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ANALYSIS GUIDELINES
Volume I. Concepts and Principles

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These guidelines are written for policy analysts in developing countries who deal with the practical issues related to planning, implementing, and evaluating agricultural policy analysis projects. The main topics covered include: (1) the policy analysis context; (2) production and marketing; (3) inputs and input marketing; (4) consumer demand and food policy; and (5) agricultural trade. Each chapter reviews the underlying economic theory, discusses the direct impacts of policy interventions, and illustrates the use of policy interventions in hypothetical and country case studies.

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AGRICULTURAL POLICY ANALYSIS GUIDELINES

PREFACE

The importance of agricultural and economic policies to the performance of a developing country's agricultural sector has attracted increased attention in recent years. This has come about for several reasons:

- The contrast between those developing countries that have grown rapidly and those that have done poorly has become more evident, as has a growing realization that economic and agricultural policies account for a great deal of the difference in performance.
- The debt crises of many developing countries in recent years have forced the International Monetary Fund (IMF) and international and national aid donors to focus on what went wrong, and why, as well as how to deal with the aftermath. Agricultural policy reform has invariably become part of a larger package of policy changes suggested by the IMF and aid donors.

Ubiquitous government involvement in the agricultural sector and elsewhere in an economy creates the potential for both great social benefit and great social harm. Thoughtful policy analysis and good economic analysis can help senior government officials make better decisions. In order for policy reform to become a reality, it is necessary that the techniques of policy analysis become more readily available to decisionmakers in developing countries; agricultural policy analysts can play a significant role in providing such analysis. "Agriculture" is a shorthand term that covers all of a nation's food and fiber systems. This larger concept encompasses the production, marketing and processing of agricultural products and their production inputs, food and fiber consumption, and the import and export of those products.

These guidelines are written for those policy analysts in developing countries concerned with the performance of the agricultural sector and are intended to help them better understand: (1) the nature of the policy process and the role of economic analysis in that process; (2) how to identify and diagnose policy problems; and (3) the economic issues involved in various policy approaches and how to analyze these issues, including identifying the need for expert assistance.

Developing countries vary greatly with respect both as to the number of trained policy analysts and as to the experience of those analysts with the policy process. Some nations have a large number of experienced analysts in government, universities, specialized research institutes and the private sector are among the best in the world. At the other end of the spectrum are nations whose analytical capacity is very limited. The analysts' level of training in economics and quantitative techniques is limited, as is their experience in working in the policy process. This latter situation is typical in a large number of the least developed countries -- nations where agricultural policies and the performance of the agricultural sector are crucial to their development.

These guidelines are written for people with limited analytical skills and policy analysis experience, and for those who will be required to do policy analysis in the future. While the concepts dealt with in these guidelines are sophisticated and powerful, the approach to them is fairly simple and straightforward so that readers can develop a useful and productive understanding of policy analysis within the limits of their training and experience. For some, the guidelines may simply serve as a refresher course, while for others they will be an introduction to new material. We assume only general familiarity with basic economic theory. Selected references are provided to more rigorous treatments of particular topics.

The material presented should be viewed as a guide, as the title implies, to understanding the policy process, diagnosing policy issues, and analysing policy alternatives. It will help many analysts to better frame policy questions, develop data, do simple but useful policy analysis, and identify areas of policy analysis where either additional training or the help of experts from within their country or elsewhere is required.

These guidelines are not intended to be an all encompassing manual of how to analyze all possible policy issues important to the agricultural sector in any and all circumstances. Such an all-encompassing document cannot be written, in large part because policy analysis is a mixture of science and art. Some of this can be self-taught, but much of it cannot. Lack of analytical skills has to be overcome mainly by formal training of one form or another. The art of doing policy analysis is gained through experience, and formal guidance from knowledgeable people helps speed analysts along the policy analysis learning curve.

Chapter I provides a necessarily general discussion that points out those elements in the policy environment to which the policy analyst must be sensitive. This chapter provides a general analytic framework that identifies and discusses specific policy issues and the interrelationships among various types of economic and agricultural policies. Its purpose is to provide an overview that ties together Chapters II-V, which examine the options for and potential effects of governmental intervention in four discrete areas:

- Chapter II : Production and Product Marketing
- Chapter III: Inputs and Input Marketing
- Chapter IV : Consumer Demand and Food Policy
- Chapter V : Agricultural Trade

Each chapter reviews the underlying economic theory relevant to the area, discusses the direct effects of typical policy interventions, and illustrates the use of these policies in both hypothetical examples and case studies. In addition, an analysis of Liberian rice policy, an annotated bibliography, a list of sources of assistance in policy analysis, and a glossary of terms often used in discussing policy analysis are provided as an annex to these guidelines.

CHAPTER I

POLICY ANALYSIS CONTEXT

Before one can discuss how to do policy analysis, it is necessary to understand the policy context and the nature of policy analysis within that context. This chapter consists of two parts:

- "The Policy Analysis Environment" examines the general decisionmaking structures that affect agricultural policy and its relevance to policy analysis.
- "The Nature of Policy Analysis" examines the general thrust of policy analysis and its use by decisionmakers.

I. POLICY ANALYSIS ENVIRONMENT

The policy analysis environment of relevance here generally encompasses those governmental agencies and bodies that are related to the agricultural sector in terms of making decisions that affect its course. This section contains two parts that investigate:

- Who is involved in decisions, and
- Implications for policy analysis.

A. Who is Involved in Decisions?

Many agencies of government are involved in making decisions that directly or indirectly influence food and agricultural policies. The role each agency plays depends on the functions of government it is responsible for and the relationship of these functions to food and agriculture issues. These roles also change over time. Sometimes the change is gradual, reflecting the evolving structure of an economy as it develops. At other times, the change may be abrupt (and transitory) in response to a crisis. For example, a financial crisis may propel the Office of the Chief Executive and the Finance Ministry to the forefront of decisionmaking.

Exhibit 1-1 presents a simplified view of the key government agencies or institutions that relate to agriculture. Not represented here is the fact that all agencies of government, whether executive or legislative, are subject to political pressures from a large number of business, citizen and other interest groups, each of which is trying to use government to improve the economic position of its

constituents relative to those of other interest groups. Also not shown are the important roles subnational governmental units (states or provinces) play in the policy process of some countries.

The importance of Legislative Assemblies in the policy process varies widely among countries. They do not exist in some nations, while in others, they may not be much more than pro forma organizations that routinely approve executive branch decisions. In still other situations, legislative assemblies play a key role, are powerful in their own right and negotiate actively with the executive branch in formulating policies.

The Office of the Chief Executive is the point at which final policy decisions are made within the administrative branch of government. In some countries, the chief executive is so powerful that he in effect tells the various ministries or agencies of government what the policies will be and the latter are responsible for implementing them. However, this extreme authoritative approach to government is not common.

More typically, ministries or agencies of government have both responsibilities for and a degree of autonomy in formulating and proposing policies. Each agency comes at this task from the standpoint of its perceived responsibilities. There may be conflicting interests among ministries or agencies, and the Chief Executive's Office is the point at which these conflicts are usually resolved.

Financial Offices (Ministry of Finance, Central Bank and the Ministry of Planning) all play important roles in determining levels of government revenue and how these moneys are spent for both ongoing activities (operating budget) and longer-term capital investments (development budget). These organizations affect food and agricultural policies directly through financial allocations to ministries or agencies whose activities help shape and determine the performance of food and agricultural activities, and indirectly through shaping fiscal, monetary and exchange rate policies.

In nearly every country, the Ministry of Finance or Treasury is likely to be a powerful institution in terms of its influence on policy, second only to the Chief Executive's Office. In addition to its administrative responsibilities for collecting taxes, regulating expenditures and directly or indirectly influencing money supply and interest rates, the Ministry of Finance can exercise powerful influence over the food and agriculture sector by:

- Influencing national priorities for government investment in development programs and projects by controlling how funds are allocated;
- Influencing the general level of prices, inflation and exchange rates through fiscal and monetary policy;
- Determining tax rates and subsidies to provide differential incentives or disincentives to the various economic sectors, industries and enterprises; and
- Controlling the allocation of resources needed to implement programs for carrying out the policy decisions of the government.

By its very nature, the budget process tends to view policies in terms of their costs and benefits measured in value terms. Because of this, it may not be overly sympathetic to benefits that are difficult to value but which some agencies think are very important.

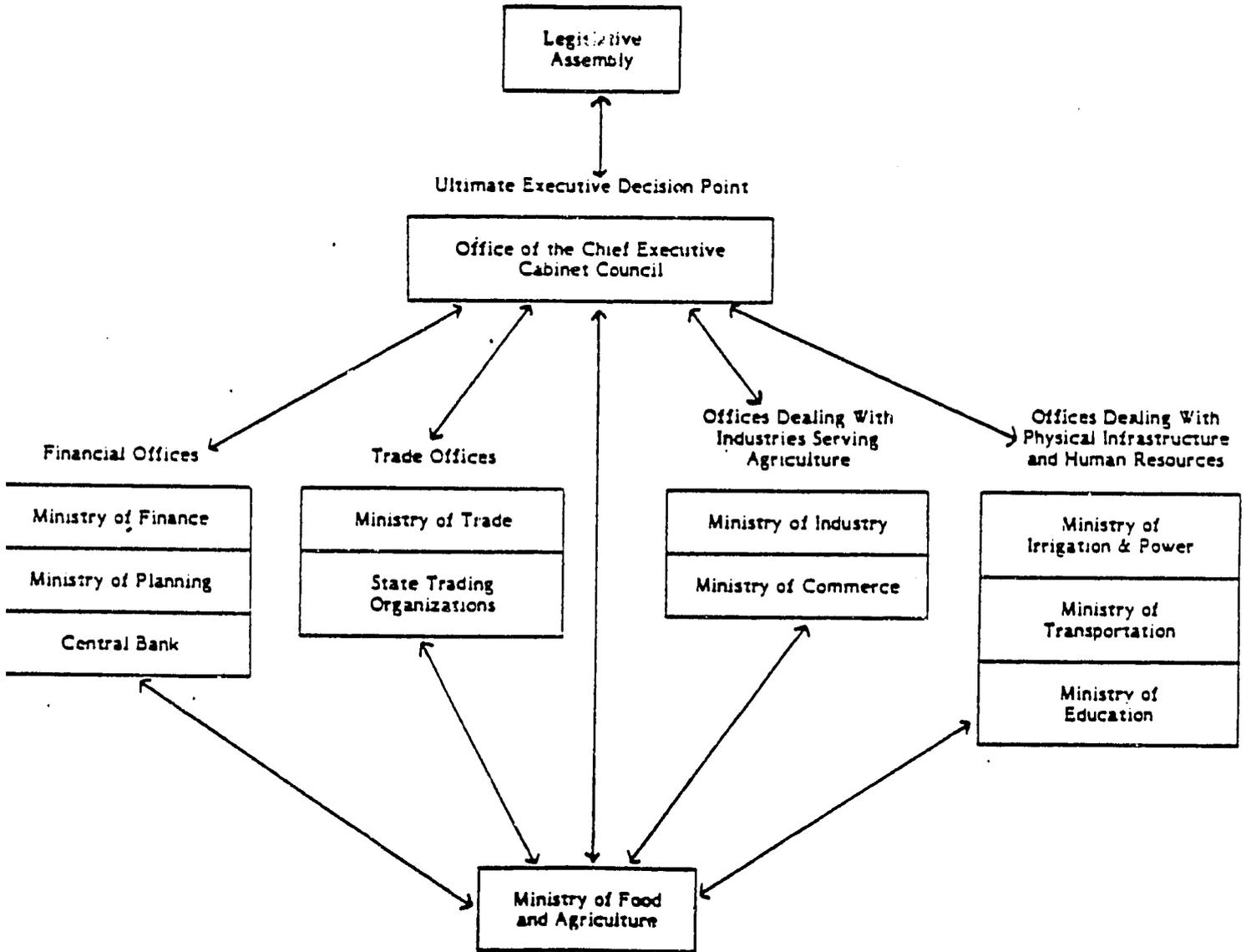
The annual or biennial budget process for allocating funds to organizations, programs and projects is the principal direct means governments have to set and enforce policy priorities. The budgeting process affects the levels at which different public programs and policies are implemented and is a key influence in determining the distributional effects among producers and consumers, large farmers and small, different regions, sectors and subsectors, rich and poor, and other factors important to policymakers. Its comprehensive jurisdiction, the specialized knowledge of its officials, and the information-intensive nature of the budget process make the Ministry of Finance one of the most valuable sources of information and analysis, as well as an important audience for policy analysis done by other agencies.

Planning Offices usually have direct lines to the Chief Executive or Cabinet Council, and they typically perform analyses designed to help policymakers determine long-term development goals and strategies. At times, they may also implement development policies and programs, including identifying, appraising, selecting and financing development projects.

Central Banks have especially important influences on food and agriculture since they affect:

- The general level of inflation through control of the money supply.

Exhibit 1-1
Simplified Representation of National Government Agencies Influencing
 Agricultural Development and Food and Agricultural Policies



- The availability and cost of credit through control of interest rates and credit allocations among various sectors and industries, as well as the seasonal availability of credit for food production and marketing.
- The availability of foreign exchange to finance imports of food, capital equipment, and production inputs.
- Producer and consumer prices through controls on foreign exchange rates.

The Central Bank may be a major participant in food and agricultural policymaking, both as a source of data on items such as money supply, credit, foreign exchange and interest rates, and as a good source of economic research and policy analysis.

Sectoral banks such as agricultural credit banks, also play an important role by determining credit allocations within agriculture, as well as the terms and conditions of lending to farmers. At the same time, sector banks can be valuable sources of information on current financial and economic conditions of agriculture and on problems in rural areas. Many have some capacity for limited types of economic research and analysis.

Ministries other than Agriculture, such as Commerce, Trade and Industry are also important to food and agriculture because they have jurisdiction over major segments of the food system, including processing, marketing, and storage of food and agricultural commodities; agribusiness enterprises; production and marketing of agricultural inputs (farm machinery, fertilizers, chemicals); and foreign trade. Indeed, in more advanced developing countries, these ministries may oversee more of the total economic value added by the food and agriculture sector than the Ministry of Agriculture itself.

The range of functions found within the Ministry of Food and Agriculture in developing countries can be the most diverse of all public sector institutions. Most of them have primary responsibility for crop and livestock production, but they may also have responsibility for rural development, forestry, fisheries, natural resources and food security.

Beyond these basic functions, the Ministry of Food and Agriculture may perform a number of other important roles, including:

- Price support operations;
- Input subsidies;

- Market regulation and control;
- Production and marketing credit;
- Promotion and supervision of farmer cooperatives;
- Operation or supervision of state-owned farms, food processing, and marketing facilities;
- Economic research; and
- Agricultural statistics.

Clearly, a ministry with the above range of responsibilities could be a powerful, perhaps dominant, force in setting national food and agricultural policies. This is not always the case, however, since many agricultural policy decisions have broad national implications for consumers, foreign trade, credit policies, government costs and other sector activities. It is concern with the broader issues that brings other units of government into the policy process, sometimes in a dominant way.

The preceding institutions are generally the more important public agencies directly concerned with food and agricultural policies. There are, however, a variety of other government organizations that may play quite significant roles in decisionmaking on some aspects of food and agriculture, especially when those organizations operate widely throughout rural areas. In addition, they often possess important information on local conditions and problems relevant to food and agricultural policymaking.

Policies affecting irrigation and electric power can be very important to agricultural production. Since the responsibilities for these functions are usually housed in separate ministries, mechanisms are needed for interaction with them by the Ministry of Food and Agriculture in the decision process. Natural resource conservation and development responsibilities for land, forests, minerals, energy and fisheries may also be located in one or more separate ministries. Since natural resources are critical to food and agricultural production, these ministries can influence food and agricultural performance through their policies and programs.

The Ministry of Education exerts an important influence on the agricultural sector. Both general education and that specifically aimed at the agricultural sector may be the responsibility of this ministry, and these activities influence the productivity of the agricultural sector. In addition, the Ministry of Education may

have responsibilities for universities, colleges, and institutions that conduct agricultural, economic, and social research, all of which may be critical in determining the agricultural sector's performance.

The public sector may also include a variety of quasi-governmental institutions that produce, process, store and market food and agricultural commodities and sometimes distribute farm inputs and credit. Depending upon the scope of their operations, such enterprises too may influence the national policy development.

B. Implications for Policy Analysis

The large number of decisionmaking participants that can influence food and agricultural policies has important implications for policy analysis.

First, many analysts in different government agencies may be working on the same set of policy issues, but each from the perspective of his or her own agency. This environment may be highly competitive and even adversarial in nature. For example, the Ministry of Food and Agriculture may favor a particular set of policies and will do analysis to help support its view. At the same time, the Ministry of Finance may oppose this policy approach, and its analysts may feel compelled to demonstrate that the approach by the Ministry of Food and Agriculture is incorrect.

In such a policy analysis environment, it is important for each analyst to do the best and most defensible work in looking at policy options. The analysis should be broad enough to encompass the points likely to be raised by others in the decisionmaking structure. This requires staying in touch with what others are thinking and doing.

Second, no one analyst will necessarily have responsibility for dealing with all the components of policy analysis. Some may be involved in identifying the issues and posing the policy alternatives to be analysed. Others may have primary responsibility for doing the economic analysis. Still others may be specialists in evaluating budgetary implications of alternative policies. Finally, the process of evaluating the performance of policies and programs over time may be lodged in several ministries or agencies and involve people who were not part of the policy design, analysis and implementation process. Effective policy analysis work requires communication among the various analysts working in the decisionmaking process.

In some countries, the number of policy analysts dealing with food and agricultural issues may be relatively few, and they might deal with most if not all aspects of policy analysis. This simplifies the analysis process, but it also reflects a limited amount of talent available to do analysis, thereby restricting the number of issues and policy options for dealing with each issue that can be examined. Improving a country's ability to do policy analysis invariably makes the analytical process more complex. At the same time, this added complexity may result in better decisions being made by broadening the number of views and increasing the amount of relevant information.

2. WHAT IS POLICY ANALYSIS: THE WORK OF THE POLICY ANALYSIS UNIT

Policy analysis is only one source of information used by policymakers in considering a possible change in agricultural policies. In most cases, other information is at least as important as policy analysis: the decisionmaker's own estimates of the likely outcome of policy change based on experience or ideology, their expectations regarding the political costs and benefits of the change, and practical considerations, such as the cost of implementation.

Policy analysis differs from economic research in that it is intended to support a particular decision. Consideration of the expected impact of alternative policy measures is a central element of the analysis, not merely an appendage added for cosmetic reasons. The results of the analysis generally take precedence over discussions of the methodology used. Nonetheless, good policy analysis does not gloss over weaknesses of approach or data, since to do so risks misleading the decisionmaker.

Policy analysis may or may not draw a conclusion regarding which of the specific alternatives considered is the best, or make a recommendation as to which should be selected. It is rare to find that any one alternative outperforms all the others along every dimension. Alternative A may increase farmer income more than Alternative B, for example, while Alternative B costs less to implement. The information available to the analysts generally does not permit them to make a choice in this situation. The decisionmakers, not the analysts, must decide which outcomes they prefer and bear the responsibility for the costs as well as the benefits that result.

Most policies seek to achieve several goals at once, and it is rare to find policies designed to achieve a single goal. In agriculture, two common goals are increasing agricultural production and maintaining or achieving an equitable distribution of income among farms of different size or regions of a country. The relative weights that the political process assigns to these goals will vary among countries and within a country over time. What usually results are policies that are in conflict to some extent with any single goal or even a broader political ideology.

