	-37.92	-66.70	-24.87	-12.34	-28.62	-22.28	-144.86	-79.89
Net Transfer	-943.82	-919.37	-1361.18	-283.10	69.90	-406.65	-256.59	-153.84	77.19	62.21
PCR	0.23	0.13	0.17	0.37	0.56	0.22	0.55	0.65	0.20	0.69
DRC	0.16	0.09	0.10	0.27	1.08	0.12	0.29	0.39	0.37	1.16
NPCo	0.68	0.58	0.53	0.52	0.98	0.53	0.51	0.58	0.90	0.91
NPCi	0.83	0.79	0.69	0.86	0.83	0.75	0.78	0.78	0.81	0.96
PC	0.57	0.54	0.47	0.39	-7.75	0.44	0.27	0.28	1.16	-1.64
EPC	0.62	0.56	0.51	0.46	1.47	0.50	0.42	0.50	0.91	0.88
MTD	-0.36	-0.42	-0.47	-0.44	0.73	-0.49	-0.52	-0.44	0.10	0.43

TABLE A5. INDICATORS OF COMPETITIVENESS, EFFICIENCY AND POLICY IMPACTS CALCULATED FOR MAJOR CROPS GROWN IN THE SOUTHERN JORDAN RIFT VALLEY (ZONE 3, JRV)
(VALUES REPORTED IN JORDANIAN DINAR)

ITEMS	CUCUMBERS OPEN FIELD	TOMATOES OPEN FIELD	PEPPERS OPEN FIELD	GRAPES	CANTALOUPE PLASTIC TUNNEL	WATERMELON OPEN FIELD	EGGPLANTS OPEN FIELD	SQUASH OPEN FIELD	BANANAS	ORANGES
Private Profit	164.02	408.24	274.09	-16.28	623.12	139.06	148.08	101.27	307.15	-1.00
Social Profit	344.27	879.93	762.97	73.82	509.90	63.89	441.64	347.00	204.16	-69.66
Private Value Added	300.02	492.34	382.18	82.21	706.02	226.25	249.63	208.31	453.71	87.57
Social Value Added	507.79	1004.25	900.55	242.19	621.65	180.12	575.22	478.55	493.26	98.62
Output Transfer	-287.01	-549.83	-579.80	-175.37	32.63	-12.01	-363.32	-304.60	-57.80	-18.69
Input Transfer	-79.24	-37.92	-61.43	-15.39	-51.74	-58.14	-37.74	-34.36	-18.25	-7.64
Factor Transfer	-27.52	-40.22	-29.49	-69.87	-28.85	-29.05	-32.02	-24.51	-142.54	-79.70
Net Transfer	-180.25	-471.69	-488.89	-90.10	113.22	75.18	-293.56	-245.73	102.99	68.65
PCR	0.45	0.17	0.28	1.20	0.12	0.39	0.41	0.51	0.32	1.01
DRC	0.32	0.12	0.15	0.70	0.18	0.65	0.23	0.27	0.59	1.71
NPCo	0.68	0.53	0.48	0.52	1.04	0.98	0.51	0.52	0.90	0.91
NPCi	0.80	0.78	0.72	0.87	0.78	0.81	0.78	0.78	0.82	0.93
PC	0.48	0.46	0.36	-0.22	1.22	2.18	0.34	0.29	1.50	0.01
EPC	0.59	0.49	0.42	0.34	1.14	1.26	0.43	0.44	0.92	0.89
MTD	-0.35	-0.47	-0.54	-0.37	0.18	0.42	-0.51	-0.51	0.21	0.70

TABLE A6: INDICATORS OF COMPETITIVENESS, EFFICIENCY AND POLICY IMPACTS CALCULATED FOR MAJOR CROPS GROWN IN THE GHOR SAFI AND WADI ARABA, JORDAN RIFT VALLEY (ZONE 4, JRV)
(VALUES REPORTED IN JORDANIAN DINAR)

ITEMS	CANTALOUPE OPEN FIELD	SP-TOMATOES OPEN FIELD	WATERMELON OPEN FIELD	AU-TOMATOES OPEN FIELD	GRAPES	GREENBEANS OPEN FIELD	EGGPLANTS OPEN FIELD
Private Profit	-51.30	205.41	227.52	239.16	118.33	308.19	-4.64
Social Profit	-138.86	490.63	156.37	546.16	359.98	711.90	148.34
Private Value Added	50.71	313.20	329.53	347.28	239.14	411.75	124.44
Social Value Added	-8.56	641.13	286.67	700.02	560.31	858.40	320.11
Output Transfer	8.70	-357.39	-14.54	-384.88	-339.77	-452.70	-201.85
Input Transfer	-50.57	-29.45	-57.40	-32.13	-18.60	-6.05	-6.18
Factor Transfer	-28.29	-42.72	-28.29	-45.75	-79.53	-42.94	-42.68
Net Transfer	87.56	-285.22	71.15	-306.99	-241.64	-403.71	-152.98
PCR	2.01	0.34	0.31	0.31	0.51	0.25	1.04
DRC	-15.22	0.23	0.45	0.22	0.36	0.17	0.54
NPCo	1.04	0.53	0.98	0.53	0.50	0.53	0.51
NPCi	0.79	0.76	0.81	1.74	0.85	0.94	0.94
PC	0.37	0.42	1.46	0.44	0.33	0.43	-0.03
EPC	-5.92	0.49	1.15	0.50	0.43	0.48	0.39
MTD	-10.23	-0.44	0.25	-0.44	-0.43	-0.47	-0.48

TABLE A7: INDICATORS OF COMPETITIVENESS, EFFICIENCY AND POLICY IMPACTS CALCULATED FOR MAJOR CROPS GROWN IN LEBANON
(VALUES REPORTED IN THOUSAND LEBANESE POUNDS)

ITEMS	CUCUMBER	TOMATO	EGGPLANT	CARROT	POTATO	SQUASH	SUGARBEET	MELON	TOBACCO	WHEAT
Private Profit	4104.70	7940.93	94.95	248.81	123.50	869.83	96.33	331.62	559.95	30.10
Social Profit	10670.86	8457.93	3604.13	1153.68	465.10	1604.13	22.92	2433.40	100.64	-22.46
Private Value Added	7093.20	11027.24	717.38	701.39	545.23	1582.55	647.95	744.42	1316.45	165.83
Social Value Added	13690.92	11580.99	4038.67	1527.31	882.40	2361.06	443.43	2890.14	789.79	109.60
Output Transfer	-6734.62	-562.69	-3326.31	-839.90	-348.42	-784.20	169.40	-2166.08	526.71	50.01
Input Transfer	-136.90	-8.93	-5.01	-13.97	-11.25	-5.70	-35.12	-20.36	0.05	-6.21
Factor Transfer	-31.56	-36.76	187.89	78.94	4.44	-44.20	131.12	-43.93	67.35	3.66
Net Transfer	-6566.16	-517.00	-3509.18	-904.87	-341.60	-734.31	73.40	-2101.79	459.31	52.56
PCR	0.42	0.28	0.87	0.65	0.77	0.45	0.85	0.55	0.57	0.82
DRC	0.22	0.27	0.11	0.24	0.47	0.32	0.95	0.16	0.87	1.20
NPCo	0.60	0.96	0.30	0.51	0.75	0.71	1.21	0.36	1.54	1.25
NPCi	0.96	1.00	0.99	0.93	0.98	0.98	0.90	0.96	1.00	0.93
PC	0.38	0.94	0.03	0.22	0.27	0.54	4.20	0.14	5.56	-1.34
EPC	0.52	0.95	0.18	0.46	0.62	0.67	1.46	0.26	1.67	1.51
MTD	-0.48	-0.04	-0.87	-0.59	-0.39	-0.31	0.17	-0.73	0.58	0.48

TABLE A8: INDICATORS OF COMPETITIVENESS, EFFICIENCY AND POLICY IMPACTS CALCULATED FOR MAJOR CROPS GROWN IN LEBANON
(VALUES REPORTED IN THOUSAND LEBANESE POUNDS)

ITEMS	APPLE	AVOCADO	BANANA	CITRUS	GRAPE	OLIVE	PEAR	STRAWBERRY	BANANA (GH)	WATERMELON
Private Profit	960.00	207.38	2734.12	1115.21	222.15	273.54	666.20	10831.41	4112.60	1017.44
Social Profit	4349.89	1656.44	2660.43	3200.24	1144.90	274.64	830.82	11486.23	2632.97	1950.12
Private Value Added	3111.59	1862.00	3688.50	2386.60	614.30	698.75	910.00	17017.28	9225.22	1429.08
Social Value Added	6462.38	3339.24	3925.37	4493.04	1523.41	685.07	1025.36	18012.18	6265.79	2611.93
Output Transfer	-3419.56	-1479.63	-236.57	-2102.88	-924.65	-1.20	-123.42	-1286.62	2822.93	-1216.79
Input Transfer	-68.77	-2.40	0.31	3.56	-15.54	-14.88	-8.06	-291.73	-136.51	-33.94
Factor Transfer	39.10	-28.18	-310.56	-21.40	13.64	14.79	49.26	-340.08	1479.81	-250.17
Net Transfer	-3389.90	-1449.06	73.69	-2085.03	-922.75	-1.11	-164.62	-654.81	1479.63	-932.69
PCR	0.69	0.89	0.26	0.53	0.64	0.61	0.27	0.36	0.55	0.29
DRC	0.33	0.50	0.32	0.29	0.25	0.60	0.19	0.36	0.58	0.25
NPCo	0.54	0.57	0.94	0.55	0.45	1.00	0.90	0.95	1.32	0.57
NPCi	0.93	0.98	1.03	1.03	0.90	0.93	0.97	0.95	0.95	0.83
PC	0.22	0.13	1.03	0.35	0.19	1.00	0.80	0.94	1.56	0.52
EPC	0.48	0.56	0.94	0.53	0.40	1.02	0.89	0.94	1.47	0.55
MTD	-0.52	-0.43	0.02	-0.46	-0.61	0.00	-0.16	-0.04	0.24	-0.36