Another aspect of the policy process that grows out of the interplay between goals and policies is that policy changes are usually incremental in nature. Aside from instances of political revolutions involving radical changes in economic and social policies, policies usually change a little bit at a time, for several reasons:

- The circumstances that give rise to changes in policy normally occur incrementally.
- Wholesale changes in policy require both a larger risk and a larger commitment of resources than most governments can afford.
- Conflicts among goals may limit the magnitude of policy changes at any point in time, because they limit what is politically possible.
- The process by which the interaction between goals and policies reveals the relative importance of different goals implies a learning-by-doing approach that makes policymakers cautious about how much change they are willing to bring about at any point in time.
- There is always uncertainty about the results of policies. Fear of the unknown, especially when dealing with people's lives and livelihoods, makes policymakers reasonably cautious.

As a consequence of the above, policy change is an ongoing set of activities dealing with adjustments in government interventions and periodic reexamination of policy issues. Policy analysis must therefore be an ongoing activity that reviews and evaluates the effectiveness of existing policies and identifies those conditions or circumstances when new policy approaches need to be considered. Sometimes the review process points to minor changes or fine-tuning of existing policies; at other times major changes in policies may be called for.

Governments have three basic ways to implement policies. One is to spend money to reach the aims directly. A second is through taxation and subsidization to encourage other economic actors to perform in ways consistent with government aims. The third way is to influence behavior through regulation or other exercise of authority. Governments directly and indirectly command large amounts of financial resources. These revenues include the direct operating budgets of government agencies, resources of parastatals and publicly financed investments. Governments also tax and subsidize goods and incomes in a variety of ways. Finally, government regulations loom large in most economies and take many forms. They include regulating prices (exchange rates, interest rates, consumer prices, prices received by producers or minimum wages) and legal prohibitions of certain types of activity, where production, consumption and trade of certain items may be banned or greatly restricted.

Since the amount of resources available to a government and its economy is limited, decisions have to be made as to how best to allocate these resources to achieve society's goals and objectives. Measurement of the costs and benefits of available alternatives are needed to enable decisionmakers to compare alternative policies or interventions within a sector such as agriculture or for the whole economy.

Policy analysts can provide both quantitative and non-quantified measures of their costs and benefits. Policy analysis consists of the following activities:

- Formulating the economic problem in the current political-economic environment;
- Defining measures of economic and social performance that relate to goals and objectives with which policies are intended to deal.
- Posing and analysing the direct and indirect economic implications of suggested changes in policies and programs;
- Evaluating the budgetary implications of such changes in terms of both expenditures and revenues for each policy alternative;
- Evaluating the administrative feasibility of implementing policies in terms of the availability of institutions and people preceded to make them work; and
- Re-evaluating current policies and programs over time to see if they are working as intended, and, if they are not working well, to specify the reasons why and to suggest needed changes.

Policy analysis provides decisionmakers with a means of quantifying at least some of the costs and benefits of alternative policies. It is also a way to identify key interrelationships within an economy and measure the indirect effects of any policy.

The work of a typical policy analysis unit is divided into five basic tasks:

- Diagnostic work,
- Decisionmaker-analyst dialogue,
- Analysis of alternative policies (interventions),
- Presenting the results, and
- Background work.

A. Diagnostic Work

Tracking the performance of the food and agricultural sectors in order to establish performance criteria and to identify poor performance and the reasons for it is an important part of the policy analysis process. To do this, the analysts of the unit must rely on the best information available regarding development in the agricultural sector, the governments' goals and objectives for the food and agricultural sectors, and an understanding of the policies and programs in place to achieve these goals. The analyst's understanding also involves knowing what performance indicators government has set for various policies. Where these indicators are not explicit, analysts may have to make judgments about what constitutes acceptable or unacceptable performance and verify the validity of these judgments with decisionmakers. These performance indicators typically cover a wide range, including rates of growth in production, total and per capita availability of key food items, and prices paid by farmers and consumers.

Having identified a set of performance indicators, the analyst asks how have they changed over time? Are they moving in the desired direction? Are their current levels near those desired or do they fall significantly short?

Part of the ongoing diagnostic work is to determine the reasons for poor performance. While one explanation may be that the performance objectives adopted by a country were overly ambitious, it is always necessary to look for the reasons behind poor performance.

A starting point is to examine a country's resource endowment for agricultural production. This means examining:

- The availability and quality of land for production of various crops and types of livestock, and the extent to which land in production can be increased.
- The availability of water for irrigation, the potential for expanding irrigated areas and the cost of doing so.

Availability of improved technology for increasing crop and livestock production is also important. If new technologies are available, at what rate are they being adopted by farmers? If the adoption rate is slow in the aggregate or by some classes of farmers, what are the reasons?

Adoption of new technology and use of output-increasing inputs is directly determined by production profitability. Farm profitability and the incentives to increase production are a function of the prices farmers receive for their products relative to what they have to pay for inputs (e.g. fertilizers, chemicals, fuels, etc.). A relatively simple comparison bearing on profitability is the relationship between domestic commodity/input price ratios and those in the international market using c.i.f. or f.o.b. values for the country. If the domestic price ratios are significantly less favorable than those in the international market, one has to determine what is causing these differences. Reasons could include:

- Taxation of export commodities and imported or domestically produced inputs.
- Food price controls or other policies that depress commodity prices.
- Overvalued currency that depresses commodity prices.
- Inadequate domestic transportation that depresses prices received by farmers for commodities and inflates input costs.
- Major inefficiencies in product and input marketing that inflate marketing costs.

Another step in a diagnostic procedure is to identify major factors that are associated with poor performance and that might be changed. One involves economic policies that directly or indirectly influence agricultural sectors.

Another set includes other factors that may be corrected by appropriate government actions. The latter might include:

- Investments in agricultural research and extension to generate new technologies.
- Improved soil conservation practices.
- Expansion of irrigated area.
- Improved storage and marketing facilities.
- Improved transportation.
- More effective credit systems for farmers.

B. Decisionmaker-Analyst Dialogue

As analysts identify major factors resulting in unsatisfactory agricultural performance in terms of the performance indicators being used, they should engage in discussions with relevant decisionmakers to develop a prioritized agenda for analysis of policy options. These discussions can involve:

- A review of the performance indicators themselves to see if they are realistic, recognizing that many times performance targets are not based on economic analysis alone.
- Identifying policy options that are precluded from study for political, cultural or other reasons.
- Deciding on options that can be studied in terms of decisionmakers' responsibilities within the larger government setting.
- Identifying those important policy issues that are beyond the responsibility of the organization in which the decisionmaker and analysts work, but need to be referred to another agency of government. For example, a Ministry of Food and Agriculture may identify overvalued currency as a major problem for agriculture, but primary responsibility for that issue lies with the Ministry of Finance, the Central Bank and the Chief Executive's Office.

The decisionmaker-analyst dialogue is a critical stage in the policy analysis process. It is the vehicle by which policy options are selected that fit the decisionmaker's political agenda or are consistent with the political constraints under which he or she operates. It is also an opportunity for building mutual respect between decisionmakers and analysts.

C. Analysis of Alternative Policies (Interventions)

At this stage in the policy analysis process, the analyst must translate the policy options selected into a set of alternatives that can be evaluated using available analytical techniques and data. The conventional benchmark or baseline option for this analysis is to assume that existing policies will continue. This option tells decisionmakers what they can expect to happen if policies are not changed.

Analysis of the baseline option involves, among other things, the following:

- Describing current policies in terms of their performance objectives, how they have been implemented, how long they have been in existence and who they are helping.
- Measuring the performance of those things policies are designed to influence; such as food consumption, food production, or input availability and use.
- Projecting the likely performance of current policy over, for instance, the next five years.
- Quantifying the costs and benefits of the existing policies.

The framework used to analyse the baseline option should then be applied to the alternative policy options that the analysts and decisionmakers have agreed on. The results of each alternative option should be compared to those for the baseline case in terms of key performance indicators and cost.

Analysts have a limited amount of time and resources for analysing policy options in a given area. This means the number of options studied must out of necessity be few, and one cannot cover all aspects of each policy in as much detail as one would like. Therefore, to the extent possible, the analysis should cover three important aspects of policies in more detail.

The first is an evaluation of the differences in impacts of policy among different segments of the population a policy is designed to benefit. These segments may be different geographic regions, income levels of consumers in the case of food policies, or size and type of farms in the case of producers.

The second aspect is to assess the indirect effects of policies. This requires going beyond the immediate goals of a policy and looking at its secondary and tertiary impacts. In the case of production-oriented policies, one might examine their impact in terms of food prices, food imports, consumption and nutrition levels, levels of local or even national employment, and economic activity spurred by increased agricultural production. In the case of food policies, one might examine their impact on consumer incomes, prices received by farmers and possibly rural-urban migration in response to the benefits offered by these policies.

Finally, one should subject policy options to some type of sensitivity analysis. Every country experiences developments that neither decisionmakers nor policy analysts expected. Based on experience, one can usually select a few key things that might go wrong, such as a change in world prices, and commodity shortages or surpluses for short or extended periods of time. Nationally, they could include one or more years of exceptionally good or poor weather, or unexpected shortages in foreign exchange. It is often useful to decisionmakers to know which policy options will perform best under unfavorable conditions. For example, if food security is a country's major goal, some policy options may provide more stable food supplies and prices than others. There may be a cost associated with achieving a greater degree of stability in food supplies, but it may be one that policymakers are willing to pay.

D. Presenting the Results

Busy decisionmakers do not have the time to study large documents filled with technical analysis. To be effective, policy analysts must present the results of their work in a brief and concise manner that emphasizes:

- A review of the basic assumptions used in the analysis.
- Presentation of the results of the analysis in terms of key performance indicators important to the decisionmaker.
- A brief discussion of weaknesses in the analysis due to inadequate or unreliable data and incompleteness in the analysis because of time resource, or information constraints.
- Other views on an issue and how others in or outside of government might argue for or against the conclusions being presented.

Presentations of analytical results should be as visual as possible, relying heavily on clear tables, charts and graphs to create visual summaries of the message to be conveyed.

E. Background Work

Since the policy process is a continuous one and most problems do not go away quickly, analysts should be prepared to work on issues periodically or fairly continuously. There are several reasons for this.

- Any piece of analysis may leave many unanswered questions in the minds of decisionmakers and they may want some or all of these questions answered.
- Information is always incomplete and sometimes seriously so. Policy analysts can be instrumental in improving the data and information base over time.
- Conditions change and policies need to be periodically reviewed. Hopefully, each time this is done the information and analytical underpinnings of policy analysis can be improved.

3. AGRICULTURE SECTOR PERFORMANCE AND THE ROLE OF POLICIES

The fundamental purpose of policy analysis is to improve the performance of the agricultural sector. Consequently, information, analysis, and advice on agricultural policies must be firmly grounded in an understanding of the sector, its role in the national economy, and its recent performance if the analysis is to be useful for decisionmakers. This understanding is country-specific, not theoretical, based on the history, society, and resource endowment of the nation concerned.

There are as many definitions of "acceptable" performance for the agricultural sector as there are agricultural systems themselves; no one definition is correct. In some countries, rural poverty has led national leaders to emphasize increasing farmer incomes, while in others priority is assigned to producing increased quantities of basic foods or generating foreign exchange. Few countries are able to sustain an aggregate annual growth rate for agriculture over three percent. A decline in agriculture's share of GDP is an inevitable concomitant of development; in and of itself it is not a sign of something wrong. However, any country that experiences several years of declining production on a per capita basis may safely be classified as a poor performer.

The structure of agricultural production influences which products are of greatest concern to policy makers. In many countries, grain production is the dominant concern, but in others it may be livestock, forest products, fibers, fruits and vegetables, fisheries, or any combination of these. Policy analysts should, as a matter of course, develop a picture of the agricultural sector in their particular country, including not only the structure of production (what is produced), but also who produces it -- small farmers or larger farmers, upland or lowland areas, etc. -- and the main factors that determine production. The latter include, at a minimum, the size and composition of the rural labor force, distribution of land ownership, access to credit and other inputs, the availability of yield-increasing technologies, and the degree of exposure to weather risk in different parts of the country.

The source of growth is as important as the growth rate in measuring and interpreting recent performance. Most developing countries increasingly must look to higher yields, rather than expansion of the area cultivated, as the source of agricultural growth, but cultivation of new lands, extension of irrigation, and expanded employment are all important factors to the agricultural policy maker in most countries.

Finally, the performance of the sector must be interpreted in light of the ultimate uses of national agricultural output as well as its production: which crops account for the largest share of exports, which foods are imported and which produced domestically, to what extent do food and cash crops compete for the same resources?

A. Measuring Performance

Once the structure of the food and fiber system has been defined, the next task is to examine how well it is performing. This requires specifying a set of goals, a set of performance indicators that tell us how well these goals are being achieved, and the role of policy in determining performance.

Most governments have a set of goals or targets for the agricultural sector and its contribution to national development. In nations that follow fairly elaborate planning procedures, these targets can be quite specific and cover many aspects of the food and fiber system. In other countries, the goals or targets may be less comprehensive and explicit. A few of the most frequently proclaimed policy goals involving both commodities and inputs are to:

- Provide economic incentives for farmers,
- Provide "fair" prices for consumers,
- Improve the distribution of income,
- Encourage the introduction of new technology,
- Encourage farmers to increase their production of particular commodities,
- Encourage the economic development of particular regions of the country,
- Reduce imports (food self-sufficiency),
- Increase exports,
- Stabilize prices,
- Limit merchants and other middlemen to a "fair" return,
- Provide tax revenues for the government, and
- Improve nutrition.

The weights assigned to various goals are determined politically. Thus, it is not possible to rank goals in a way that is applicable to all countries. Moreover, in a given country, it is sometimes difficult to specify the general goals with enough precision to determine quantitatively the extent to which they are achieved. It is equally difficult to assign meaningful numerical weights to the various goals. As a result, different people will judge the success or failure of a particular policy in very different ways. Furthermore, goals and the weights assigned to them are discussed in the process of considering specific policies and programs, and they may change over time.

The policy goals listed above obviously are not mutually exclusive. Some of them are complementary; others tend to be in conflict. Higher prices for farmers, for example, may result in increased production, reduced imports, but higher prices for consumers.

Three difficult questions are apparent from the discussions so far:

- (1) How can the policy goals be quantified?
- (2) How can the alternative goals be weighted?

(3) How can the interdependency among goals be taken into account?

One way to deal with these questions is to examine a number of alternative policies with respect to several performance indicators, and to calculate the costs of each policy in terms of government expenditures and the social costs associated with inefficiencies involved. These costs can then be matched against the perceived or measured benefits attained from each policy. Decisionmakers in the political process will ultimately decide which mix of costs and benefits suits them the best.

The specific performance indicators used are a function of the overall goals for development of the agricultural sector and of the nature of the country's agricultural system. In some cases, specific targets for these indicators are produced as part of the national planning process. More commonly, however, performance must be judged on the basis of historical levels and recent experience in countries in a similar situation.

The following indicators are commonly used in both developing and industrialized countries:

- the overall rate of growth for agricultural production;
- the rate of growth for the principal export and food crops;
- the increase in per capita food production;
- the extent to which domestic production and commercial imports meet the theoretical nutritional requirements of the population;
- the degree of reliance on food imports;
- the size of the agricultural labor force;
- the rate of fertilizer application per unit of land;
- the rate of increase in the yield of principal products;
- the total area cultivated, and the irrigated area; and
- the percentage of grain acreage planted to high-yielding varieties.

B. Policies and Performance

It is convenient to approach the analysis of agricultural policies using a framework of market processes within a country's food and fiber system as was depicted in Exhibit 1-2. It is these processes that provide the linkages for determining both the behavior of producers, marketing firms and consumers with respect to production and consumption levels, and how government policies influence the performance of the system.

Policies may take several forms and can be classified in various ways. Some influence the availability and prices of inputs and the state of technology of agricultural production. In product markets, policies may directly affect prices received by producers or paid by consumers. Others may affect the cost and efficiency of marketing services. Many policies are interrelated and some are in conflict with each other in terms of achieving policy objectives. Policy analysts must take these interrelationships into account, because, in some instances, several policies must be changed simultaneously to achieve the desired results.

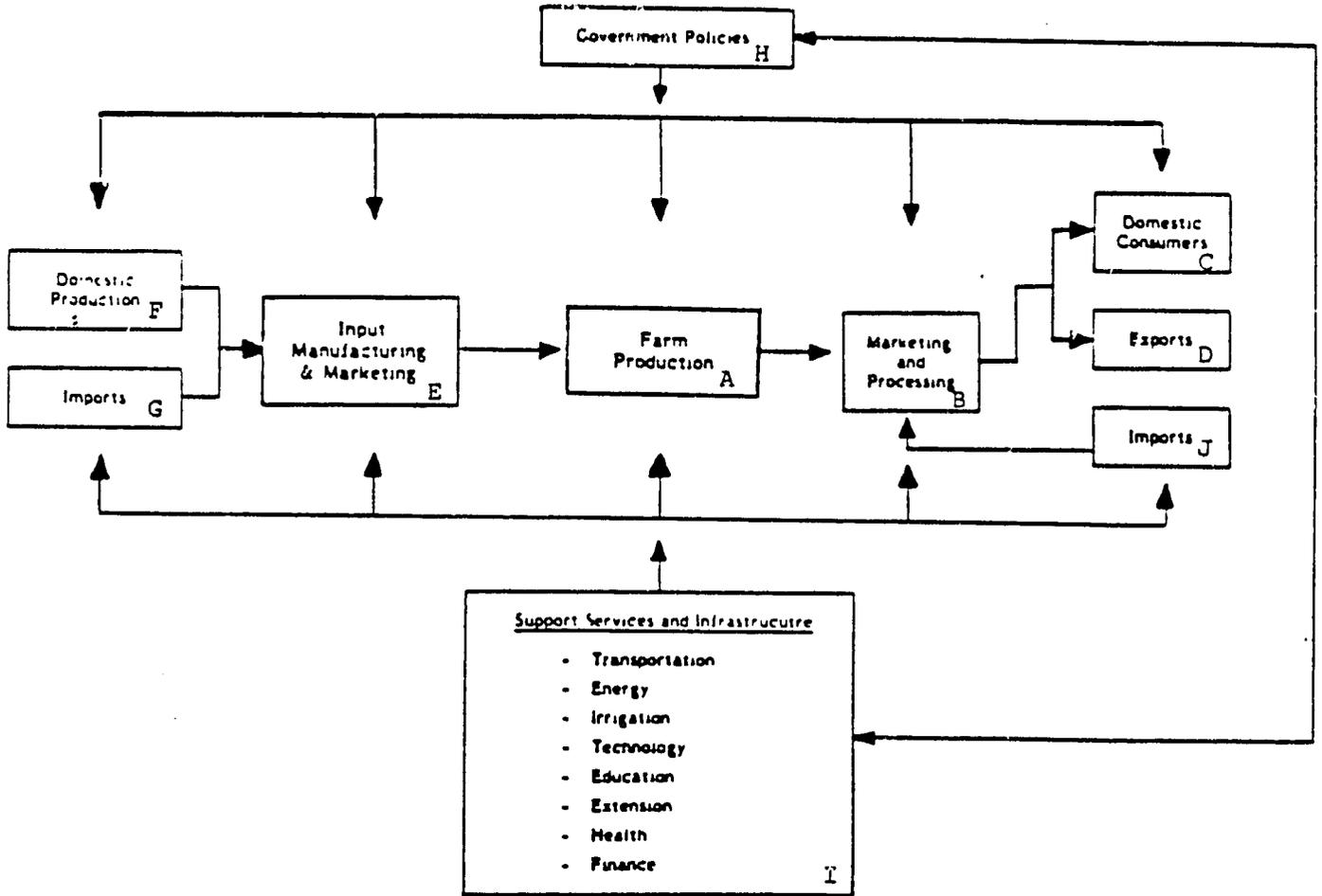
It is useful in analyzing agricultural policies to describe in some detail the structure and operation of the relevant markets, the manner in which prices are determined, and how a variety of supporting activities influence the productivity of agricultural production and distribution of that output.