TABLE A9: INDICATORS OF COMPETITIVENESS, EFFICIENCY AND POLICY IMPACTS CALCULATED FOR MAJOR CROPS GROWN IN ZONE 1 OF LEBANON
(JROUD-AKKAR, DANNIEH, EHDEN, BCHARRE, HASROUN, TANNOURINE, JEZZINE, KESROUAN AND CHOUF)
(VALUES REPORTED IN LEBANESE POUNDS)

ITEMS	APPLE KURTUBA	APPLE KFARDEBIAN	APPLE FARIA	APPLE AKKAR	APPLE EHDEN	APPLE FAKRA	APPLE HRAJEL	APPLE FNAIDEK	PEARS AKKAR	PEARS FNAIDEK	PEARS HASROUN
Private Profit	-454,900	667,850	-143,400	293,850	169,500	-478,000	-388,750	260,950	411,350	674,750	344,795
Social Profit	41,582	2,719,044	659,416	2,097,246	1,817,890	-176,016	1,112,910	2,139,531	736,864	834,642	652,617
Private Value Added	309,000	1,978,000	551,000	616,500	537,500	419,500	805,000	640,000	694,000	940,000	713,300
Social Value Added	820,119	4,064,647	1,409,638	2,360,433	2,095,320	740,723	2,352,545	2,443,878	978,736	1,048,954	997,715
Output Transfer	-534,306	-2,137,225	-904,890	-1,756,846	-1,568,613	-393,668	-1,582,335	-1,819,591	-296,928	-123,424	-296,928
Input Transfer	-23,187	-50,578	-46,252	-12,913	-10,792	-72,445	-34,790	-15,712	-12,192	-14,470	-12,513
Factor Transfer	-14,637	-35,453	-55,822	59,463	90,569	-19,239	-45,885	74,703	40,778	50,938	23,406
Net Transfer	-496,482	-2,051,194	-802,816	-1,803,396	-1,648,390	-301,984	-1,501,660	-1,878,581	-325,514	-159,892	-307,822
PCR	2.47	0.66	1.26	0.52	0.68	2.14	1.48	0.59	0.41	0.28	0.52
DRC	0.95	0.33	0.53	0.11	0.13	1.24	0.53	0.12	0.25	0.20	0.35
NPCo	0.54	0.54	0.51	0.32	0.32	0.72	0.43	0.32	0.75	0.90	0.75
NPCi	0.93	0.91	0.90	0.95	0.95	0.89	0.92	0.94	0.94	0.93	0.94
PC	-10.94	0.25	-0.22	0.14	0.09	2.72	-0.35	0.12	0.56	0.81	0.53
EPC	0.38	0.49	0.39	0.26	0.26	0.57	0.34	0.26	0.71	0.90	0.71
MTD	-0.61	-0.50	-0.57	-0.76	-0.79	-0.41	-0.64	-0.77	-0.33	-0.15	-0.31

Table A10: Indicators Of Competitiveness, Efficiency And Policy Impacts Calculated For Major Crops Grown In Zone 2 Of Lebanon (Akkar And Minieh Coast)

(VALUES REPORTED IN LEBANESE POUNDS)

ITEMS	CARROTS AKKAR PLAIN	ORANGE MINIEH	ORANGE COASTAL AKKAR	VALENCIA COASTAL AKKAR	CUCUMBER MINIEH	EGGPLANT AKKAR PLAIN	GRAPES AKKAR PLAIN	POTATO COASTAL AKKAR	SQUASH MINIEH	TOBACCO COASTAL AKKAR	TOMATO MINIEH GH	WHEAT AKKAR PLAN
Private Profit	254,840	485,870	93,135	1,130,801	6,167,355	42,000	5,524,400	61,380	270,750	240,280	4,893,600	195,760
Social Profit	1,153,700	2,936,934	2,786,383	3,384,521	9,387,607	3,537,598	1,974,551	160,128	901,253	-473,517	6,257,890	80,753
Private Value Added	708,500	1,281,150	856,500	2,066,060	8,149,900	705,000	5,887,000	439,430	1,045,000	828,500	6,997,000	326,500
Social Value Added	1,531,804	3,860,709	3,881,792	4,523,162	11,464,210	4,011,083	2,325,791	548,648	1,626,280	154,663	8,413,791	208,629
Output Transfer	-839,895	-2,592,535	-3,042,603	-2,478,083	-3,387,696	-3,326,310	3,549,845	-125,940	-609,935	667,822	-1,478,131	107,174
Input Transfer	-16,591	-12,976	-17,311	-20,981	-73,386	-20,226	-11,364	-16,722	-28,655	-6,015	-61,339	-10,697
Factor Transfer	75,555	-128,495	-332,044	-203,382	-94,058	189,515	11,360	-10,470	49,223	-39,960	-52,501	2,864
Net Transfer	-898,860	-2,451,064	-2,693,248	-2,253,720	-3,220,252	-3,495,598	3,549,849	-98,748	-630,503	713,797	-1,364,290	115,007
PCR	0.64	0.62	0.89	0.45	0.24	0.94	0.06	0.86	0.74	0.71	0.30	0.40
DRC	0.25	0.24	0.28	0.25	0.18	0.12	0.15	0.71	0.45	4.06	0.26	0.61
NPCo	0.51	0.36	0.27	0.50	0.75	0.30	2.45	0.87	0.71	2.75	0.86	1.36
NPCi	0.91	0.94	0.94	0.95	0.96	0.97	0.91	0.96	0.94	0.97	0.97	0.88
PC	0.22	0.17	0.03	0.33	0.66	0.01	2.80	0.38	0.30	-0.51	0.78	2.42
EPC	0.46	0.33	0.22	0.46	0.71	0.18	2.53	0.80	0.64	5.36	0.83	1.56
MTD	-0.59	-0.63	-0.69	-0.50	-0.28	-0.87	1.53	-0.18	-0.39	4.62	-0.16	0.55

TABLE A11: INDICATORS OF COMPETITIVENESS, EFFICIENCY AND POLICY IMPACTS CALCULATED FOR MAJOR CROPS GROWN IN ZONE 3 OF LEBANON (ZGHARTA COAST AND KOURA)
(VALUES REPORTED IN LEBANESE POUNDS)

ITEMS	CUCUMBER SEBAEL GH	CUCUMBER ANFEH GH	CUCUMBER ZGHORTA GH	OLIVES KOURA	TOMATO ANFEH GH	TOMATO ZGHORTA GH	TOMATO SEBAEL GH
Private Profit	-3,188,525	-2,001,825	-1,540,820	139,425	4,179,150	2,822,200	775,160
Social Profit	-166,110	1,452,810	1,395,112	243,202	5,852,270	5,229,652	603,109
Private Value Added	1,625,500	1,935,000	3,645,100	416,700	8,106,000	7,345,000	5,013,500
Social Value Added	4,270,234	4,601,146	5,635,624	509,257	9,750,422	8,826,542	3,813,267
Output Transfer	-2,693,848	-2,693,848	-2,032,618	-105,838	-1,689,292	-1,520,363	1,155,354
Input Transfer	-49,114	-27,702	-42,094	-13,281	-44,870	-38,821	-44,879
Factor Transfer	377,682	788,489	945,409	11,220	28,698	925,910	1,028,183
Net Transfer	-3,022,415	-3,454,635	-2,935,932	-103,777	-1,673,120	-2,407,452	172,051
PCR	2.96	2.03	1.42	0.67	0.48	0.62	0.85
DRC	1.04	0.68	0.75	0.52	0.40	0.41	0.84
NPCo	0.60	0.60	0.75	0.83	0.86	0.86	1.20
NPCi	0.98	0.99	0.98	0.89	0.98	0.98	0.98
PC	19.20	-1.38	-1.10	0.57	0.71	0.54	1.29
EPC	0.38	0.42	0.65	0.82	0.83	0.83	1.31
MTD	-0.71	-0.75	-0.52	-0.20	-0.17	-0.27	0.05

TABLE A12: INDICATORS OF COMPETITIVENESS, EFFICIENCY AND POLICY IMPACTS CALCULATED FOR MAJOR CROPS GROWN IN ZONE 4 OF LEBANON
(KESROUAN, METN, BAABDA, ALEY, COSTAL PLAIN OF CHOUF, BATROU AND JBEIL)
(VALUES REPORTED IN LEBANESE POUNDS)