In most countries, agricultural commodity and input markets have many of the following general features:

- There is a mix of private and government participation in procurement and distribution of agricultural commodities and inputs. The government may, however, dominate some markets by granting monopolies to government agencies.
- The government adopts internal price and trade policies that cover some or all segments of the population and may fix consumer prices and prices producers receive for commodities or pay for inputs.
- Demand and supply are brought into balance through adjustments in imports, exports, or changes in domestic stocks whenever there is a shortfall in supply or demand. Scarce foreign exchange, however, may prevent the use of imports as an adjustment mechanism when there is a shortfall in domestic supply. In such situations, the domestic price of a commodity or input will rise to bring supply and demand into balance. If the domestic price is controlled and, therefore, prevented from adjusting, a black market will develop to eliminate the excess demand.

Exhibit 1-2

The Food and Fiber System



- The government maintains national stocks of agricultural commodities, especially food grains. Food aid -- food imports obtained at below commercial import prices -- should also be considered, if it is available to the country.
- For some export crops, such as coffee or cocoa, domestic consumption may be negligible and the quantity exported essentially corresponds to the quantity produced. For other crops there may not be any significant domestic production and all requirements are met through imports.
- Production and consumption units are not homogeneous. Distinct groups of producers and consumers exist with different production or consumption responses to a price change. These groups may also be important in evaluating the equity effects of price and other policies.

In addition to the market behavior, there are other characteristics of agriculture that are important, especially in developing countries:

- Public investment in education, research and extension services may be too low in relation to the social rates of return that can be realized from this investment.
- Inadequate transportation can disadvantage major producing regions and sometimes consuming regions of a country.
- There may be inadequate public investment in irrigation systems and their management and in soil conservation relative to the private and social rates of return that can be realized from these investments.
- Regulation of investment in the business sectors serving farmers may limit opportunities to improve efficiency in these activities and lower the cost of the services or products they provide farmers.
- Laws and regulations governing property rights, especially land tenure arrangements, may work against farmers' adopting new production practices and increasing agricultural productivity. They may also encourage certain types of private investment in agriculture that increases production but results in excessively intensive use (exploitation) of land and water resources. The latter set of forces can seriously reduce a country's food production capacity over time.
- Government provides "cheap" credit to farmers as a way to stimulate production or to offset the adverse effects of other policies.

The following questions identify key issues that should be addressed:

- What are the kinds and extent of present government interventions?
- How do these interventions affect farmers' incentives and supply responses?
- What is the impact of existing policies on producers' incomes, consumers' food expenditure, and government budgets?
- What role can price policies play in increasing agricultural production and trade in relation to the country's comparative advantage?
- Are government interventions making the marketing system for commodities and inputs more or less efficient?
- Are a variety of longer-term development policies contributing significantly to growth in agricultural output and improving the efficiency of the food and fiber system?

Judging the benefits of alternative policies requires a good understanding of the structure of production and consumption, and who benefits or loses from higher or lower prices for either commodities or inputs.

First, higher commodity prices or lower input prices achieved through interventions offer benefits in proportion to quantities produced or used in the case of inputs. These benefits tend to go mainly to larger producers and this result may conflict with a country's equity objectives. Second, governments may not be able to extend price incentives to small producers who sell only small quantities of commodities and use few purchased inputs. Third, the rural poor, particularly laborers, may receive income benefits from higher prices through expanded employment opportunities that flow from increased production on larger farms. But because they must buy food, they suffer negative real income effects from higher food prices. The net gain or loss for these people needs to be carefully evaluated.

Consistent with consumer theory, empirical studies have found that as relative food prices change, consumers purchase more of the cheaper goods and less of the more expensive goods, if income is held constant. Moreover, the lower the income of a household, the stronger the substitution effect tends to be. Poor consumers respond to price changes of staple foods more strongly than do higher income households. (That is, the expenditures of the poor on food are far more

elastic with respect to prices than are expenditures of the rich.) This observation is significant where price policy is concerned. Since food price changes have a differential impact on food consumption levels of poor and rich households, they also have a differential impact on households' nutritional status. In the face of higher overall price levels, the poor tend either to buy less of the goods they are accustomed to consuming, or to maintain the level of their consumption by purchasing cheaper -- and sometimes less nutritious -- goods.

For the poor, substitution effects of prices are reinforced by income effects. Changes in relative food prices, in the short run, are one of the most important determinants of change in the relative and absolute real income of low-income families. Because the poor spend a larger proportion of their budget on food than do higher income households, an increase in food prices will cause a larger decline in real income of the poor than of the more well-to-do. Hence, food prices have a direct impact on the level and distribution of income among consumers -- which includes consumers who are also producers. So, while higher food prices may be desirable from a production point of view, assuming they cause producers to improve productivity and adopt new technology, they are undesirable as far as consumers are concerned, especially in their impact on low-income households. *

Perhaps not surprisingly, politicians have generally been more acutely aware of this conflict than have economists. There is intense political pressure to keep food prices low, especially in urban areas. Consumers want cheap food and employers desire low-wage labor, which can be maintained only so long as increases in the cost of living are held to a minimum. However, recent studies of prices and production recommend that food prices be allowed to increase in many countries to stimulate the desired levels of agricultural output, and increase the income level of food producers.

Thus, policy decisionmakers face a dilemma. Is it possible to meet production and consumption objectives simultaneously? The answer is yes, but it requires a mix of policies, because production and equity considerations cannot be

* Mellor, J., "Food Price Policy and Income Distribution in Low-Income Countries." Economic Development and Cultural Change, 27 (1978): 1-26.

dealt with by price policy alone. Getting prices set right will have to be accompanied by policies that also deal with the adverse impacts of price changes and, in some instances, by policies that redistribute income such as land reform.

To offset the impact of higher food prices on low-income consumers, consumer subsidy programs specifically aimed at the poor can be used. Such programs would theoretically allow the poor to achieve adequate levels of nutrition, yet would not interfere with production incentives, and would not impose the fiscal drain created by attempts to subsidize all production and consumption of major foods.

A long-term strategy for resolving the price problem is increased productivity. Given existing technologies and institutional structures, the price level necessary to encourage increased food output is often too high to enable large groups of the population to achieve adequate food intake levels. In the long term, however, raising agricultural productivity through improved technology results in lower real food prices and contributes to growth and development. Measures to increase productivity need to be part of the policy mix. Ideally, these measures should be available to large and small farms alike (scale neutral) so that their benefits are spread widely. Where possible, they should be labor intensive as well, especially in countries with large pools of underemployed rural people, so that small farms and landless labor can benefit from them as well as large producers.

Food-grain reserves, over and above minimum operating stocks, can also help to serve developmental and humanitarian objectives by enabling governments to stabilize grain prices, to feed low-income people directly, to respond to emergencies, and to meet other needs. It costs something to maintain reserves and these costs limit the level of stocks that can be carried. Maintaining a fund of foreign exchange earmarked for importing food in times of need is an alternative and sometimes less costly approach than keeping grain stocks. Some combination of both approaches can also be used. While grain or financial reserves will not solve the long-run food problem in developing countries, they can be major factors in avoiding the burden of higher prices and reduced consumption forced upon some countries by sharp variations in production.

Comparisons across commodities will reveal patterns of bias in policies in favor of particular groups of products. For example, policies in some countries provide particularly strong disincentives for the production of export crops. In

other cases, some domestic food or fiber crops receive more favorable price treatment than others. These distortions usually reduce the economic efficiency of the food and fiber system, resulting in less total output.

Relative commodity price relationships are also central to the question of national food self-sufficiency, an objective that has been given much emphasis in recent years. In most locations, producers can substitute between food and export products. If the relative prices of food crops rise, land will be switched to them, and the reverse will happen with higher relative prices of export products. These differentials should be analyzed in terms of their economic efficiency impacts. If pricing policies are providing improved incentives for one group of products, does the country have a comparative advantage in the production of those crops? For example, does it cost more in foreign exchange earnings foregone through lower export crop production than in savings through lower food imports? If increased security of food supplies is sought, analysis is needed to evaluate alternative pricing, storage, and trade policies to select the most cost-effective approach for stabilizing a country's food consumption and prices.

Another area of general concern is regionally uniform pricing of products and inputs. Uniform pricing is inefficient because it negates inter-regional comparative advantage through subsidies on transport costs for more remote regions. It is inequitable in the sense that low-cost producers are taxed through transfers to high-cost producers. Uniform pricing also affects incentives for production of crops in a given location. Farmers distant from markets receive large subsidies to produce low value-to-weight ratio crops over high-value crops in which they may have a comparative advantage.

At the sector level, the effects of market interventions on the agricultural sector's domestic terms of trade are a key issue. As already emphasized, many government policies have some impact on the agricultural sector's terms of trade. Many policies are used to distort price structures to transfer income out of agriculture to government, industry, or consumers. These include overvalued currency, multiple exchange rates, tariffs, and quantitative restrictions on imports that favor domestic manufacturing industries. They also include taxes, procurement at low prices, and liberal use of imported food on concessional terms to keep domestic food prices low. In evaluating shifts in terms of trade, analysts should try to take account of all the relevant policies and estimate their quantitative effects.

An optimum price structure in a growth context would: (1) allocate factors to insure that the largest output and optimum product-mix is produced; (2) insure that the desired goods are produced at optimum levels of cost and efficiency; (3) distribute goods to the "right" consumers at minimum cost and delay; (4) foresee future demand and supply conditions so that required goods and services can be efficiently produced at the appropriate time; (5) facilitate improvements in technology and productive structure in accordance with factor endowments and development objectives; and (6) achieve a satisfactory distribution of national income between producers and consumers and between sectors of the economy.

No single policy structure can accomplish all these things at the same time. Policy analysts must provide information on the extent to which progress toward one objective is gained at the cost of progress toward another.

C. Efficiency and Equity in the Analysis of Market Interventions

Whatever the goals chosen, a country's ability to achieve them is limited by the resources available to it, including its land, labor supply, capital and other productive assets. It is, therefore, of primary concern that these scarce resources be allocated to produce a mix of goods and services and a distribution pattern within the country that comes as close as possible to meeting social objectives concerning income, equity and growth. If resources can be reallocated to produce a combination of goods and services that has a significantly higher total value, it means that resources are not now being used efficiently.

Efficiency and Pricing

The concept of efficiency in using resources and allocating the goods produced has several aspects to it. Each of these is important to the analysis of agricultural policy. One important dimension of efficiency is technical or operational. Are the resources actually employed in both private and public activities being used without undue waste or loss? If not, resources could be saved and costs lowered through improved management and organization of the activities.

Efficiency of resource allocation requires that scarce resources be used in such a way that one or more persons in the economy cannot be made better off without making at least one other person worse off. This overall economic efficiency condition requires, in turn, that individual efficiency criteria for production,

exchange and choice of product-mix be satisfied. An ideal state of affairs is when resources are allocated in such a way that the marginal value of output is equal in all activities.

Exchange is efficient if the ratio of marginal utility to price is equal for all goods. If this condition holds, all opportunities for mutually beneficial trades will have been exhausted. The distribution of goods and services among consumers will be efficient in terms of the preferences of consumers.

The remaining efficiency criterion deals with the very important problem of how much of each good to produce. It requires that each good be produced to the point where its marginal social cost of production is equated to the value placed on the marginal unit of the product by consumers. Thus, the opportunity costs of resources used in its production are equated at the margin to a good's scarcity value to consumers. When all efficiency conditions are satisfied, an economy is efficient, and it is impossible to make anyone better off without making someone else worse off.

Efficient pricing relates to the possibility of simultaneously satisfying these criteria through decentralized decisions made by producers and consumers in an economy. This requires that all producers and consumers face the same market prices (adjusted for location and quality) that are in competitive equilibrium. If this is the case, inputs will be chosen efficiently by producers, goods will be distributed efficiently among consumers, and goods will be produced in quantities according to consumer preferences and the prevailing distribution of income -- all in the context of market-clearing prices and quantities in input and output markets.

A perfectly efficient pricing system as described above does not exist anywhere, although some come closer to it than others. The main reasons for departures from the ideal are:

- Government interventions distort market prices,
- Public and private monopolies distort prices and resource use to the extent that they operate in non-competitive ways,
- Prices of publicly produced goods or owned resources are set at other than competitive levels.

Thus, the policy analyst is faced with the task of obtaining "efficient" prices against which to compare domestic prices in order to judge the size of price distortions. There are two fairly straightforward approaches. One is to use international prices. The other is to calculate shadow prices that reflect the scarcity value of goods or resources. Both are discussed below.

In the case of an open economy facing given prices in international markets, border prices of imports and exports become important in the definition of opportunity costs of production and scarcity values in consumption. If the highest producer value of another unit of a product is its export price (f.o.b.), that price measures the opportunity cost of the resource that could be used to produce another export or replace some import. If the lowest consumer price of another unit of some other product is its import price (c.i.f.), then that price measures the scarcity value of the good to the economy. If the economy is operating efficiently, domestic prices will be equal to border prices for tradable goods, adjusted for quality differences and internal transportation costs. For nontradables (land, labor, etc.) efficiency prices will be determined by the opportunity costs of the factors used to produce them when the alternatives are to produce an export good or displace an import.

In addition to market prices, there are also shadow prices. These are the same as efficiency prices which are prices determined by a competitive market with no government intervention. Shadow prices can be calculated when market prices are distorted and are not a good representation of efficiency prices, or where markets do not exist to generate price information using such analytical techniques as linear or nonlinear programming.

Price Distortions and Economic Growth and Equity

Reducing price distortions will have a positive effect on economic growth and development. First, improving the allocation of resources in production and goods in consumption will lead to a larger total output for the economy and greater total consumption. These efficiency gains can be very substantial.

Second, more efficient pricing systems provide better signals to guide public investments that determine the longer-term rate of growth in output. And, public investments in research, education, transportation, and irrigation are critical to the development of the food system. Artificially depressed prices reduce

returns to these investments and discourage governments from making them. On the other hand, prices that reflect scarcity values improve returns to these public investments and may encourage government to allocate more resources for them relative to other possible investments in the economy.

Research at the World Bank has recently reviewed price distortions in 31 developing countries and analyzed their impact on growth. * Distortions are defined to exist when prices of consumer and producer goods and services and domestic factor inputs diverge from scarcity values (that is, the estimated efficiency prices). Border prices are used to measure distortions for traded goods. In this approach, distortions reflect both market imperfections and government interventions. While government interventions may sometimes be designed to reduce distortions, in most cases governments introduce distortions through their policy actions.

The research carefully evaluated price distortions arising from the following areas of government intervention: protection of manufacturing, underpricing of agricultural commodities, exchange rates, interest rates, wages, utility pricing, and inflation. The results indicate that distortions are common, but that some prices are distorted much more than others.

A composite distortion index was constructed for each country using simple averages of individual distortions. This distortion index was related to the countries' growth rate and to components of growth during the 1970s. The results show that the average growth rate of low-distortion countries in the 1970s was 2 percentage points higher than the overall average, while the growth of high-distortion countries averaged about 2 percentage points lower than the overall average. Moreover, price distortions adversely affect both agricultural and industrial growth. High-distortion countries had an average 1 percentage point lower agricultural growth rate and an average 3 percentage point lower industrial growth rate than the overall average. Low-distortion countries had higher average growth rates by about the same number of percentage points.

* Agarwala, R., "Price Distortions and Growth in Developing Countries," World Bank Staff Working Papers No. 575, Washington, 1983.

Interventions that distort prices are often justified on the basis of helping low-income groups. Taking the proportion of income going to the bottom 40 percent of the population as a measure of equity, the World Bank study shows that a high distortion index was related to reduced rather than greater equity, although this link was not as strong as that for growth performance.

This broad review of the impact of market intervention on development does not lead, of course, to simple, universal policy recommendations for all countries. Careful empirical work is needed to clarify the degree of distortions in specific markets and countries, to identify and evaluate alternatives for reducing the loss in efficiency from distortions without jeopardizing broader social objectives.

4. AN OPERATIONAL APPROACH TO ANALYSIS

This section has three purposes. The first is to review basic economic concepts dealing with efficiently allocating resources in production and goods in consumption. Policies can either promote or retard economic efficiency.

Second, it briefly introduces some fairly simple, but nonetheless economically valid approaches for examining policy interventions and how they affect various parts of the food and fiber system. These include actions that influence commodity and input prices directly, efficiency of commodity and input marketing, trade and exchange rates, food consumption, and investments in long-term agricultural development. In subsequent chapters these simple analytical techniques are elaborated, with examples of their application offered in various case studies. Each of these latter chapters, however, focuses primarily on the direct effects of policy interventions in that segment or level of the food and fiber economy. For example, the chapter on policy interventions in input markets does not deal with their indirect effects on food consumption.

The third purpose of this section is to provide an operational framework within which the analyst can make those linkages. This is done both implicitly and then explicitly in a tabular presentation at the end of this chapter.

To accomplish these purposes, this section is divided into seven parts:

- The price system,
- Commodity and input prices,
- Marketing,
- Food policy,
- Exchange rate policies,
- Trade, tax and subsidy policies, and
- Economic interrelationships.

A. The Price System

Despite the fact that everything relates to everything else, one has to avoid falling into the trap of trying to estimate how one change alters every other part of the system. The analysis that policymakers will value most is one that is selective, not comprehensive; that concentrates on the major quantifiable impacts; and that can be done in a limited time and with limited resources.

The price system is the main way in which the various parts of the food and fiber system are linked together, and it is the main source of information to both participants and observers on what is happening in the system. A pricing system plays four very important roles in an economy:

- It allocates goods and services in consumption;
- It allocates factors of production (land, labor, and capital) and is one of the important determinants of rates of return to these factors;
- Depending on the ownership pattern of resources, prices are one determinant of the distribution of income; and
- Finally, prices play an important role in determining the level of savings and investment, in other words, how much present consumption a society is willing to forego in order to increase future consumption.

Absolute price levels are important, because they determine the terms of trade between consumers and producers, competitiveness in world markets, government budget costs, and a variety of other things that affect the overall

efficiency of the food and fiber system and how rapidly output and consumption grow over time.

Relative prices are also important. These include price relationships among commodities, among inputs, and between individual commodities and individual inputs. The "correct" relative prices are only a necessary, not a sufficient condition, for having the "right" price relationship, since price relations can be kept correct through large-scale and costly government policies that keep absolute price levels either too low or too high.

There are three categories of government intervention that determine domestic price levels, one of which is exchange rate policies. It is common for developing countries to maintain overvalued exchange rates. These work to discourage exports and encourage imports. Imported commodities are made artificially cheap. The effect on farm-level production incentives may be mixed, but typically it works against farmers. Imported food and fiber at "cheap" prices compete with what farmers produce. This benefits consumers through lower food prices but harms farmers by depressing prices of what they produce. Imported inputs such as fertilizer are also made cheaper with overvalued exchange rates. While this can be a benefit to farmers, it works to discourage domestic fertilizer production. On balance, an overvalued currency usually disadvantages producers in the typical developing country situation.

Trade and tax policies, a second category of intervention, are also important determinants of price levels. Import duties, domestic taxes, and export subsidies raise domestic prices. Export taxes and domestic subsidies lower prices. Such policies generally result in net income transfers between and within producer and consumer groups.

Government policies to subsidize consumer food prices or support producer prices are a third category of intervention that influences price levels. The more typical case in developing countries involves consumer subsidies and these can result in depressed prices to consumers. But there are also situations where the government supports commodity prices significantly above world levels (after exchange rate adjustments), and this leads to its own kind of misallocation of resources by resulting in inefficient production.