ITEMS	CUCUMBER AMCHIT GH	CUCUMBER JBEIL GH	CUCUMBER JIEH GH	OLIVES CHOUF	STRAWBERRY CHEWEIFAT GH	STRAWBERRY BATROUN GH	TOMATO JBEIL GH	TOMATO AMCHIT GH	TOMATO HALAT GH	TOMATO SAIDEYAT GH	TOMATO CHEWEIFAT GH	TOMATO JADRA GH	TOMATO NAAMEH GH
Private Profit	-642,487	1,469,520	2,144,450	942,000	6,290,070	11,768,645	1,690,515	-1,046,450	4,787,330	5,961,550	2,209,650	2,401,775	1,341,100
Social Profit	1,855,646	4,135,406	2,545,235	364,807	3,173,878	12,451,464	4,765,970	459,211	5,967,290	1,543,235	2,114,966	3,883,297	1,352,981
Private Value Added	1,858,500	3,850,310	5,365,750	1,460,000	14,344,000	18,457,600	4,926,450	1,561,050	8,005,700	10,304,000	6,511,000	6,164,000	5,373,000
Social Value Added	4,304,689	6,541,268	5,265,494	866,007	11,013,617	19,379,164	7,117,859	3,003,188	9,459,961	5,816,469	6,220,749	7,378,832	5,126,588
Output Transfer	-2,478,340	-2,722,002	66,091	568,563	2,871,050	-1,286,620	-2,232,504	-1,475,717	-1,482,354	4,417,496	233,031	-1,266,969	194,193
Input Transfer	-32,152	-31,045	-34,165	-25,430	-459,333	-365,056	-41,095	-33,578	-28,092	-70,035	-57,220	-52,137	-52,219
Factor Transfer	51,945	-25,072	501,041	16,800	214,191	-238,745	884,046	63,522	-274,301	69,216	195,567	266,690	258,293
Net Transfer	-2,498,133	-2,665,886	-400,785	577,193	3,116,192	-682,819	-3,075,455	-1,505,661	-1,179,960	4,418,315	94,684	-1,481,522	-11,881
PCR	1.35	0.62	0.60	0.35	0.56	0.36	0.66	1.67	0.40	0.42	0.66	0.61	0.75
DRC	0.57	0.37	0.52	0.58	0.71	0.36	0.33	0.85	0.37	0.73	0.66	0.47	0.74
NPCo	0.60	0.69	1.01	1.53	1.16	0.95	0.73	0.68	0.86	1.54	1.03	0.86	1.03
NPCi	0.98	0.99	0.99	0.88	0.94	0.92	0.96	0.98	0.96	0.97	0.98	0.96	0.98
PC	-0.35	0.36	0.84	2.58	1.98	0.95	0.35	-2.28	0.80	3.86	1.04	0.62	0.99
EPC	0.43	0.59	1.02	1.69	1.30	0.95	0.69	0.52	0.85	1.77	1.05	0.84	1.05
MTD	-0.58	-0.41	-0.08	0.67	0.28	-0.04	-0.43	-0.50	-0.12	0.76	0.02	-0.20	0.00

TABLEA13: INDICATORS OF COMPETITIVENESS, EFFICIENCY AND POLICY IMPACTS CALCULATED FOR MAJOR CROPS GROWN IN ZONE 5 OF LEBANON (COASTAL SAIDA AND SOUR)
(VALUES REPORTED IN LEBANESE POUNDS)

ITEMS	AVOCADO GHAZIEH	BANANA ABOULOUSSOUD	BANANA AKABIEH	BANANA ZAHRANI	BANANA SOUR	VALENCIA ABOULOUSSOUD	VALENCIA BRAK	VALENCIA ANSARIYEH	VALENCIA SOUR	LEMON GHAZIEH	ORANGE BRAK	ORANGE SOUR	CUCUMBER ZAHRANI GH	TOMATO ZAHRANI GH
Private Profit	412,050	1,310,700	1,466,510	643,850	-969,610	1,232,225	378,810	1,043,465	27,562	70,750	6,400	-493,685	833,925	1,507,880
Social Profit	1,832,006	1,274,731	1,448,059	1,202,303	-685,919	3,341,239	2,616,721	4,247,910	1,553,567	1,748,456	1,339,370	1,452,035	4,609,252	3,664,281
Private Value Added	1,826,000	3,412,500	3,109,250	2,042,000	591,600	2,362,000	1,726,750	2,150,140	992,452	1,295,000	1,587,000	774,600	2,910,000	4,029,500
Social Value Added	3,289,868	3,620,445	3,301,808	2,808,353	878,467	4,461,498	4,115,243	5,467,267	2,624,303	3,085,984	3,076,242	2,854,999	6,693,923	6,216,690
Output Transfer	-1,479,632	-255,749	-223,780	-791,812	-343,118	-2,102,877	-2,402,740	-3,322,827	-1,641,287	-1,802,055	-1,502,055	-2,102,055	-3,827,002	-2,213,575
Input Transfer	-15,765	-47,804	-31,222	-25,459	-56,252	-3,380	-14,248	-5,699	-9,435	-11,071	-12,813	-21,656	-43,079	-26,385
Factor Transfer	-43,912	-243,914	-211,009	-207,900	-3,176	9,517	-150,581	-112,682	-105,846	-113,278	-156,272	-134,679	-8,596	-30,789
Net Transfer	-1,419,956	35,969	18,451	-558,453	-283,691	-2,109,014	-2,237,911	-3,204,445	-1,526,005	-1,677,706	-1,332,970	-1,945,720	-3,775,327	-2,156,401
PCR	0.77	0.62	0.53	0.68	2.64	0.48	0.78	0.51	0.97	0.95	1.00	1.64	0.71	0.63
DRC	0.44	0.65	0.56	0.57	1.78	0.25	0.36	0.22	0.41	0.43	0.56	0.49	0.31	0.41
NPCo	0.57	0.94	0.94	0.75	0.75	0.55	0.45	0.40	0.41	0.45	0.55	0.36	0.56	0.68
NPCi	0.92	0.92	0.93	0.93	0.89	0.98	0.95	0.94	0.94	0.95	0.94	0.95	0.98	0.97
PC	0.22	1.03	1.01	0.54	1.41	0.37	0.14	0.25	0.02	0.04	0.00	-0.34	0.18	0.41
EPC	0.56	0.94	0.94	0.73	0.67	0.53	0.42	0.39	0.38	0.42	0.52	0.27	0.43	0.65
MTD	-0.43	0.01	0.01	-0.20	-0.32	-0.47	-0.54	-0.59	-0.58	-0.54	-0.43	-0.68	-0.56	-0.35