In addition, marketing and processing efficiency also affects price levels. Inefficient marketing and processing activities due to lack of transportation or storage, or due to monopoly power (including that of parastatals) can depress prices received by producers and inflate prices paid by farmers for inputs and by consumers for food and fiber.

B. Commodity and Input Prices

Commodity and input prices are powerful forces in determining producer incentives, allocating resources in production and allocating consumer expenditures on food and fiber.

When the policy analyst initially examines a particular country situation, some of the first things he usually looks at are prices and price relationships. For one thing, price information is almost always available in one form or another because transactions are actually occurring in the marketplace. Moreover, they provide some indication of how the food and agriculture situation is being affected by government policies, commercial practices and the underlying supply-demand situation. Finally, prices are the measure by which consumers and producers judge whether they are being fairly treated by the market place or by the government.

But how is one to know whether a price is too low, too high, or just right? One needs a frame of reference, and this generally involves:

- Determining what the country situation has been for the commodities of interest in terms of surpluses or shortages,
- Determining what the world situation has been according to similar criteria, and
- Characterizing the country's food and agricultural policies and how they influence prices.

As part of policy analysis, one needs to compare both absolute and relative prices within a country that are in all likelihood distorted by a variety of government interventions to a set of efficiency prices that are not distorted or at least not very much. The differences between these two sets of prices provides an indication of the extent to which the current price structure is distorted for farmers, consumers and others operating in the food and fiber system.

The current market values of inputs and outputs at the farmgate and at major consumption points can be observed directly from existing market information. The average price farmers receive for various products, for example, is usually collected and recorded by a government unit such as the Ministry of Agriculture. The same is true for consumer prices. While these prices are generated by markets, they are likely to be distorted by a variety of government interventions. We need, therefore, an additional set of prices that are reasonably free of distortions.

One practical approach for getting undistorted prices, and the one chosen here, is to use border or international prices, that is, world prices for inputs and products that can be traded. Since a country can obtain an additional unit of a good by importing it (paying the imported or c.i.f. price) or can earn the export price (f.o.b.) by exporting an additional unit, the border price represents the opportunity cost of consuming an additional unit of the good in the country.

The border price is the opportunity cost for any good that can be traded (a "tradeable"), whether the good is actually imported or exported or whether it is produced and used domestically. For example, even if a country is self-sufficient in fertilizer, in theory it could still earn the border price for fertilizer by exporting part of its production.

Although world prices may be subject to trade and other distortions of their own, and may fluctuate from year to year, these changes are out of the control of most countries. Therefore, the border price represents the opportunity cost of a particular good, even if the world market is somewhat distorted.

Border prices can be obtained directly for those commodities and inputs that are actually imported or exported by a country on a regular basis. For goods that are not traded but could be, one can derive a set of border prices relevant to a particular country. In the case of imports, one can obtain prices at export points in major exporting countries and add transportation costs (ocean or land) to get from export points to a country's import points. Similarly for exports, one can obtain imported prices in major importing countries and subtract the appropriate transportation costs to get back to a country's export location.

A table such as the one represented by Exhibit 1-3 can be filled in. This will provide information on prices at different points in the food and fiber system as well as the quantities used by producers, consumers, and others, and the value of consumption, production, and imports or exports. Border prices might be in terms of the country's currency or a major international currency commonly used in trade. We do not need to convert from one currency measure to another when calculating relative prices. However, as discussed later, exchange rates enter the picture when we want to compare actual price levels measured in different currencies.

Exhibit 1-3 will also tell us something about the relative importance of commodities or inputs in terms of total domestic use, domestic production and trade.

Exhibit 1-3

Border, Consumer, and Farm Prices and Values

<u>Commodities</u>	<u>Farm Level</u>	<u>Consumer Level</u>	<u>Exports/Imports</u>
Wheat			
Price			
Quantity			
Maize			
Price			
Quantity			
Rice			
Price			
Quantity			
Vegetable Oil			
Price			
Quantity			
Etc.			
<u>Inputs</u>			
Fertilizer (by Type)			
Price			
Quantity			
Chemicals			
Price			
Quantity			
Etc.			

Having obtained the basic price information, one can then calculate a variety of relative prices, as shown in Exhibit 1-4. Any major discrepancies in these relative prices among border, consumer and producer prices should be evident. If there are discrepancies, these will usually result from government policies or other factors. They might include:

- Import duties, export taxes, or quantitative trade restrictions;
- Domestic taxes, subsidies, or price support programs; or
- Marketing inefficiencies that affect various commodities or inputs differently.

Exhibit 1-4

Relative Prices

	<u>Border</u>	<u>Consumer</u>	<u>Farmer</u>
<u>Commodity Price Ratios</u>			
Wheat Price/Maize Price			
Wheat Price/Rice Price			
Wheat Price/Oil (Oilseed) Price			
Rice Price/Oil (Oilseed) Price			
Wheat Price/Cotton Price			
Rice Price/Cotton Price			
Etc.			
<u>Commodity/Input Price Ratios</u>			
Wheat Price/Fertilizer Price			
Maize Price/Fertilizer Price			
Rice Price/Fertilizer Price			
Cotton Price/Fertilizer Price			
Etc.			

A note of caution is in order concerning border and farm-level commodity/input price ratios. There may be situations where the border and farm-level price ratios are the same and yet there is significant government intervention affecting price levels. This would be the case, for example, in a country that followed policies to depress commodity prices and subsidize fertilizer prices. These two sets of policies could be offsetting so that border and farm level commodity/fertilizer price ratios were the same.

Exhibit 1-5 is an example of a case where there are two agricultural production areas, an interior city, and a port city. Maize is the principal crop in one production area while cassava is dominant in the other. The cost per ton to transport bulk commodities between areas is shown on lines connecting the circles.

Exhibit 1-5

Transport Between Agricultural Production Areas

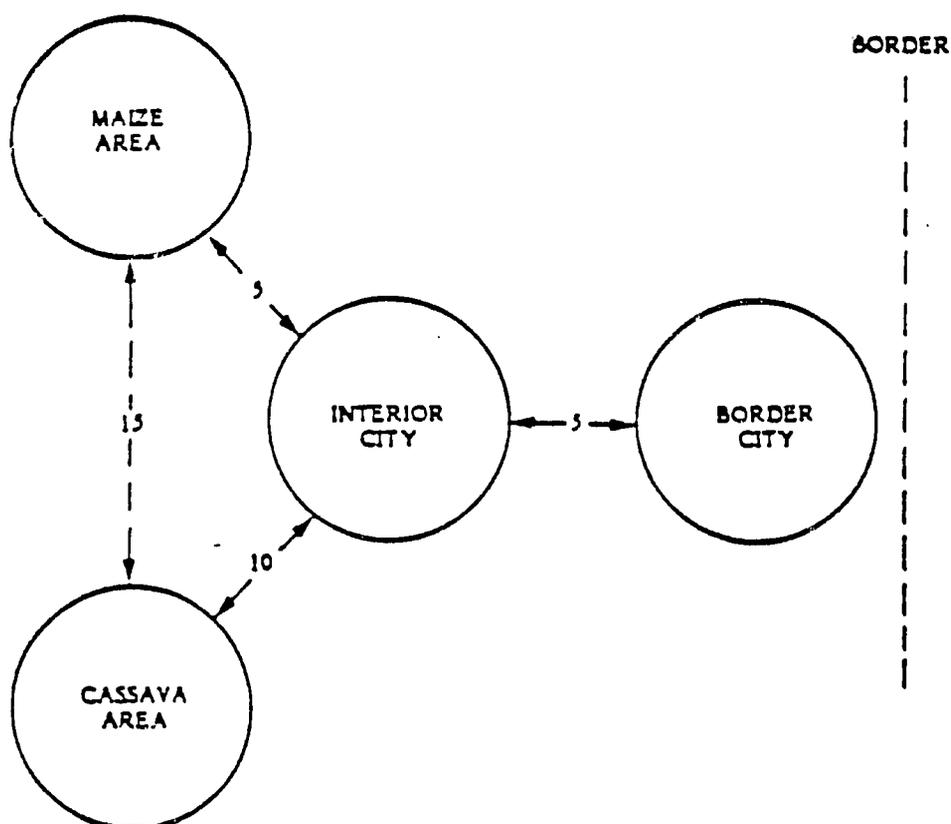


Exhibit 1-6 shows a set of prices and price ratios that provide some examples of practical problems in interpreting data. Within the country, all the prices are consistent in that price differentials are based solely on transportation costs. Yet the maize/cassava price ratio varies from 1.5 to 2.3.

Prices at the border city, however, are not generally equal to what we have called efficiency prices based on international values. While cassava is considered a non-traded good, corn could be exported or imported at \$150/ton, but government controls hold the price \$40/ton below that level. Imported fertilizer is subsidized by \$25/ton. Based on international opportunity costs, it looks like

both maize and fertilizer should be priced higher in the port city and in a ratio nearer to 1.0 than the 0.9 that actually prevails.

Exhibit 1-6

Prices and Price Relationships:
The Importance of Location

	<u>Farmer</u>		<u>Consumer</u>		<u>Efficiency</u>
	<u>Maize Area</u>	<u>Cassava Area</u>	<u>Interior City</u>	<u>Port City</u>	<u>Border Price</u>
----- dollars/ton -----					
Maize	100	115	105	110	150
Cassava	65	50	60	65	65
Fertilizer	135	140	130	125	150
----- ratio -----					
Maize/Cassava	1.5	2.3	1.8	1.7	2.3
Maize/Fertilizer	.7	.8	—	.9	1.0
Cassava/Fertilizer	.5	.4	—	.5	.4

What if one were looking at ratios of national average prices? Assume the following:

- In the production regions, the primary crop accounts for 30 percent of production, while the secondary crop accounts for 20 percent;
- Consumers are equally divided among the four locations; and
- Each production area accounts for half of fertilizer use.

The result using national average prices would be the price structure shown in Exhibit 1-7. National averages disguise all the regional variation that may occur. In our example, the national average maize/cassava price ratio of 1.9 at the farm level is in between (and quite different from) the regional ratios shown in Exhibit 1-6.

Exhibit 1-7

Example of National Average Prices

	<u>Farm</u>	<u>Consumer</u>	<u>Efficiency</u>
	-----dollars/ton-----		
Maize	103	108	150
Cassava	53	60	65
Fertilizer	138	—	150
	-----ratio-----		
Maize/Cassava	1.9	1.8	2.3
Maize/Fertilizer	.7	—	1.0
Cassava/Fertilizer	.4	—	.4

As an analyst gains experience, he develops some type of map in his mind of normal price relationships based on geography, stage of processing or distribution, competitive crops, etc. Then discussion of a particular reference price can often serve as shorthand for what happens in the rest of the system. But in many cases the problem at hand is that one of the price relationships has become distorted, and the analyst has to look more critically at the data in order to properly diagnose the problem.

C. Marketing

In developed countries, marketing and processing activities account for a greater total value of economic activity than that generated by food and fiber production at the farm level. The reverse is true in most developing countries, especially in the least developed nations. Even so, marketing and processing activities are still substantial, especially for export crops and for food and fiber provided to the non-subsistence urban population.

The marketing and processing sectors are also politically sensitive areas. This grows out of the perception that middlemen can exploit both consumers and producers and earn exorbitant profits. While examples of monopoly profits can be found, numerous studies show that marketing and processing activities are generally competitive when the private sector is allowed to operate, and that returns are normal considering the risk involved in these activities. Nonetheless, the fear of exploitation by middlemen still persists politically in many developing countries.

In this section, marketing and processing activities are viewed in two ways. One is to describe and quantify the components of marketing and processing, whether for a single commodity or input or for the total marketing system. The other is to describe ways by which analysts can judge the efficiency with which resources are being used in marketing and processing activities. In some cases, government intervention may lead to inefficiencies; in others, intervention may be required to make the system more efficient.

Marketing and Processing Activities

One can think about marketing and processing activities in terms of:

- A single stage of activity within the marketing chain for one commodity or input;
- The complete marketing and processing chains for a commodity or input; or
- The whole marketing system encompassing all commodities and inputs.

Whatever the level of these activities, one can look at the components of marketing and processing costs, and, these can be measured in value terms. The basic components are listed in Exhibit 1-8.

Exhibit 1-8

Components of Marketing/Processing Activities

	<u>Unit Values</u>	<u>Percent of Final Price</u>
Raw Material Procurement Costs		
Storage/Inventory Costs		
Processing - Marketing Costs		
Transportation Costs		
Profit (Loss)/Unit of Farm Product		

Raw Material Procurement Costs: A firm or an industry purchases raw materials. These might be raw commodities purchased from farmers or imported. Or, they might be commodities or inputs that have already gone through several stages of marketing and processing, as in the case of bakeries buying flour from flour mills.

Storage/Inventory Costs: Marketing and processing firms must carry inventories of raw materials and the products they sell. The costs include capital costs of facilities, financing of inventories, spoilage and waste, and losses (gains) due to price risks that cannot be protected against. For some marketing and processing activities, storage and inventory costs may be small, such as in local town markets. For others, such as major food and fiber processing firms, these costs can be very substantial.

Processing Costs: These are the direct costs of carrying on processing or marketing activities at a specific location. They basically reflect the cost of transforming a product, including labor, capital and material charges. Storage and

inventory costs may be included in calculating these margins or treated separately.

Transportation Costs: Transportation costs are involved in moving raw materials and processed products from one location to another. They need to be calculated for appropriate segments of the food and fiber system and for each of the key organizations that participate in the system. They may be relatively small for a participant that does not have to move raw material or processed products very far.

Profit (Loss): Whether for private firms or parstatal, profits represent the difference between total revenues and total costs. Profits or losses can be calculated on the basis of units of final product for the appropriate level of activity such as per ton of grain or fertilizer or per bale of cotton sold. They are an important indicator of performance.

A better measure of profitability, however, is in terms of return on investment, since it is a standardized measure across industries. For example, an industry with little capital investment and a high rate of turnover of inventory can have a very low profit margin expressed as a percent of sales but a much higher return investment. Conversely, a very capital intensive industry can have a very high rate of return based on sales value but a relatively low rate of return on investment. Profitability measured in terms of rates of return on investment is a good indicator of how efficiently capital is allocated among economic activities. If, over time, rates of return on investment, since it is a standardized measure across industries then one can conclude that capital is allocated in a reasonably efficient manner. On the other hand, persistent wide discrepancies are a signal that capital may be allocated inefficiently either as a result of government policies or imperfections in capital markets.

Efficiency of the System

The above description of marketing and processing indicates that one can measure the cost of components of these activities, but it does not tell us a lot about how efficiently they are operating. If the food system were operating under a free market policy and was highly competitive in terms of large numbers of firms competing with each other, rates of return on investment would be a good indicator of efficiency among firms and segments of the system. However, that is not the case in most developing countries where we find:

- Some segments of the food system are highly competitive;
- Other segments are controlled by either government monopolies or a few private firms; and
- Government interventions of one kind or another directly affect many activities.

Even where economic activity is highly concentrated, one may not observe high profits or high rates of return because of inefficiencies in the system. In the case of parastatals, governments impose goals on them other than those related to profit or rates of return on investment. These include such goals as price or supply stabilization, employment practices that result in overstaffing, government price regulations, etc. Operating to achieve these other goals may result in actual losses rather than profits. Governments may also impose restrictions on private firms that limit their profitability too. These could include employment requirements, operating under favorable exchange rates, restrictions on the markets they can serve (resulting in suboptimal use of capacity and high costs) or government regulations on selling prices or prices of purchased inputs.

An assessment of marketing and processing efficiency requires two distinct types of economic analysis. One is to determine if the existing marketing structure can be made more efficient. The other is to determine whether efficiency gains might be realized from changing the structure of markets, to provide for more competition.

Beginning with the existing market structure, an initial step in the analysis is to identify the various government interventions, describe how they work, and quantify their impact on the components of marketing and processing activities that were listed in Exhibit 1-8. This is not an easy task, but it is essential for judging efficiency. For example, some private firms or parastatals may be required to maintain large stock or inventory levels. The quantitative difference between the desired and required levels of stocks or inventories and the associated costs needs to be estimated. The added costs will be determined by such factors as the cost of facilities, the amount of money required to finance these additional stocks, and additional losses that result through spoilage and waste.

Given the estimated effects of interventions on marketing and processing activities, one then has to determine if resources are being used efficiently in terms of both technical and resource allocation efficiencies. Technical

efficiencies concern the way inputs are transformed into outputs (goods and services). Technical efficiency will depend on both the technologies or state-of-the-art being used as well as how these technologies are being managed. As a practical matter, technical efficiency can be judged only on a comparative basis. Relevant comparisons may be among different firms within a country or between firms in different countries engaged in similar activities and using basically the same technology. Consider the following example. The flour extraction rate for wheat is generally about 72 percent, varying somewhat with the type of wheat being milled and milling methods. If one finds that the wheat milling industry in a particular country is obtaining a flour yield of only 65-68 percent, then technical inefficiencies are indicated and their sources have to be identified.

Inefficiencies in resource allocation may also be present. These involve either using the wrong mix of inputs or producing the wrong outputs in terms of market demand. On the input side, resources are not allocated efficiently in production unless the marginal value products of all inputs are equal. There are a number of analytical techniques for studying this issue, including production function analysis and linear programming that can be used for individual firms or industries. The mix of outputs will be efficient if the marginal value of sales is equal for all outputs.

Finally, one has to look at the structure of industries in determining the efficiency of firms or industries. In a competitive industry environment (large number of firms producing essentially the same products), each firm will produce up to the point where it and other firms in the industry earn a normal rate of profit, that is a level of profit necessary to keep it in business, but not any more. In such a situation, prices will be equal to both marginal costs and minimum total average costs. In the case of a profit maximizing monopoly, on the other hand, output will be set at a level where marginal costs equal marginal revenue and output will be less and prices higher than in a competitive industry.

These two cases are shown in Exhibit 1-9. In a competitive situation, output will be Q_c and price will be P_c . In the case of a monopoly, output will be lower at Q_m and price higher at P_m . There are several measures for ascertaining concentration of firms in industries as a guide to judging their market power.

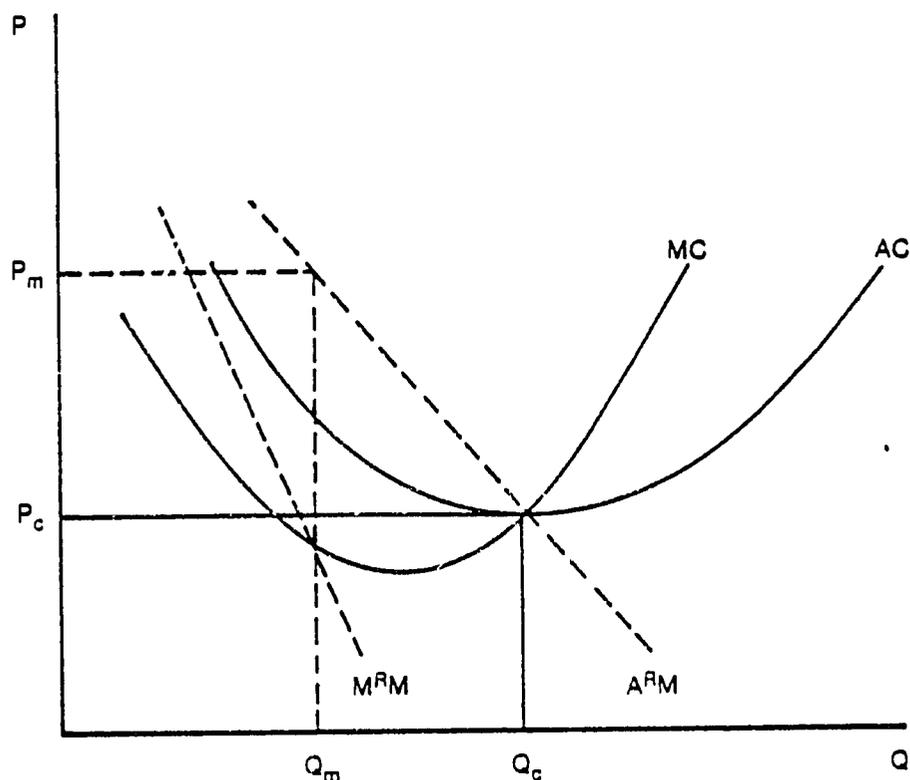
An important policy question in almost every country is the extent to which concentration of firms in an industry leads to monopoly power. The corollary to this is the extent to which making markets more competitive leads to

greater output, lower prices and greater economic welfare for society.

These are not easy questions to answer, because the tradeoffs between competitive and monopolistic industry structures are not clear-cut.

Exhibit 1-9

Output and Price Relationship in a Competitive
Versus a Profit Maximizing Monopoly



For industries that involve significant economies of scale, the average cost of production for a monopolist can be substantially lower than for many small firms comprising a competitive structure. Even through a profit maximizing monopolist would set its price above average costs, that price could still be lower than the price that prevailed under a competitive market structure.

Another issue concerns efficiency of operation both in the short run and over time involving innovation (developing or using new technologies). There are different views on this matter. Some people argue that monopolies are less likely to seek efficiencies and to innovate, because their high profits make them complacent. Others argue that only large firms can afford the costs and bear the

risks associated with innovation and that they will be more progressive than small firms that typify a competitive market structure.

A further complication is that real world industries are characterized by a mixture of large and small firms. This situation -- an oligopolistic market structure -- is one in which the relationship between structure and the pricing behavior of firms is more tenuous and it becomes difficult to predict output and pricing behavior.

D. Food Policy

Food policy focuses on the needs of the consumer. But just as policy interventions at the farm level can ripple through the system and directly affect consumers, food policy interventions can reverberate backwards through the marketing chain with either salutary or harmful consequences.

At its highest level of abstraction, food policy may focus on issues like the degree of national self-sufficiency in basic foodstuffs, the role of food as a wage good, food security, or the production tradeoff between food and export commodities like coffee, cocoa, cotton or jute. The degree of self-sufficiency may be an issue for geographical, economic or purely xenophobic reasons. While there is no economic basis for judging whether it is better to be 80 percent self-sufficient than 75 percent, the degree of reliance on foreign sources for basic foodstuffs is in some cases an issue of major concern to policymakers.

The role of food as a wage good often leads to policies to hold down food prices in hopes of keeping down industrial labor costs. Compared to developed countries where food is only 20-25 percent of personal consumption expenditures, low-income developing countries may see 40-60 percent of worker income devoted to food. In these cases, a 20 percent change in food prices can significantly affect wage demands.

The food security issue refers primarily to the level of reserve stocks, if any, a country should carry to protect against years when there are bad crops. It may also refer to the degree to which a country depends on imports.

Finally, the tradeoff between food and export crops is often a very critical one for policymakers in the poorest developing countries. Export crops earn foreign exchange, but if they are produced at the expense of domestic food crops there may be (a) little or no net benefit since the country must import food from abroad, and (b) the country is made subject to the vagaries of international markets. Comparative advantage and the character of demand for available foreign exchange are the two key determinants of the appropriate course.

At a more prosaic but equally important level, food policy is generally focused on one or more of the following goals:

- Keep food prices at a "favorable" (low) level,
- Insure a minimum level of consumption for poor or vulnerable members of the population,

- Stabilize prices and supplies inter- and intra-seasonally, or
- Improve the quality and safety of the food consumed.

Extent of Food Price Subsidies

Since a major issue in developing country food policy is excessive use of subsidies, we need a way to determine their nature and size. Some approaches for getting at this issue were discussed earlier.

The merits of using relative border prices as a basis for judging whether or not domestic prices paid by consumers or received by farmers were reasonably correct or highly distorted. But one also has to be concerned about absolute price levels as well. As discussed in Section III-D and E above, exchange rates and trade policies affect absolute price levels in an economy relative to world levels. These policies can also provide substantial subsidies to domestic food prices. Thus, the approaches outlined for exchange and trade policies are relevant for getting at what can be major sources of consumer food price subsidies.

Minimum Consumption Level

For most countries, a key concern is to ensure that the poorer parts of the population get enough to eat. At the extreme, this means preventing starvation. But it also encompasses nutritional objectives. There is an endless variety of ways to promote minimum consumption levels, and they have very different effects on other parts of the food and agriculture sector.

Two types of data are needed to deal with this policy objective. One is a survey or census of households that identifies how many people fall into different income groups and their geographic locations. This information enables the analyst to define who is poor. Poverty, of course, is a relative measure. It is common, therefore, in any particular country to define the poor as some segment, say 20-40 percent, at the lower end of the income distribution.

A second data requirement is knowledge of individual or household food consumption levels in terms of the quantities of various foods consumed. One can calculate nutritional intake from consumption data and match this against what a country considers to be acceptable nutritional standards. In some developing countries, there may be considerable seasonal variation in food consumption levels with abundant supplies and high consumption levels for several months after the food crop harvest and a "lean" period of food shortages for several months before

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At a more prosaic but equally important level, food policy is generally focused on one or more of the following goals:

- Keep food prices at a "favorable" (low) level,
- Insure a minimum level of consumption for poor or vulnerable members of the population,

- What is the expected average length of time that stocks would have to be held before they are needed and used?
- How much new storage capacity is required to carry stocks?
- What is a realistic estimate of losses due to spoilage, waste, theft, etc.? Combined, these may be quite high under typical developing country storage and climatic conditions.
- What are the management requirements to operate a stocking policy and program?
- What are the costs of carrying stocks in terms of:
 - Investments in storage,
 - Government outlays to build stocks and the interest on this money,
 - Magnitude of storage losses and their cost,
 - Additional personnel requirements, and
 - Gains or losses on inventories as market prices fluctuate?

An alternative to holding stocks is to maintain a financial reserve that can be drawn upon to increase imports in times of need. This approach is generally much more cost effective than carrying physical stocks because most of the costs listed above are avoided. However, a financial reserve does not address all the reasons for maintaining stocks such as (a) poor transportation that results in either very high import costs or prevent food from reaching people on a timely basis, and (b) the role of stocks in a price support program.

As a consequence, stabilizing food supplies might require a combination of physical stocks and financial resources. Analysts and policymakers will have to wrestle with defining an optimum combination.

Food Quality and Nutrition

A country may wish to focus some of its food policies on groups of people who are nutritionally deficient in selected ways. This approach can take many forms, including targetting those people in certain areas with such special nutritional problems, as iodine deficiency, or targetting infants, children and pregnant women with special nutritional requirements.

These approaches may require special foods or nutrients, some of which are available domestically and some that have to be imported, such as vitamin or protein supplements.

Analysts who examine these policies will have to look at:

- Identifying the target groups,
- Administrative requirements for reaching the people,
- Amount of foods or nutrients required, and
- The cost of procuring needed foods including foreign exchange requirements and the costs of delivering them to the targeted groups.

E. Exchange Rate Policies

Exchange rate policies can have a major impact on an economy and its agricultural sector. They are what link domestic prices to international prices. When exchange rates are distorted, as they are in many developing countries, price signals are also distorted, and adversely affect an economy in several ways. These are discussed below.

Undermine Exports and Production

A dynamic export sector is important to a country's development. Export growth is retarded by overvalued currencies since incentives to produce for export are reduced. A country's exports are made less competitive both in world markets and with respect to domestic production of nontradeable goods.

An overvalued currency can also undermine government efforts to increase producer incentives through domestic price support programs. In the extreme, serious currency distortions might make domestic price support efforts totally ineffective.

Harm to Agriculture

The harm to agriculture from overvalued exchange rates can be especially severe and come in several ways. First, agricultural products or manufactured goods based on agricultural raw materials account for the bulk of the exports from the majority of the least developed countries. Second, if the internal terms of trade are seriously biased against agriculture, people migrate from rural to urban areas, and this typically increases the demand for imported foods. Third, most poor people live in rural areas and depend directly or indirectly on agriculture for their livelihood. A depressed agricultural sector aggravates the rural poverty problem.

Stimulate Imports

Since an overvalued currency depresses the price of imports, the quantity imported will tend to increase. Cheap food policies are reinforced by an overvalued exchange rate, and this usually harms domestic food producers. If imports are regulated by quantitative restrictions, then the benefits will tend to favor those who can get imports and penalize those who cannot, distorting economic activity and resource use.

Precipitate Debt Crises

Seriously overvalued currencies sooner or later lead to a debt crisis that can be very disruptive to economic growth and development plans. A country typically compensates for an unfavorable trade balance caused by an overvalued currency by borrowing, but eventually a country cannot borrow any more. An initial reaction might be to impose controls on imports. But that usually will not solve the foreign exchange shortage and may perpetuate the degree of overvaluation since nothing is done to increase exports and foreign exchange earnings. Ultimately a country runs out of foreign exchange and other drastic policy reforms are required or imposed by international lending agencies such as the IMF.

Increase Protection Against Imports

As noted above, overvalued exchange rates generate pressures to restrict imports. These actions can have adverse effects on agriculture, particularly when the protection favors domestic industries. This results in a misallocation of resources away from the agricultural to the protected and less efficient industrial sector.

Promote Rent-Seeking Activities

Instituting exchange and import controls generates economic rents, or artificial profit opportunities. Enterprising people devote time and energy to figuring out how to capture these rents (profits). It is not unusual for corruption to flourish in such an environment. Resources are directed from producing goods and services to capturing rents, and the economy suffers as a result.

How to Measure Overvaluation

Although determining the degree to which a country's currency is overvalued requires very complex economic analysis, there may be relatively easy ways to get a good estimate under certain conditions. In those countries where a black market for currencies is allowed to exist, even though officially illegal, the black market rate may be a good approximation for the extent of currency overvaluation.

Examples of the premium in open market currency rates over official rates for a sample of countries is presented in Exhibit 1-10 (The premium is the amount one has to spend above the official number of units of national currency to buy dollars or other foreign currency.) For some countries, the open market rates

Exhibit 1-10
Open Market Currency Rate Premiums
Above Official Rates

Country	Open Market Rate Unit	Premium	Date
Colombia	Peso	20.5	December 1983
Dominican Republic	Peso	260.0	February 1984
Ghana *	Cedi	223.0	December 1983
Ivory Coast	France	0.0	December 1983
Malaysia	Ringgit	0.4	December 1983
Morocco	Dirhan	8.7	December 1983
Pakistan	Rupee	29.6	December 1983
Peru	Sol	7.3	December 1983
Sri Lanka	Rupee	40.0	December 1983
Zaire	Zaires	195.0	December 1983

* After major devaluation in October 1983; prior to this devaluation the open market was 3,172 percent.

Sources: Picks World Currency Report and International Financial Statistics,
IMF.

were either identical with official rates indicating an equilibrium exchange rate, or only slightly above the official rates indicating small distortions. The open market rates for others were 20-40 percent above official rates, a significant difference. In the case of a few countries, the open market rates were at more than a 100 percent premium to the official rates, a very wide discrepancy.

Black market premiums of 5-10 percent may not present a serious problem. Premiums of 20-40 percent could be considered serious. Premiums in the 100-300 percent range are probably devastating to an economy and its agriculture.

F. Trade, Tax and Subsidy Policies

Trade, tax and subsidy policies can distort a country's prices and its comparative advantage in production. There are two relatively simple measures to indicate whether or not these types of interventions are causing a country's production pattern to deviate significantly from comparative advantage based on international market prices. These are the nominal and effective rates of protection. A third measure, domestic resource cost, is more difficult to calculate, because it involves the use of producer prices for tradeable and non-tradeable goods including factors of production, and these are not easy to estimate when the required data are not readily available. Consequently, this measure is not discussed here. An explanation of this approach can be found in standard references and texts dealing with trade and project evaluation.

Nominal rates of protection and the nominal protection coefficient (NPC) measure the tax or subsidy on a tradeable good, without regard to taxes or subsidies on inputs used to produce that good. NPC's are easy to calculate. The formula for both inputs and commodities or products, using the same currency units, is as follows;

$$\frac{\text{Domestic Price} - \text{Border Price}}{\text{Border Price}} \times 100$$

Domestic and border prices have to be adjusted for transportation so that both prices are at the same location for example, the farm level.

An NPC of 1.3 implies that the domestic price is higher than the equivalent border price by 30 percent. Both trade and domestic market interventions can account for a higher or lower domestic price relative to the world market, and these interventions should be identified and measured.

The effective rate of protection and the effective protection coefficient (EPC) also measure the effect of taxes or subsidies on tradeable goods, but additionally they consider the impact of these interventions on inputs used to produce those goods. In this sense, the EPC relates to a value-added concept.

Virtually all countries treat raw or semi-finished products differently from the more highly processed form of these products. Many times trade, tax, and subsidy policies are designed to favor domestic processing. Some countries impose a tax on the export of products in unprocessed form but not on the processed product. Others will have a higher rate of import duty on highly

processed forms of a product than on less processed forms, favoring the domestic processing industry.

Calculation of EPC's requires knowledge of the value added structure at different stages of processing. The EPC can be calculated according to the following formula.

$$\frac{V_d - V_b}{V_b} \times 100$$

where: V_d = value added, evaluated at domestic prices

V_b = value added, evaluated at border prices

The EPC, whether expressed as a ratio or a percentage, is a measure of the degree of protection provided domestic production or processing activities. It may differ from the degree of protection calculated by using NPC's.

Trade policies in many countries have often led to high and variable rates of protection between economic sectors in the economy. High protection for manufacturing shifts the domestic terms of trade against agriculture and creates disincentives for agricultural production. This sometimes inadvertent discrimination against agriculture has resulted in capital transfers from agriculture to urban/industrial activities through the skewed domestic price structure.

Even when effective protection levels are relatively similar for industry and agriculture, trade and exchange rate policies can discriminate against exports. This bias against exports has been accentuated in some countries by export taxes and even quantitative export restrictions. The same policies tend to encourage imports, sometimes leading to increased agricultural imports at the expense of domestic production.

The net result of trade interventions is often to hold producer prices below those that would exist if domestic prices were equivalent to world prices, penalizing domestic production. Trade policies can be re-enforced by overvalued exchange rates and food subsidies.

Many countries are now showing interest in modifying their market intervention policies to adjust their price structures. The transitional problem of adjustment can be considerable and no universal prescription for scope, timing, and path of adjustments exists.

G. Economic Interrelationships

As discussed earlier, we are concerned in this section with the economic interrelationships among various parts of the food and fiber system. In the following table, we identify (1) several areas of economic activity such as production, consumption, and marketing; (2) common sources of change in these areas, be they policy, technology, or market structure; (3) the effect these changes may have on various parts of the food and fiber system; and (4) some of the key pieces of information required to analyze these effects.

Exhibit 1-11 is not meant to be an exhaustive list of changes in the food and fiber system, their effects on different components of the system or the information needed to analyze these changes. The effects depend on the specific nature of the change, which could deviate from those assumed here. The chart does suggest the types of key interrelationships with which policy analysts should be concerned.

There are different ways to study key interrelationships. One is to build a comprehensive model of the whole food and fiber system. This is a very demanding task in terms of the trained people, services, data and time required. As a practical matter, constructing and using large economic models is beyond the capabilities of most developing countries.

A more practical approach is to develop data and key economic, technical, and institutional relationships for different parts of the food and fiber system. Most policy issues concern only one part of the system, and the first task is to measure the direct effects of policies. Once this is done, the results of policies in one component of the system can be used to see how another part of the system is affected. For example, a change in producer price policies will result in a change in food output. This output change can then be examined in terms of its effect on consumer prices, food consumption levels, trade, etc. Sometimes, the analyst will have to go through several iterations to capture any feedback effects from these sectors on production itself.

It is feasible in many situations to build smaller economic models that capture several important interrelationships simultaneously. For example, models can be constructed to analyze the effect of changes in imports on consumer and producer prices, consumption, and production. These same models can trace

through the effect of changes in production technology on output, producer and consumer prices, and imports or exports.

Either the pragmatic or small model approaches, while not comprehensive, usually gives a good approximation of the indirect effects of a policy change in one area. They also have the advantage of being able to incorporate important considerations in an ad hoc way that are difficult to capture in large formal models, such as distributional issues.

The following chapters examine approaches to analyzing specific policy interventions. Each chapter focuses primarily on the direct impact of a policy. Taken together, however, the chapters provide a basis for capturing indirect effects of specific policies and formulating workable models for dealing with such interrelationships simultaneously.

Exhibit 1-11

Effects of Changes in Policies and Other Factors on the Food and Fiber System, and Information Requirements

<u>Economic Activity</u>	<u>Source of Change</u>	<u>Effects of Change</u>	<u>Information Requirements</u>
1. Production	- Improved Technology	<ul style="list-style-type: none"> - Shift supply curve to right - Lowers market prices - Increases exports or decreases imports - Improves balance of payments - Might alter income distribution among producers - Increased demand for capital - Increased need for training and education 	<ul style="list-style-type: none"> - Extent of shift in supply curve - Price elasticity of domestic demand - Price elasticity of export and import demands - Distribution of adoption of technology among producers - Effects of changes in productivity and prices on producer incomes for adopters and non-adopters.
	- Price Support Program	<ul style="list-style-type: none"> - Increases prices received by producers - Increases production - Increases consumer prices - Reduces imports - Improves balance of payments - Might alter income distribution among producers - Reduces production risk - Increased land values 	<ul style="list-style-type: none"> - Price elasticity of supply - Price elasticity of demand - Price elasticity of import demand - Share of commodities receiving support - Producers benefiting by farm size and location - Budgetary costs
	- Subsidy on Inputs	<ul style="list-style-type: none"> - Lowers price and increases input use - Increases production - Lowers market prices of outputs - Reduces imports or increases exports - Might alter income distribution among producers 	<ul style="list-style-type: none"> - Price elasticity of input demand - Production response - Price elasticity of import or export demands - Who uses the subsidized input - Government cost of subsidies - Input substitution
2. Marketing/Processing	- Reduced marketing margins due to improved efficiency, improved transportation, and lower costs.	<ul style="list-style-type: none"> - Reduces market prices - Increases domestic consumption - Increases exports - Increases producer prices - Increases output - Reduces imports - Increases demand for inputs - Improves trade balance 	<ul style="list-style-type: none"> - Price elasticity of demand for final products - Price elasticity of supply - Marketing margin data - Price elasticity of export and import demands - Cost of achieving marketing efficiency
	- Increasing competition in marketing/processing industries	<ul style="list-style-type: none"> - Reduces or eliminate monopoly profits - Lowers selling price of commodities - Increases buying price of raw materials and paid to farmers - Increases production and consumption 	<ul style="list-style-type: none"> - Relationship between industry structure and prices - Existence of significant economies of scale - Information on producer, consumer and trade effects same as above

Effects of Changes in Policies and Other Factors on the
Food and Fiber System, and Information Requirements

<u>Economic Activity</u>	<u>Source of Change</u>	<u>Effects of Change</u>	<u>Information Requirements</u>
3. Food Consumption.	- Food price subsidy	- Increases consumption - Increases imports - Increases government costs	- Price elasticity of demand - Cross price elasticities of demand - Household budgets for different income levels - Government cost of subsidies
	- Price controls	- Stabilizes market prices - Destabilizes supplies - Distorts production mix - Causes black markets	- Production and marketing costs - Seasonal and geographic price pattern - Amount of excess demand and effect on black market prices
	- Food assistance	- Increases consumption - Either increase or decrease market prices - Either increase or decrease production and imports	- Income elasticity of demand - Household budgets - Degree to which benefits are targeted - Government costs - Price elasticity of supply - Level of assistance
4. Exchange Rates	- Reduce overvaluation of currency	- Increases price of imported commodities and inputs - Increases price received by farmers - Increases consumer prices - Increases exports and reduces imports - Stimulates production if higher input prices more than offset by rise in commodity prices - Shifts production in favor of tradeable commodities (exports) - Improves trade balance	- Price elasticity of demand for commodities and inputs - Price elasticity of supply - Price elasticity of import and export demands - Degree exchange rate change affects domestic prices - Change in product/input price ratios - Identify producer benefit - Identify price increases for different foods and how these affect different consumer groups
5. Trade/Tax Policies	- Decrease export taxes	- Increases producer price of exports - Increases consumer prices of same goods - Increases production of exports, and may reduce production of competing commodities - Increases exports - Reduces domestic consumption of export commodities - Improves trade balances - Reduces government revenue	- Price elasticity of demand for export commodities - Price elasticity of supply - Change in government revenue - Effect of increased exports on exchange rate
	- Decrease import taxes	- Reduces prices of imports - Consumer prices decline - Prices of imported inputs decline - Government revenue declines	- Price elasticity of demand for commodities involved - Price elasticity of supply - Change in government revenue - Effect of increased imports on exchange rate

CHAPTER II

PRODUCTION AND PRODUCT MARKETING

The delineation of where production ends and marketing begins is not always clear. As a practical matter, it is convenient to consider anything that occurs on the farm as production and everything that occurs after the product leaves the farm as marketing. Thus, maize shelling would be considered part of the production process if it is performed by the farmer before he sells his product, but it would be considered a marketing activity if it is carried out by merchants.