TABLE A14: INDICATORS OF COMPETITIVENESS, EFFICIENCY AND POLICY IMPACTS CALCULATED FOR MAJOR CROPS GROWN IN ZONE 6 OF LEBANON (ZAHLE AND WEST BEKAA)
(VALUES REPORTED IN LEBANESE POUNDS)

ITEMS	APPLE BEKAA	CUCUMBER BEKAA GH	GRAPES BEKAA PROCESSING	GRAPES BEKAA TABLE	MELON BEKAA IRRIGATED	POTATO BEKAA IRRIGATED	SUGARBEET BEKAA IRRIGATED	TOMATO BEKAA IRRIGATED	WATERMELON BEKAA IRRIGATED	WHEAT BEKAA RAINFED
Private Profit	391,250	4,714,000	209,900	-145,825	88,025	-68,820	38,470	630,950	54,350	56,210
Social Profit	3,209,485	13,209,480	1,129,830	807,891	2,183,286	181,419	-46,471	2,759,129	2,020,879	-4,339
Private Value Added	1,558,000	6,732,500	607,000	516,500	771,000	397,700	613,500	1,369,000	445,000	110,000
Social Value Added	4,160,120	15,293,212	1,511,970	1,408,689	2,900,525	682,101	400,100	3,548,039	2,432,505	49,973
Output Transfer	-2,637,225	-8,609,620	-924,651	-924,651	-2,166,079	-307,425	169,398	-2,275,717	-2,016,794	47,633
Input Transfer	-35,105	-48,908	-19,681	-32,462	-36,554	-23,024	-44,002	-96,678	-29,290	-12,393
Factor Transfer	216,115	-65,232	14,960	61,528	-34,264	-34,161	128,459	-50,860	-20,976	-523
Net Transfer	-2,818,235	-8,495,480	-919,930	-953,716	-2,095,261	-250,239	84,941	-2,128,179	-1,966,529	60,549
PCR	0.75	0.30	0.65	1.28	0.89	1.17	0.94	0.54	0.88	0.49
DRC	0.23	0.14	0.25	0.43	0.25	0.73	1.12	0.22	0.17	1.09
NPCo	0.43	0.49	0.45	0.45	0.36	0.75	1.21	0.51	0.28	1.36
NPCi	0.93	0.97	0.88	0.88	0.92	0.96	0.89	0.91	0.92	0.85
PC	0.12	0.36	0.19	-0.18	0.04	-0.38	-0.83	0.23	0.03	-12.95
EPC	0.37	0.44	0.40	0.37	0.27	0.58	1.53	0.39	0.18	2.20
MTD	-0.68	-0.56	-0.61	-0.68	-0.72	-0.37	0.21	-0.60	-0.81	1.21

TABLE A15: INDICATORS OF COMPETITIVENESS, EFFICIENCY AND POLICY IMPACTS CALCULATED FOR MAJOR CROPS GROWN IN ZONE 7 OF LEBANON (BAALBECK)
(VALUES REPORTED IN LEBANESE POUNDS)