But this distinction can become murky. In many cases, the farmer and his family transport crops to market and may even sell them directly to consumers. At the opposite extreme, it is not uncommon for some crops to be sold unharvested. In Egypt, for example, farmers typically sell their oranges on the tree, and the buyer is responsible for picking, sorting and boxing the fruit.

In order to examine production and marketing, however one distinguishes between them, this chapter is divided into four sections:

- Policy options in product markets,
- Components of policy analysis,
- Analysis of interventions, and
- Selected case studies.

I. POLICY OPTIONS IN PRODUCT MARKETS

Governments attempt to alter the functioning of production activities and product markets for a number of reasons, not all of which are economically motivated. In order to clarify the policy options that are available to government, this section examines three issues:

- Government intervention in production,
- Selecting among interventions, and
- Implementing product market interventions.

A. Government Intervention in Production

Farm production and the marketing of farm products are the dominant activities that occur within a nation's food and fiber system. Analysis of these activities requires attention to:

- Levels of production as well as the economic organization of the producing sector;
- Prices received or paid by farmers, merchants, and processors;
- Distribution of farm products in the domestic market and for export;
- The degree of services added to raw agricultural products and the prices of these services; and
- Incomes received by farmers, merchants, and processors.

In addition, the decisions made by farmers, merchants, and processors influence the other three principal components of the food and agricultural sector: the purchase and sale of farm inputs, the price and availability of food to the nation's consumers, and international agricultural trade.

Because of their importance, production and product marketing are of major interest to policymakers and nearly every agricultural policy action affects them, directly or indirectly. Governments intervene in the production and sale of agricultural products to improve the sector's performance, measured against the goals outlined earlier in this volume. While there are many different ways to classify these policy interventions, they can be divided into three broad groups:

- Direct government participation in markets through policies that require the government to buy and sell commodities or services.
- Government taxes or subsidies paid by or to producers, marketing agents or others in the product market.
- Other regulatory actions that are taken to alter production or product marketing.

Direct Government Participation in Markets

Direct participation in markets requires particular capabilities on the part of the government. For example, when the government establishes a support price (floor price) for a commodity, it must be able to buy, sell and store the commodity for the policy to be effective. The same is true for other forms of direct intervention including, for example, the operation of grain marketing boards, the management of buffer stocks to stabilize supplies and prices, governmental importation and distribution of commodities, and the operation of state-owned transport systems. In some cases, government operations replace the private sector completely, while in others the government and private companies participate jointly.

One of the most common tools used by developing country governments to influence the product market is the creation of an organization that buys or sells commodities or services at prices set by the government. The organization may be a branch of the government, such as the Ministry of Supply, but is usually a parastatal such as Mexico's CONASUPO, Egypt's National Transport Company, or St. Lucia's Agricultural Marketing Board. In some cases, government organizations monopolize trade as in the cases of Egypt's Cotton Organization and the Cocoa Marketing Boards of several West African countries.

Government Taxes and Subsidies

In the case of subsidies or taxes on agricultural products or on marketing services, the government brings about a transfer of resources between itself and private producers, merchants and processors without actually taking possession of commodities or providing services. If the good is subsidized, the farmer receives an additional payment from the government or a higher price; if the good is taxed, the farmer receives less, assuming the incidence of the tax falls on the farmer. Taxes and subsidies can be implemented directly, or indirectly through pricing mechanisms used by parastatals with the revenues from taxes (losses from subsidies) captured (paid) by the national treasury.

Other Regulation

This class of policy intervention covers a broad range of government actions to "change the rules" under which production and marketing occur. Unlike the previous two categories, these interventions do not require the government to buy or sell commodities nor to provide direct payments or to levy taxes. Perhaps the most common intervention in this category is the establishment of a fixed price by government decree.

Other examples of regulatory policy are the licensing of producers or traders, thereby limiting who can legally engage in these activities; limiting the types or quantities of a good that can be sold; or quality control. For example, the Government of Egypt has forbidden the slaughter of cattle below a certain age in an effort to increase the total availability of beef.

Finally, the production or trade in some goods may be constrained or banned, with offenders subject to fines, imprisonment, or even harsher penalties.

B. Selecting Among Interventions

The nature of the production and marketing processes and commodity characteristics determine, to a significant extent, the policy approaches a government can take. Not all of the tools outlined above can be implemented for every product or marketing service. For example, governments often purchase and store non-perishable commodities, like grain, to achieve price support, price stabilization and food security goals. This is generally not an option with perishable commodities such as fruits, vegetables and livestock products, since they cannot be stored very long. Developed countries wishing to support the price of these commodities have programs to process them into less perishable forms: such as processing milk into milk powder, cheese or butter. This can be very expensive, however, and may not be a viable option for many developing countries.

Insufficient financial resources or trained people also limit the policy options that can be used. Price support programs involving processing, storing and distributing large quantities of commodities may be beyond the capability of many governments to operate.

As a rule, governments try to achieve more than one goal with any given policy action. For example, a government-operated stock of grain may be established to support producer prices and encourage production, ensure a supply of grain for urban areas (or for poor urban residents), as well as eliminate or weaken the role of private traders thought to follow exploitative market practices.

When a government intervenes in the product market, it is either introducing a distortion or attempting to eliminate one. Interventions usually have both positive and negative results and the two have to be weighed carefully. The fact that many of the results are indirect makes the task doubly difficult. For example, some governments have established state-owned marketing boards for export crops in order to fix the price to the farmers below the world price, thereby collecting revenues for the government. The low price, however, discourages production, thus reducing both government and farmer revenues. To counteract this, governments may introduce offsetting policies that subsidize inputs used in the production of these crops. While these additional policies, in themselves, increase farmers' revenue, they also increase government costs.

C. Implementing Product Market Interventions

Most basic agricultural products are "tradeables," that is, they can be imported and exported. Consequently, most interventions in domestic product markets that cause domestic prices to differ from world market prices also require trade interventions. If the domestic price is set above the world price, for example, then the government must limit imports through the use of quotas, tariffs, or foreign exchange allocations for imports in order not to undermine the domestic price. Otherwise, there will be a large incentive for traders to bring the good into the country, thus flooding the market and making it practically impossible to enforce the domestic price. Conversely, if the domestic price is set below the world market level, exports will have to be restricted in some way to prevent commodities from being exported in large quantities, thereby pulling the domestic price up to the world level. Foreign trade policies and their implementation are discussed in Chapter 5.

Another consideration is the need for trained people and physical facilities to implement interventions effectively. The need for skilled people and facilities is especially great when a government is involved in handling commodities that are imported or purchased from producers. These include:

- Storage, processing and transportation facilities of adequate size and located near producers, import points and consumers.
- A trained staff of sufficient size to deal with the logistics of handling commodities and managing inventories.
- Timely and efficient disbursement of funds when commodities are purchased and collection of funds when they are sold.

2. COMPONENTS OF POLICY ANALYSIS

Before discussing how policy interventions in production and product markets can best be analyzed, it is necessary to clarify two important components:

- Analysis of product markets, and
- Institutional aspects of production and marketing.

A. Analysis of Product Markets

It is important for the analyst to understand how commodities are produced and sold in order to interpret such critical factors as marketing margins, production costs, and sources of farm income. The specific operations carried out at each step in the production and marketing chain are reflected in the prices paid and received at each point. Meaningful comparison of retail price and farmgate prices, or of farmgate prices in two different locations, may require adjustments in prices to reflect differences in quality, location and degree of marketing services performed.

Functions of the Market

Agricultural markets perform four key functions. Markets transfer goods and services from those who have them to those who want them, and they determine prices. Markets provide information to producers, consumers and others on the types of goods available and their relative value or degree of scarcity. This information enables producers and consumers to adjust production and consumption over time in order to balance supplies with demands.

Markets also have a stabilizing influence on the economy by providing a mechanism to transfer goods from surplus areas to deficit areas and by providing incentives to store excess production for use later on or ration supplies in times of shortages. While swings in prices caused by changes in production are sometimes cited as undesirable, they may help stabilize farmers' incomes because prices rise in years of low production and fall in good production years. The degree of stabilization depends on the price elasticity of demand.

Each of these functions can be performed by a central planning agency, incorporating non-economic as well as efficiency concerns. But experience indicates that the market does a better job in practice and at much less cost to the economy as a whole. The amount of information required by a central agency to effectively substitute for impersonal market decisions is so overwhelming that even the most advanced centrally planned economy has not been able to devise an efficient system for pricing and distributing goods and services.

Perhaps the primary motivation for policy intervention in the agricultural sector is dissatisfaction with the way the market operates. Some dissatisfaction may be justified because of conditions found in certain developing countries: poor communications, a markedly unequal distribution of wealth and income or weak

market support systems. These factors result in a situation where market failures can be costly. Such failure may take the form of monopoly and monopsony in important markets, distorted prices that are far from the efficient ideal, or simply a failure of goods and services to move from suppliers to customers. When market failure occurs, the advantages of a free market are lost to some degree.

Nonetheless, there is a growing consensus in the development community that policymakers underestimate the efficiency of markets. Unnecessary interventions may be due to erroneous perceptions about or ideologies concerning markets. Part of the problem also lies in the fact that commonly used government interventions do not deal with the causes of market failure and governments are left to deal with the same problems that confronted the private sector. In all likelihood, government actions will make a bad market situation even worse. If markets are not performing well because of an inadequate transportation system, government regulation of prices will not help overcome inadequacies in transport. A more appropriate role for government is to improve the transport situation.

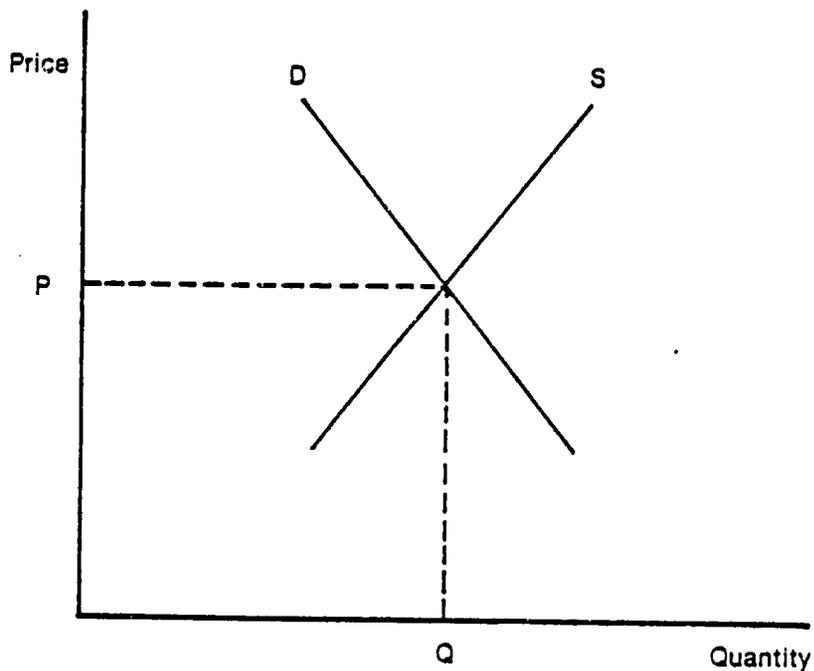
Supply, Demand and Price Formation

There are as many product markets as there are commodities. A market is defined as the sphere of economic activity that determines the price of a commodity, including the influence of substitutes. This concept is distinct from that of a marketplace where the physical exchange of commodities occurs. A market usually consists of a great many marketplaces.

As an abstract economic concept, a competitive market can be represented by demand and supply curves as shown in Exhibit 2-1. At any point in time, a competitive market will be in equilibrium (balance) when the total quantity supplied (including imports) Q_s , equals the quantity demanded (including exports) at the prevailing market price, P .

Exhibit 2-1

Competitive Market Equilibrium



Analysts have the responsibility for making this theoretical concept operational. To do this requires quantifying the position and shape (elasticity) of the supply and demand curves, as well as identifying and quantifying the factors that cause them to shift. The level of market demand and its responsiveness to price are determined by:

- The number of consumers,
- Their tastes and preferences for various goods and services,
- Consumer income, and
- The availability and prices of substitute or complementary goods and services.

The level of the market supply curve and its responsiveness to price is determined by:

- The quality, quantity and price of resources available to produce the commodity,

- The production technologies employed, and
- Prices of goods or services that compete for the same production resources.

The positions of the demand and supply curves will change as a result of shifts in some of the above factors, leading to a change in the equilibrium quantity, the equilibrium price or both. For example if consumer income increases, the demand curve usually shifts to the right, because at each price consumers will demand more of the particular commodity. If the price of an alternative commodity increases, this causes a leftward shift in the supply curve as farmers shift resources toward production of the more remunerative commodity. Similarly, if the cost of producing the crop in question declines due to a change in technology or a decline in the price of one or more inputs, then the supply curve shifts to the right because farmers will be willing to produce more of the crop at a given price.

Any shift in price away from the equilibrium price will result in a gap between demand and supply, so that the market is not in balance. This situation is unstable. In most cases the market will correct itself through adjustments in both production and consumption.

The pressures pushing agricultural markets toward equilibrium are extremely strong. Governments can and often do resist them, but the market will eventually tend to reassert itself. For example, if the government attempts to set a price below the equilibrium level, consumers will want to purchase more of the good than farmers are willing to produce and sell. Since the amount sold must in fact equal the amount purchased, there are several possible ways in which the imbalance is eliminated:

- Government will have to import an amount of the commodity equal to the excess in demand over supply and sell it at the fixed price;
- A black market will develop in which the commodity sells above the fixed price and possibly even above the equilibrium price if some of the commodity moves at the below-equilibrium administered price, and
- Supplies may be bid away from poor people into the hands of wealthier ones who have the income to buy at higher, black market prices.

From the standpoint of policy analysis, two basic conclusions about supply and demand can be drawn, supported by extensive empirical research. One is that production and consumption of an individual commodity are responsive to a change in its price, all other prices remaining unchanged. However, one gets this production response at the expense or to the benefit of competing commodities so that increasing the output of one commodity does not necessarily mean an increase in total agricultural output. The same is true on the consumption side. A decline in the price of one commodity will lead to an increase in consumption, but there are usually offsetting consumption declines for some other commodities.

Another conclusion is that in the aggregate, the production and consumption of agricultural products is fairly unresponsive to an increase in all agricultural product prices. The supply response from increasing the use of all inputs is generally small.

The major determinants of aggregate output in the long term are those factors that shift the aggregate supply function to the right. These include increasing the supply of key inputs such as land, labor and irrigation, and improving production technologies that result in greater output for a given level of input use.

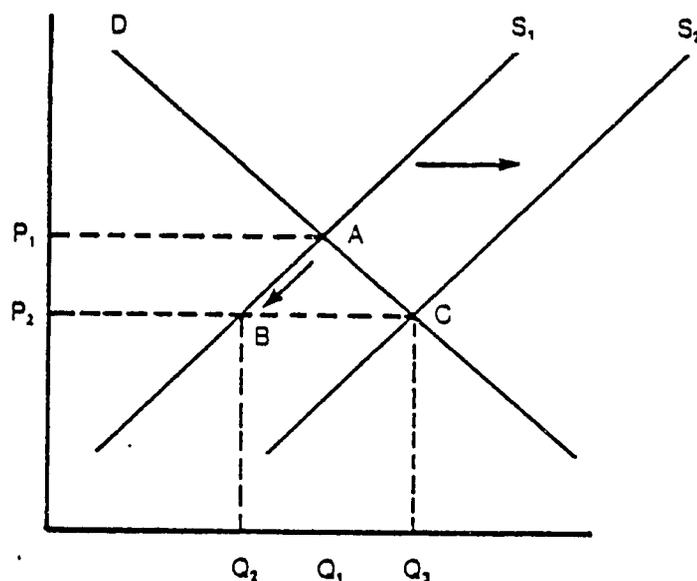
Similarly, the major determinants of aggregate demand levels are population size and consumer income. The latter gets reflected in consumption of a more resource-intensive diet (more meats and less grains) and not in consumption of more pounds of food (except in the case of hungry people).

When dealing with production policy, one must always remember the difference between movement along a supply curve and a shift in the curve. Movement along a supply curve occurs solely in response to price, with all other factors held constant. A rightward shift in the supply curve typically occurs when more or cheaper inputs are made available, when technology changes, or when the prices of competing crops fall.

In Exhibit 2-2, a reduction in market prices from P_1 to P_2 would cause farmers to reduce output to Q_2 , requiring imports of $Q_3 - Q_2$ to meet demand. This represents movement along supply curve S_1 from A to B. But if a new irrigation project or improved seeds cause the supply curve to shift to S_2 , one ends up at the same price P_2 but with markedly different production and no need for imports.

Exhibit 2-2

Illustration of Movement Along a Supply Curve Versus a Shift in the Curve



From the policymaker's standpoint, the change in the amount of a commodity marketed in response to a price change may be as important as the change in production, especially in the case of subsistence food crops.

The amount marketed in response to a price change is complicated by the fact that a price change also results in changes in farmers' incomes, thereby resulting in a shift in their demand curve. Therefore, estimating the change in markets in response to a price change requires knowledge about:

- Price elasticity of production (supply), which is positive.
- Price elasticity of the producer's demand for the commodity, which is negative.
- Effect of a price change on producer income and the income elasticity of demand (usually positive).

For some food commodities, an increase in the quantity marketed may be less than the increase in production. The higher price increases producer incomes and will lead them to consume more of the commodity.

The Role of Marketing Services

Agricultural production is only part of the story. The marketing function, including transport, storage and processing, is equally important in determining the quantity available to consumers and the prices facing both consumers and farmers. The marketing function changes commodities with respect to location, form and timing of their availability. For example, paddy rice harvested in October in Bicol Province in the Philippines is transformed by milling, transport, packaging, and storage into polished rice offered for sale in December in Manila.

A key question raised by policymakers is whether or not the marketing margins are "fair." As a rule, one judges the marketing margin to be fair if analysis indicates that it can be fully explained by the following:

- Transportation cost,
- Storage cost,
- Processing cost,
- Interest charges paid for financing required to perform marketing services,
- Allowance for losses in the process, which may be high in the case of a perishable product,
- Allowance for risk caused by price variability and other factors, and
- Reasonable profits for the entrepreneurs performing each of the above functions.

Generally, one cannot infer a great deal about fairness or efficiency from the absolute size of per-unit marketing margins alone. Two other aspects of the system have to be examined. One is the competitiveness of the system as indicated by the profit margins. The other concerns the costs imposed on the agricultural marketing system by such things as inadequate transportation or storage, high losses, excessively high interest rates and taxes (or subsidies).

As discussed in Chapter 2, monopoly power can increase marketing margins in at least two ways. One is that monopolists can command a higher rate of profit than firms operating in a competitively structured industry. Secondly, monopolists may be insensitive to costs and not operate in the most efficient ways.

This may be especially true for parastatals that are under political pressure to employ more people than are actually needed to perform marketing functions efficiently. Consequently, it is important for analysts to study the competitive structure of agricultural markets. The number of firms involved is one simple, though not foolproof measure of judging competitiveness.

An inadequate marketing infrastructure is another source of high marketing costs. Two of the most common problems are inadequate transportation and poor storage that result in large losses due to spoilage or pests. Most agricultural commodities are bulky (high volume or heavy weight relative to value) and have varying degrees of perishability. In a similar vein, policy analysis should also look at the availability and cost of credit to the agricultural marketing system, and the extent to which marketing margins are influenced by taxes and subsidies.

B. Institutional Aspects of Production and Product Marketing

With few exceptions, agriculture is primarily a private sector activity in the developing world. Admittedly, state farms or parastatal-managed farming operations exist in many countries, but such public sector farms rarely account for a significant share of total agricultural production.

The Structure of Production

Excluding state farms, four basic types of production units can be identified that are of interest to policy makers:

- Very small farms, defined as farms that are too small to provide full-time employment for the farm family or sufficient income to support the family at a minimal level. For these households, off-farm employment is an important source of family income.
- Small farms, defined as those that have sufficient land to provide families with minimally acceptable levels of income. This category includes subsistence farms, in which the farm produces nearly all of the food consumed by the family with little if any surplus available for sale. It also includes small producers of commercial crops in which most or all of the production is sold.
- Medium-sized farms, defined as those that provide families with adequate levels of income and employment, and sell a significant proportion of their output.
- Large farms, defined as those that produce primarily for sale, require labor in addition to that provided by the family, and yield relatively high levels of income by national standards.

This classification of farm size is best done in terms of relative levels of income from farming in relation to a country's average income level. The definition of an adequate subsistence level of income will be much lower in a poor country than in a rich one. Also, farm size measured in terms of area cultivated is not a very useful way of classifying farms because of tremendous variations in land productivity among regions of a country and in the land requirement for different crops. In arid areas with poor soils it might require 10 hectares of crop land for a farm family to survive. On the other hand, farms of one hectare can be prosperous if they are irrigated, use advanced technology, are close to urban markets and can produce and sell high-valued crops.

Land tenure systems are also important since they affect both the distribution of income generated by production and the investment decisions related to increasing productivity. Typical tenure patterns include:

- Owner-Operator, where the farmer owns the land that he tills.
- Tenancy, in which one person owns the land and collects rent (*fixed, share, etc.*) but does not generally take the lead in making management decisions for the farm or provide labor to the farm operation. The owner may be an individual, a business or the government.
- Communal, in which the land is owned by a kinship group such as a clan or tribe. In most cases, the land is allocated to individuals who manage their share as an individual unit.
- Public, in which land is owned by the government and is simply occupied by the farmer or herdsman without payment, with or without the tacit approval of the state.

It is common to have mixed tenure patterns for individual farming operations. For example, the total hectareage a farmer operates may be a combination of parcels of land that are owned by him, rented from a neighbor on a cash-rent basis, owned by relatives and rented on a share-crop basis, and used free of charge because it is state grazing land.

Any diagnosis of agricultural output problems and analysis of policy options requires fairly detailed knowledge about producers and the conditions under which they operate.

The classification system described above is one useful way to organize information for policy analysis. For example, suppose the structure of production for a country's main staple crop is as shown in Exhibit 2-3. Region I is the main

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- Owner-Operator, where the farmer owns the land that he tills.
- Tenancy, in which one person owns the land and collects rent (fixed, share, etc.) but does not generally take the lead in making management decisions for the farm or provide labor to the farm operation. The owner may be an individual, a business or the government.
- Communal, in which the land is owned by a kinship group such as a clan or tribe. In most cases, the land is allocated to individuals who manage their share as an individual unit.
- Public, in which land is owned by the government and is simply occupied by the farmer or herdsman without payment, with or without the tacit approval of the state.

It is common to have mixed tenure patterns for individual farming operations. For example, the total hectareage a farmer operates may be a combination of land that is owned by him, rented from a neighbor on a cash-rent basis, owned by relatives and rented on a share-crop basis, and used free of charge because it is state grazing land.

Any diagnosis of agricultural output problems and analysis of policy options requires fairly detailed knowledge about producers and the conditions under which they operate.

The classification system described above is one useful way to organize information for policy analysis. For example, suppose the structure of production for a country's main staple crop is as shown in Exhibit 2-3. Region I is the main

producing region, and is dominated by small farmers. Region II is an established irrigated area with both large and small farms, while Region III is a newer irrigated region consisting entirely of large farms.

Exhibit 2-3
Structure of Production for a Staple Crop

	Region I (Dryland)		Region II (Irrigated)		Region III Irrigated		Totals/Averages				
	Lg.	Sm.	Lg.	Sm.	Lg.	Sm.	Lg.	Sm.	Dry.	Irr.	Tot.
Area (1000 ha)	100	300	50	30	20	--	170	330	400	100	500
Yield (T/ha)	5.0	6.0	9.0	10.0	8.0	--	6.5	6.4	5.7	9.1	6.4
Production (1000 T)	500	1,800	450	300	160	--	1,110	2,100	2,300	910	3,210
Marketed Surplus	450	200	400	200	150	--	1,000	400	650	750	1,400

Although these numbers are hypothetical, they reflect several features common to many developing country situations:

- Yields on small farms are slightly higher than those on larger units with the same type of land because of the greater intensity of land use by the former, especially the greater use of labor per unit of land.
- Dryland yields are lower, but dryland may be more important in total production than irrigated areas.
- Small farms are disproportionately concentrated in dryland areas.
- Small farms consume a much higher proportion of total production than do large farms, so that large farms account for a relatively higher share of the marketed surplus.

Now suppose the government is considering a number of policy alternatives. Individually, or collectively these might include:

- Increasing producer prices,
- Expanding irrigated area, and
- Increasing the availability of improved seeds.

The costs of implementing these policies can be calculated from information concerning their design and implementation. The benefits can also be calculated in terms of increases in production and marketable surplus for:

- The total of all farmers,
- Dryland versus irrigated areas, and
- Small vs. large farms.

All of these benefits may be important to policy decisionmakers.

The Structure of Marketing Institutions

The answers to four questions will tell the analyst most of what he or she needs to know about the structure of marketing institutions for a particular crop or group of products:

- What is the division of responsibility for marketing functions among institutions, and how many different firms or organizations offer each service in any given geographic region? Do firms providing a particular marketing service (such as transport of wheat to market) have clearly defined territories or do many firms serve overlapping regions? What percentage of the total marketed volume is handled by the largest firm? The largest five firms?
- Are new firms free to enter the market for a product or service, or are there significant barriers to entry? For example, is a large amount of capital needed to begin operation or is a special license required from the government?
- Are the inputs needed to perform marketing services (e.g., transport equipment, jute bags or processing equipment) readily available?
- What are the linkages between product marketing organizations and other agricultural or non-agricultural marketing entities? For example, are the same firms that handle domestic trade in a given commodity also dominant in the export trade? Do the same firms handle inputs for the product and its final commercialization? Do the firms that market a given product control credit or sale of consumer goods in the main producing regions?

Many policy decisions affecting product marketing turn on the issue of whether the marketing operation is competitive and efficient. Although it is often difficult to determine with precision whether a given marketing operation is

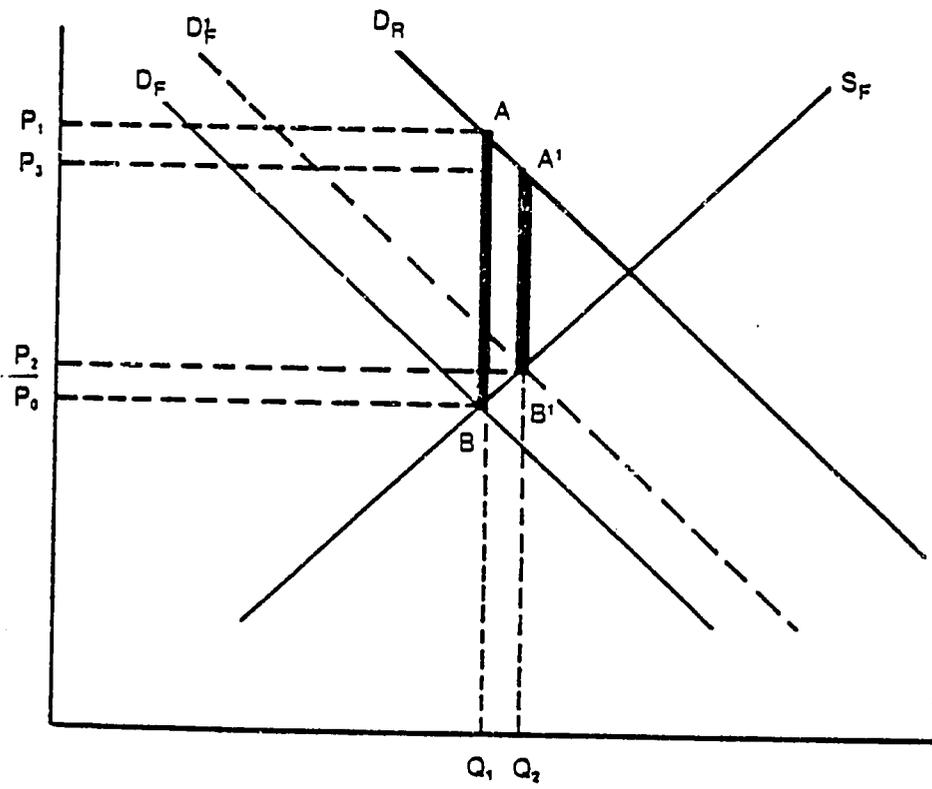
competitive, the answers to the previous questions will generally give a good indication. If there are several firms of roughly equal size competing to buy the production in the main producing regions and there are no major barriers preventing new firms from entering the marketing business, then it can generally be concluded that the product market is competitive and the marketing margins observed are efficient, whether they are 2 percent above the farmgate price or 200 percent.

A second way to measure competitiveness is to compare the observed marketing margins to an estimate of what the marketing margin should be, based on synthesized costs. Such an estimate requires information on the farmgate price, the cost of transport and storage, the effective interest rates, the percentage of the product lost in transport and storage, and other legitimate costs of operation, as well as the price at each stage in the marketing process. If the sum of these estimated costs and the farmgate price is reasonably close to the observed price in the market, then it may be assumed that the marketing function is operating in an economically efficient (competitive) manner. It is important to bear in mind, however, that marketing may still be plagued with technical inefficiencies -- poor roads, high spoilage rates, etc. -- whether or not it is economically efficient. Thus, the analysis of marketing costs also provides valuable information for allocating funds to public investments in marketing, because it helps to indicate which technical problems should have priority for corrective action.

Reducing marketing margins by improving the efficiency of the marketing system can be of direct benefit to producers as well as consumers. Exhibit 2-4 illustrates the case of relating the market for paddy rice at the farm level to the market for milled rice in an urban shop. Supply of the raw product at the farm level is graphed as S_F while demand for the processed product at retail is graphed as D_R . If the marketing margin AB is reduced to A^1B^1 due to increased competition or a new road that reduces transportation costs, both consumers and farmers benefit. Consumers pay less (P_3 rather than P_1) and producers receive more (P_2 rather than P_0). The precise division of benefits depends on supply and demand elasticities.

Exhibit 2-4

Relationship between Market for Paddy Rice at Farm Level and Milled Rice at Urban Shop



3. ANALYSIS OF INTERVENTIONS

In nearly every case, a policy intervention in the market for a given product will also affect other product markets. Often the analyst cannot limit his investigation to the direct effects of an intervention; indirect effects must also be considered. In order to help the analyst determine the effects that are likely to arise from policy interventions in production and product markets, this section discusses three elements:

- Identification of policy alternatives,
- theory of price interventions, and
- Measuring impacts on production and consumption.

A. Identification of Policy Alternatives

Once a problem has been identified for analysis, policymakers and analysts have to select those policy options that offer potential solutions to the problem. In some cases, the selection will have been made in a limited way before the analysis begins. Still, the analyst may have an opportunity to formulate one or more options on his own.

For example, the analyst may be asked to predict whether the planned increase in the support price for a staple grain will eliminate the need for imports. On examination of the situation, however, the analyst may find that what appears to be a single option is instead only one of several related options, such as:

- Raise the support price from x to y , leaving the rest of the program as it stands.
- Leave the support price at x , but expand storage and collection capacity so that the support price is made effective throughout the country.
- Raise the support price by a smaller amount, but announce the change before planting (rather than just after harvest), so that farmers have an opportunity to react to the new price.

It is important to determine the underlying causes of the problem as part of the identification of alternatives. In this case, one needs to identify why the current support price is not producing the desired increase in production before considering whether prices should be raised or whether other modifications would be more appropriate. The impact of a policy intervention cannot be determined accurately without understanding how the intervention actually works, as distinct

from how it is supposed to work. In some situations, the policy may be fine but its impact is undermined by poor implementation.

Suppose that the support price is not effective because the government does not have enough storage space or enough money in the budget to buy as much grain as is offered at the support price. If the problem is storage capacity, the price change will have little if any impact on the market price, because the amount of grain purchased by the government will not increase very much. In the case of a budget constraint, a higher support price may reduce the effect of the program, because the government will be able to buy less grain at the higher price.

The remainder of this section examines two policy interventions in the product market, both of which are usually intended to result in a market price different from the price that would exist without the intervention:

- Establish a support price to producers above the equilibrium market price, enforced by the government standing ready to purchase and store an amount of commodity required to make the support prices effective.
- Set the price paid by consumers below a market equilibrium level, being ready to enforce this price level through a combination of imports and use of existing stocks.

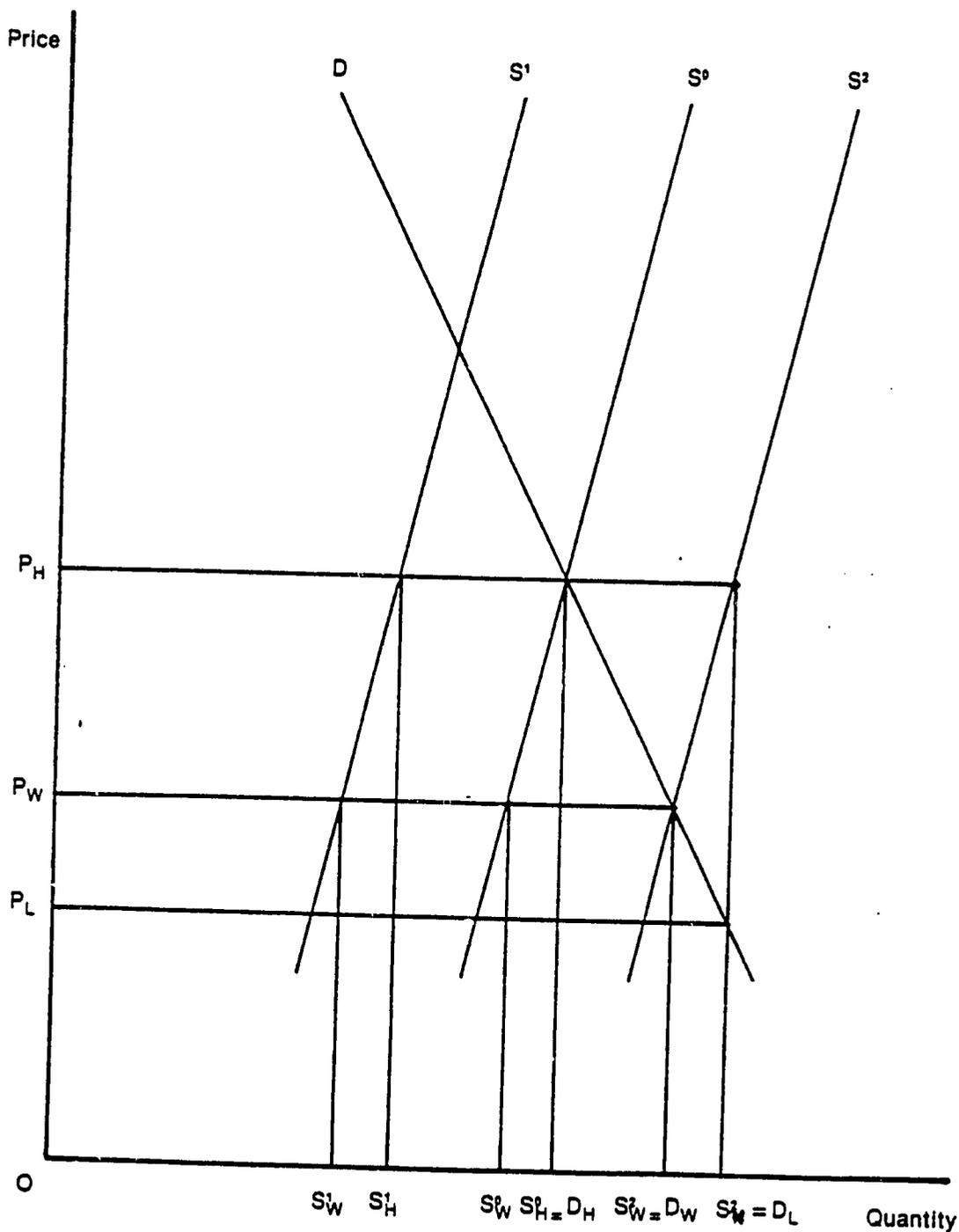
B. Theory of Price Interventions

The theoretical impact of a few possible product price interventions is illustrated in Exhibit 2-5. For the commodity in question, domestic demand is represented by the curve labelled D while three supply situations have been assumed. S_0 is the supply curve assuming normal weather and growing conditions. S_1 results from a poor weather situation, and S_2 from favorable weather and crop conditions. In countries that are heavily dependent on dryland agriculture and that experience considerable variation in rainfall levels, weather-induced shifts in supply conditions can be quite large.

As a starting point, assume the country's existing policies allow the domestic price to be equal to the world price, P_w , after the appropriate exchange rate adjustments are made. This policy is enforced by importing an amount of the commodity required to balance domestic demand with total availability. Only in very good crop years would domestic production S_w^2 equal domestic demand D_w

Exhibit 2-5

Theoretical Impact of Several Possible Price Interventions



and imports not be required. With normal production (S^O supply curve) imports would be equal to $D_W - S^O_W$. With a poor crop imports would increase to $D_W - S^1_W$.