ITEMS	APPLE AINATA	APPLE YAMOUNEH	APPLE BAALBECK	CUCUMBER BRITAL GH	CUCUMBER KAFARDAN GH	GRAPES BAALBECK	POTATO BAALBECK IRRIGATED	SUGARBEET BAALBECK IRRIGATED	TOBACCO RASMELHADETH IRRIGATED	POTATO MAJDALOUN
Private Profit	1,246,100	131,000	160,900	3,799,000	758,760	-533,525	-230,630	228,840	355,410	-163,665
Social Profit	2,466,256	694,965	901,264	10,433,640	8,094,943	-117,819	305,869	-269,182	-409,669	118,581
Private Value Added	2,154,000	1,100,000	1,171,000	7,211,000	4,480,500	268,500	172,000	777,000	866,000	199,300
Social Value Added	3,427,332	1,622,892	1,890,620	13,759,723	11,823,368	680,597	832,872	601,629	137,138	564,254
Output Transfer	-1,309,780	-554,890	-753,124	-6,734,620	-7,387,696	-424,826	-688,415	163,045	727,016	-381,188
Input Transfer	-36,448	-31,998	-33,504	-185,897	-44,828	-12,729	-27,543	-12,326	-1,846	-16,234
Factor Transfer	-53,176	41,073	20,744	85,917	-6,685	3,609	-124,373	-322,650	-36,217	-82,708
Net Transfer	-1,220,156	-563,965	-740,364	-6,634,640	-7,336,183	-415,706	-536,499	498,022	765,079	-282,246
PCR	0.42	0.88	0.86	0.47	0.83	2.99	2.34	0.71	0.59	1.82
DRC	0.28	0.57	0.52	0.24	0.32	1.17	0.63	1.45	3.99	0.79
NPCo	0.65	0.70	0.65	0.60	0.45	0.49	0.50	1.21	3.66	0.62
NPCi	0.87	0.86	0.86	0.94	0.97	0.92	0.95	0.92	0.99	0.96
PC	0.51	0.19	0.18	0.36	0.09	4.53	-0.75	-0.85	-0.87	-1.38
EPC	0.63	0.68	0.62	0.52	0.38	0.39	0.21	1.29	6.31	0.35
MTD	-0.36	-0.35	-0.39	-0.48	-0.62	-0.61	-0.64	0.83	5.58	-0.50

TABLE A16: INDICATORS OF COMPETITIVENESS, EFFICIENCY AND POLICY IMPACTS CALCULATED FOR MAJOR CROPS GROWN IN ZONE 8 OF LEBANON (QAA AND HERMEL)
(VALUES REPORTED IN LEBANESE POUNDS)

ITEMS	MELON QAA IRRIGATED	TOMATO QAA IRRIGATED	WATERMELON QAA IRRIGATED	WATERMELON QAA TUNNELS
Private Profit	324,700	846,125	387,525	956,025
Social Profit	1,697,178	3,590,027	1,963,143	1,918,590
Private Value Added	691,000	1,306,000	828,000	1,412,000
Social Value Added	2,298,984	4,364,050	2,630,144	2,610,691
Output Transfer	-1,624,559	-3,075,717	-1,816,794	-1,216,794
Input Transfer	-16,575	-17,667	-14,651	-18,104
Factor Transfer	-235,506	-314,148	-226,526	-236,126
Net Transfer	-1,372,478	-2,743,902	-1,575,618	-962,565
PCR	0.53	0.35	0.53	0.32
DRC	0.26	0.18	0.25	0.27
NPCo	0.36	0.34	0.36	0.57
NPCi	0.93	0.94	0.92	0.91
PC	0.19	0.24	0.20	0.50
EPC	0.30	0.30	0.31	0.54
MTD	-0.60	-0.63	-0.60	-0.37

TABLE 17: INDICATORS OF COMPETITIVENESS, EFFICIENCY AND POLICY IMPACTS CALCULATED FOR MAJOR CROPS GROWN IN ZONE 9 OF LEBANON (NABATIYEH AND MARJAYOUN)
(VALUES REPORTED IN LEBANESE POUNDS)

ITEMS	OLIVES KFERHATA	OLIVES NABATIYEH	TOBACCO ADEHIT	TOBACCO ELEREZ	TOBACCO BENT-JEBEIL	WHEAT GHASANIEH	WHEAT NABATIYEH
Private Profit	1,546,250	1,134,750	687,280	582,437	108,660	-95,150	101,300
Social Profit	2,001,845	320,117	207,739	113,918	-178,664	-130,543	11,147
Private Value Added	2,040,000	1,532,500	1,365,000	1,335,000	765,000	111,750	166,600
Social Value Added	2,474,595	706,467	833,372	803,762	441,090	46,517	72,367
Output Transfer	-453,593	806,362	526,706	526,706	316,024	50,610	74,784
Input Transfer	-18,997	-19,670	-4,922	-4,532	-7,886	-14,623	-19,449
Factor Transfer	21,000	11,400	52,087	62,719	36,586	29,840	4,080
Net Transfer	-455,595	814,633	479,541	468,519	287,324	35,393	90,153
PCR	0.24	0.26	0.50	0.56	0.86	1.85	0.39
DRC	0.19	0.55	0.75	0.86	1.41	3.81	0.85
NPCo	0.83	1.94	1.54	1.54	1.54	1.36	1.36
NPCi	0.92	0.87	0.96	0.97	0.94	0.84	0.86
PC	0.77	3.54	3.31	5.11	-0.61	0.73	9.09
EPC	0.82	2.17	1.64	1.66	1.73	2.40	2.30
MTD	-0.18	1.15	0.58	0.58	0.65	0.76	1.25

TABLE A18: INDICATORS OF COMPETITIVENESS, EFFICIENCY AND POLICY IMPACTS CALCULATED FOR MAJOR CROPS GROWN IN THE COASTAL ZONE OF THE GAZA STRIP
(VALUES REPORTED IN NEW ISRAELI SHEQALIM)

ITEMS	SQAUSH	PEPPER	POTATOES	TOMATOES GREEN HOUSE	CUCUMBER GREENHOUSE	EGGPLANT	CAULI-FLOWERS	STRAWBERRY GREEN HOUSE	CITRUS	MONGO
Private Profit	329.16	1876.88	-52.86	8741.27	6528.75	944.10	568.26	2386.75	-1314.63	1622.40
Social Profit	827.67	2454.27	490.08	10978.25	7924.40	1643.40	847.82	3979.15	-1131.74	2113.28
Private Value Added	2738.06	4138.63	1484.05	13542.72	9956.80	3320.30	1938.93	7973.00	462.07	4074.90
Social Value Added	3236.57	4716.02	2026.98	15779.70	11352.45	4019.60	2218.50	9565.40	644.96	4565.78
Output Transfer	-390.00	-500.00	-350.00	-1800.00	-1200.00	-520.00	-240.00	-1200.00	-120.00	-450.00
Input Transfer	108.51	77.39	192.93	436.98	195.66	179.31	39.57	392.40	62.89	40.88
Factor Transfer	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Net Transfer	-498.51	-577.39	-542.93	-2236.98	-1395.66	-699.31	-279.57	-1592.40	-182.89	-490.88
PCR	0.88	0.55	1.04	0.35	0.34	0.72	0.71	0.70	3.85	0.60
DRC	0.74	0.48	0.76	0.30	0.30	0.59	0.62	0.58	2.75	0.54
NPCo	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
NPCi	1.10	1.10	1.11	1.11	1.11	1.11	1.09	1.11	1.09	1.11
PC	0.40	0.76	-0.11	0.80	0.82	0.57	0.67	0.60	1.16	0.77
EPC	0.85	0.88	0.73	0.86	0.88	0.83	0.87	0.83	0.72	0.89
MTD	-0.15	-0.12	-0.27	-0.14	-0.12	-0.17	-0.13	-0.17	-0.28	-0.11

TABLE A19. INDICATORS OF COMPETITIVENESS, EFFICIENCY AND POLICY IMPACTS CALCULATED FOR MAJOR CROPS GROWN IN THE JORDAN VALLEY ZONE OF WEST BANK
(VALUES REPORTED IN NEW ISRAELI SHEQALIM)

ITEMS	SQAUSH	STRING BEANS	BROAD BEANS	JEW'S MALLOW	TOMATOES GREEN HOUSE	PEPPER GREEN HOUSE	POTATOES	BANANAS TISSUE CULTURE	CITRUS	GRAPES SEEDLESS
Private Profit	-31.67	350.95	1936.86	1348.37	11841.30	8260.41	1828.28	7270.35	661.97	678.47
Social Profit	174.16	585.17	2256.07	1632.49	13988.25	9678.49	2219.23	8462.46	1030.09	1677.88
Private Value Added	909.00	1225.13	2582.14	1893.37	16767.01	11255.73	2559.67	8418.12	1793.39	2364.70
Social Value Added	1114.83	1459.35	2901.35	2177.49	18913.96	12673.81	2950.62	9610.23	2161.51	3364.11
Output Transfer	-150.00	-180.00	-292.80	-240.00	-1920.00	-1280.00	-330.00	-1022.00	-280.00	-625.00
Input Transfer	55.83	54.22	26.41	44.12	226.95	138.08	60.95	170.11	88.13	374.42
Factor Transfer	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Net Transfer	-205.83	-234.22	-319.21	-284.12	-2146.95	-1418.08	-390.95	-1192.11	-368.13	-999.42
PCR	1.03	0.71	0.25	0.29	0.29	0.27	0.29	0.14	0.63	0.71
DRC	0.84	0.60	0.22	0.25	0.26	0.24	0.25	0.12	0.52	0.50
NPCo	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
NPCi	1.10	1.10	1.08	1.10	1.10	1.10	1.09	1.10	1.10	1.11
PC	-0.18	0.60	0.86	0.83	0.85	0.85	0.82	0.86	0.64	0.40
EPC	0.82	0.84	0.89	0.87	0.89	0.89	0.87	0.88	0.83	0.70
MTD	-0.18	-0.16	-0.11	-0.13	-0.11	-0.11	-0.13	-0.12	-0.17	-0.30

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