This country may feel that it does not want to be so dependent on imports, and subject to fluctuations in world prices. One policy option is to implement a price support program that sets producer prices at P_H . The higher price would stimulate production, but also reduce consumption. With normal weather, the country would be self-sufficient at P_H with output S^O_H being identical to desired consumption at that price. In the case of poor weather, imports would be required equal to $D_H - S^1_H$. With a very good crop, production would exceed the quantity demanded at the support level by $S^2_H - D_H$. To maintain the integrity of P_H , this amount of commodity would have to be removed from the market and either stored at some cost as protection against a poor crop or exported using an export subsidy.

An alternative policy situation is where the government decides that the current price level P_W is too high despite large imports, and it wants to maintain a price at P_L . If both producers and consumers faced the same price level, consumption would increase, production would decline and imports would rise compared to the current situation. Consumers would be better off, producers worse off and foreign exchange outlays for imports would increase.

Another option is to combine these approaches using a price support program that yields producers P_H and a subsidy program that resulted in consumers paying P_L . The implications of this approach under a normal crop scenario appear below, and the reader can do the calculations for other crop situations.

Production would be S^O_H , with a support price at P_H . Consumption would be D_L with the market price held down at P_L and imports would be $D_L - S^O_H$. The government would have to pay a large subsidy to move domestically produced grain into consumption at P_L , equal to $(P_H - P_L) \times S^O_H$. In addition, the domestic consumer price is below the imported or world price so an additional subsidy is necessary equal to $(P_W - P_L)(D_L - S^O_H)$. Consumers benefit greatly from a lower price. Producers benefit greatly from a higher support level. The cost to the government is very large, however, because of the combined subsidies required on domestic production and imports.

There are several considerations involved in implementing any of the above policies. If producers are offered a minimum support price, that price must be made effective. This means that the government must be prepared to buy and store the commodity in all producing regions at the announced support level. In times of very large crops, the amount to be purchased and stored may be quite large, requiring a substantial number of employees, transportation and storage facilities, and a great deal of money.

When imports are required, they must be in the right amount and at the right time. If they are too large or too small there is the risk that consumer prices will be either be lower or higher than desired. Unnecessarily large imports could also overwhelm the producer price support system.

Having some domestic stocks accumulated in times of large supplies might be one way to meet temporary shortfalls in imports arising from delays in import arrivals due to logistical problems or delays in buying because of money shortages.

C. Measuring Impacts on Production and Consumption

Exhibit 2-5 is useful for translating the policy into conceptual terms and identifying the direction of major impacts, but data and the coefficients of supply and demand relationships are needed to quantify the effects of policies.

Data Needs and Sources

The basic information needed for analysis of price interventions includes:

- The current price levels at the farmgate level (and at other market levels),
- The current production and quantity marketed for the product under examination,
- Level of imports or exports,
- The price elasticities of total and marketed supplies, and consumer demand, and
- The world price as a reference point.

If this information is not immediately available to the analyst (such as from previous work by his office), it must be drawn from one or more of the following sources:

- Estimates of supply and demand elasticities made by other analysts within the country or for other countries with similar production and consumption patterns,
- Professional judgments based on reliable but probably fragmentary information, or
- Officially published data on imports, exports, domestic production, and marketing. If these data are not complete or current, estimates might be obtained from reliable observers in both the public and private sectors.

Basic Analytical Techniques

This section presents a simplified approach to estimating the direct impact of policies, prices, quantities, farm receipts, consumer expenditures and government costs. The approach is useful if the policy change contemplated is relatively small in percentage terms (say, no more than a 10 or 20 percent change in a price). The reliability of one's estimates declines as the magnitude of change increases.

Initial Case

To translate the initial policy situation in Exhibit 2-5 into a quantitative example using the normal weather and crop scenario, assume that the commodity in question is rice (produced in a West African country using French francs (F) as their monetary base) and that the initial case involves the following values:

- Price elasticity of demand is -0.4 ,
- Short-run price elasticity of supply is 0.3 ,
- P_w is F 150 per metric ton,
- D_w equals 1,500 thousand metric tons (tmt),
- S_w^0 equals 1,000 tmt,
- Imports are 500 tmt,
- Shifts in the supply curve due to extremely favorable or poor weather equal 500 tmt,
- Value of production is F 150 million,
- Value of consumption is F 225 million,
- Value of imports is F 75 million, and

- For simplicity, internal marketing costs are ignored so that production is valued at the same market level as consumption.

Policy Alternative I

Under this alternative, the country decides to increase the domestic price of rice by 20 percent to F 180 per metric ton in order to stimulate production. The effects of such a policy are outlined below.

With respect to production and producer returns, the following would be expected:

- Production would increase by 6.7 percent to 1,067 tmt (20 percent price increase x 0.3 price elasticity of supply);
- Gross receipts of producers would increase to F 192 million (F 180 per metric ton x 1,067 tmt) or by F 42 million;
- Domestic consumption would decline by 8 percent to 1,380 tmt (20 percent price increase x -0.4 price elasticity of demand), or by 120 tmt;
- Imports would decline from 500 to 313 tmt (equal to consumption minus production). Outlays on imports would now be about F 47 million vs. F 75 million earlier; and
- If the government did the importing, it would buy rice at F 150 on the world market and sell it for F 180 domestically. Therefore it would realize a revenue gain of F 9.39 million (F 30 per ton x 313 tmt).

Policy Alternative II

In this case, the government wants to use a higher producer price to stimulate production but does not want to increase consumer prices, but instead keep them at the world market level:

- Production and producer returns would increase by the same amount under Policy Alternative I,
- Consumer prices and consumption would remain unchanged at 1,500 tmt,
- Imports would be reduced from 500 to 433 tmt and the amount of foreign exchange required would be about F 65 million, and
- The government would incur a subsidy cost of F 30 per ton, the difference between producer and consumer prices. The total subsidy would be F 32 million (F 30 x 1,067 tmt produced).

Policy Alternative III

In this case, the government decides it wants to increase producer prices as in Alternative II, but it also feels that the world price of rice is too high and would like to lower consumer prices by 20 percent to F 120 per ton. The results one can expect are as follows:

- Production would be 1,067 tmt at a price of F 180;
- Consumption would increase by 8 percent from the initial situation to 1,620 tmt at a consumer price of F 120;
- Imports would be 553 tmt at the world price of F 150;
- Government would incur the following subsidy costs:
 - F 64 million on domestic production (F 60 x 1,067 tmt);
 - F 16.6 million on imports (F 30 x 553 tmt); and
- Foreign exchange expenditures on imports would be F 83 million.

This analysis is done in highly simplified form. To make this analysis more realistic, several factors would need to be taken into account:

- Introduce marketing costs (margins) to distinguish between prices paid by consumers and received by producers,
- Estimate the extent to which higher producer prices and returns affect on-farm consumption of rice and, therefore, such things as the marketable surplus and import requirements,
- Examine ways in which the government would actually implement various subsidies, and whether or not they are workable, and
- Introduce fluctuations in production due to weather, examine what they mean for imports, and analyze the personnel, storage, and financial requirements for those situations where the government is required to buy and store rice for some period of time.

Some Indirect Effects

The above examples dealt only with rice, and the effects of policy changes on production, consumption, imports and government subsidy costs. The increase in rice production resulting from a higher producer price came about, in part, as a result of less acreage being devoted to some other crop. It may be important,

from a policy standpoint, to know the other crop in which production declined and by how much. If the other crop is a commercial crop that is exported, export availabilities will decline as will foreign exchange earnings. In addition, the other crop might be a politically sensitive food crop such as oilseeds. Lower oilseed production may force the country to increase vegetable oil imports, thereby partially offsetting gains from lower rice imports in terms of foreign exchange expenditures.

In the same way, some of the alternatives discussed above involve higher or lower levels of consumption, price, production, and possibly imports or exports for major competing foodstuffs. For a discussion of how these indirect influences affect producer returns, import requirements, and consumer well-being see Chapter 5).

4. SELECTED CASE STUDIES

In order to provide an application of the material presented in this chapter, two case studies are presented that have a direct bearing on governmental interventions in production and product marketing:

- Pakistan's agricultural policies, 1960-1985, and
- Price policies in Kenya in the 1970s.

A. Pakistan's Agricultural Policies, 1960-1985*

Pakistan is often cited as one of the countries where the Green Revolution has had the largest impact. The introduction of high-yielding grain varieties coupled with increased irrigation has enabled Pakistan to achieve virtual self-sufficiency in wheat, the main staple crop. Wheat production more than doubled between 1960 and 1980, although acreage expanded by less than 50 percent. Rice production more than tripled.

* This discussion draws heavily on Prices, Taxes and Subsidies in Pakistan Agriculture, 1960 - 1976, World Bank, April 1980, and the IBRD Country Reports for Pakistan, 1981, 1984, and 1985.

At the same time, the agricultural sector has been plagued by several difficulties, including the continued poverty of landless laborers and the relatively slow pace of development in the remote northern and western regions of the country. Despite the major improvements in yield and production during the past two decades, Pakistan's yield levels remain quite low by international standards. For example, Pakistan's wheat yield in 1983 (a relatively good year) was 1,678 kg. per hectare compared to the Asia average of 2,049 kg. and the world average of 2,150 kg.

Agriculture remains the principal source of livelihood for the 75 percent of the population living in rural areas. Although agriculture's share in total GDP has declined to below one-third of the total, it continues to be a major source of foreign exchange and raw materials for the nation's growing industrial sector.

Government Objectives in the Agricultural Sector

The goals pursued by the government of Pakistan in the agricultural sector are essentially those sought by all governments, whether in developing or developed countries: rapid growth of income, a secure supply of food and basic commodities, and support for the development of other sectors of the economy. Pakistan has perhaps placed a somewhat larger emphasis on the latter, given the key role of cotton and textile manufacture in the nation's industry (accounting for roughly 40 percent of the total) and the stress put on industrial expansion in the national development strategy.

Agricultural Pricing Policies

Throughout this period, Pakistan's decisionmakers have used commodity prices as a major tool to guide economic development and redistribute income. During the 1960s and early 1970s, policies kept commodity prices for both food and industrial crops low relative to world prices and encouraged farmers to produce for the domestic market rather than for export. Subsidies on inputs were used to partially offset the tax implicit in low producer prices. Some observers have argued, however, that the subsidies benefitted primarily larger and wealthier farmers, whose greater access to irrigation and higher fertilizer use enabled them to take better advantage of the subsidies offered. Thus, in general, Pakistan's agricultural policies during the 1960s and early 1970s favored consumers and the industrial sector rather than farmers and, within agriculture, tended to favor the larger farmers rather than smaller farmers and landless labor.

Since the early 1970s, the government has moved to bring domestic prices more closely in line with world prices, relying on Pakistan's comparative advantage. The devaluation of the rupee (R) 1972 and, more recently, the floating of the rupee against foreign currencies have permitted domestic prices to move toward world prices.

These changes in the macro-economy have been supported by a gradual rise in procurement prices for wheat and rice to world levels in the early 1980s. At the same time, the subsidy on fertilizer has gradually been reduced, falling from Rs.1.4 billion in 1981/82 to Rs.551 million in 1984/85.

Exhibit 2-6 shows the movement in domestic wheat and rice prices relative to world prices and relative to the price of fertilizer. These shifts have made fertilizer use relatively less attractive to farmers and have slowed the expansion of fertilizer use. But continued technological progress made increased fertilizer use profitable. Thus, offtake of nitrogenous fertilizers increased 38 percent in the five-year period 1978/79 - 1983/84, compared to 93 percent in the previous five-year period.

The government's pricing policy must balance several competing concerns. On the one hand, prices must be kept at levels that encourage increased production and use of improved technology. On the other hand, higher prices are also reflected in increased costs for the government's food distribution program, in which flour and other basic commodities are sold to consumers at below-market prices. In addition, the total cost of these and other subsidies reduces the availability of funds for government programs to assist agriculture through improvement of the irrigation system, expansion of the rural road network or increased research and extension services.

Performance of the Agricultural Sector

The government's emphasis on basic grain production appears to have paid off in terms of rapid growth in national output of rice, wheat and maize during the 1960s and early 1970s, despite the relative low prices paid to farmers during this period. Agricultural production as a whole grew at 4 percent per year, with rice and wheat production rising at 6.4 and 5.4 percent per year, respectively.

One result of this rapid expansion in basic grain production was an increasing reliance on domestically procured wheat to stock the government-operated ration shops that sell subsidized grain and flour to the urban population. This

shift enabled the government to maintain and even expand the program during the early 1970s, when world grain prices rose sharply, by substituting domestic grain for imports. The use of price policies to effectively insulate the domestic market from the world market transferred much of the cost of the ration shop program from the government to the farmers.

While this large transfer of resources from farmers to consumers undoubtedly had a significant impact on the distribution of income and the profitability of agriculture during this period, its operation was relatively invisible to farmers and consumers alike, since domestic price relationships remained comparatively constant. As in the Kenyan case, discussed next, the rapid change in production technology enabled the government to maintain production incentives for farmers, even though the differential between world and domestic prices constituted a heavy tax on agricultural production.

This resource transfer has now been eliminated by bringing domestic prices into line with world prices. Thus, the government has achieved a savings in foreign exchange (through elimination of wheat imports) at the expense of increased budgetary outlays for procurement of grain.

Since introduction of the revised pricing policies in the early 1980s, the agricultural sector has sustained the record of growth established in the earlier period. Value-added in agriculture has continued to rise at a respectable 3 to 4 percent annually. Exhibit 2-6 shows the development of agriculture since the mid-1970s, both overall and in terms of the major cereal crops.

Exhibit 2-6
Agricultural Performance, 1974/75 - 1983/84

	Value-added (percent change)	Total Output		
		Wheat	Rice	
(Index, 1959/60 = 100)				
1974/75	na	190	196	233
1975/76	na	222	222	263
1976/77	2.5	247	234	275
1977/78	2.6	248	214	296
1978/79	3.5	242	255	329
1979/80	6.7	248	278	323
1980/81	3.8	278	234	314
1981/82	3.9	304	289	345
1982/83	3.7	287	318	346
1983/84	-6.2	na	280	349

Source: IBRD Country Economic Reports for Pakistan, 1984 and 1985.

Factors other than price policy also influenced agricultural performance in the early 1980s. First, 1983/84 was an extremely bad year for agriculture in Pakistan, due to a severe drought that affected both irrigated and unirrigated areas nationwide. Wheat yields fell by nearly 12 percent relative to the previous year, and cotton yields declined by over 40 percent. Second, the privatization of the fertilizer distribution system that accompanied the rise in fertilizer prices (both absolute and relative to major grain prices) apparently brought about a dramatic improvement in the availability of fertilizer to farmers, which encouraged expanded use. Third, the government has greatly expanded its efforts to ensure the availability of irrigation water, increasing its outlays for maintenance and operation of irrigation systems by over one-third between 1981/82 and 1983/84.

While a price policy favorable to increased production is clearly a key to encouraging farmers to expand production, Pakistan's recent experience underscores the importance of other factors -- weather, the availability of inputs and technological change -- that shape farmers' response to prices.

Policy Response to Changes in the Environment

The experience of Pakistan over the past two decades provides several examples of the ways in which policies interact with the technical, administrative and economic environment. The impact of a given policy in the product market is a function not only of the policy itself, but also the environment in which it is implemented. As the environment changes, the impact of a given set of policies is also likely to change, so that the government must continually reexamine its policies and programs to ensure that they are having the desired effect. To complement the broad overview of the sector provided above, this section briefly discusses several instances where policy change affected or had been affected by changes in other parts of the agricultural sector: price policy and grain management issues; the impact of rising international prices for oilseeds on domestic marketing policy; and the impact of tubewell technology on farmer response to prices.

These examples underscore the need for analysts to be aware of changes such as these in the agricultural sector, so that they can be alert to potential shifts in the impact of agricultural policies and programs.

Food surplus versus food deficit. At the present time, Pakistan faces the difficult problem of selecting policies appropriate for the transition from a grain deficit situation to one where there is a potentially exportable surplus. As an importing country, the "world price" or opportunity cost of grain is the import (cif) price, whereas for an exporting country, it is the generally much lower export (fob) price to which the economy must respond. If the country is not consistently an importer, this situation tends to magnify domestic price fluctuations between good and bad years. In a year of low production and consequent imports, the domestic price will rise to the higher cif price, motivating farmers to increase production for the following year. But if they are successful in generating a surplus, it will have to be disposed of at the lower fob price, putting increased downward pressure on the domestic price. Thus, the problem of managing trade, domestic procurement, and grain prices becomes more complicated, not least because the world market itself is unstable.

Changing prices for a major import. Changes in world market prices can also affect the process of policy reform. During the 1980s, Pakistan's agricultural marketing policies have gradually shifted towards greater reliance on the private sector to process and market agricultural products, whether domestic or imported. For example, many of the oilseed processing plants nationalized in the 1970s were returned to private management in the early 1980s in hopes of decreasing the drain on the public treasury. Price controls were, however, maintained on ghee (a form of cooking oil that is a major element in the Pakistani diet). The official price provided a reasonable incentive to oilseed processors at the time the plants were sold, but subsequently a rapid increase in the world price raised the cost of unprocessed oilseeds above the official price of ghee. Thus, the government faced a difficult choice between allowing the price of ghee to rise, importing ghee or oilseeds and selling them at a loss, accepting the political consequences of a ghee shortage, or directly subsidizing the plants that it had recently sold precisely to end such subsidies. (In this case, a fortuitous moderation of world oilseed prices defused the problem before a crisis was reached.)

Tubewell technology and farmer response to price. A final example is the impact of tubewells on farmers' response to price changes. The low and uncertain rainfall in many of Pakistan's major producing regions has traditionally limited the ability of farmers in unirrigated areas to respond to price incentives by shifting toward high value crops or by raising production of basic grains. Over the past

twenty years, however, farmers have made increasing use of private and cooperatively-owned tubewells to irrigate areas that have traditionally been dryland. This technological change has altered farmer production options and therefore their response to changes in crop prices. A greater percentage of grain farmers are now able to expand production by irrigation if the price is high enough to make it worth their while, implying a rise in farmer responsiveness to the price of grain. However, farmers now have a wider range of options other than grain and, in addition, the potential for double-cropping means that farmer decisions to grow a particular crop are affected by the profitability of subsequent crops. Thus, a change in the price of a summer crop may now have a much larger impact than previously on the production of winter crops that indirectly compete with it or that tend to follow it in the rotation.

B. Price Policies in Kenya in the 1970s*

The performance of Kenya's agricultural sector in the 1970s is indicative of the positive results that can be achieved through a combination of programs increasing the capacity of small farms to expand production and policies that establish price incentives encouraging them to take advantage of these opportunities. The Government of Kenya has consistently relied on administered pricing, an approach that has caused serious problems in other countries. The Kenyan government, however, has developed an open, consensus-based price setting mechanism that balances consumer and producer interests and ensures that domestic prices do not get out of line with international prices. Technological improvements have been used to supplement and support price incentives to producers, rather than as a substitute for them.

Objectives for the Agricultural Sector

Kenya's agricultural sector plays a key role in the national economy. When Kenya became independent in 1963, the agricultural sector was responsible for 40 percent of total national production, 80 percent of exports and provided the main source of income for 75 percent of the population. It was also highly dualistic as a result of policies pursued during the colonial era, with a prosperous com-

* This section relies heavily on Cathy Jabara, Agricultural Pricing Policy in Kenya, Harvard Institute for International Development Discussion Paper No. 185, Cambridge, Mass., August 1984.

mercial sector growing cash crops for export and an impoverished small-farm sector producing primarily food crops.

The main objectives of economic development policy in the post-independence period were similar to those adopted by most developing countries: to promote rapid growth in per capita income, to improve economic and social equity and to eliminate poverty and exploitation. In the agricultural sector, these goals were translated into a program that emphasized development of small farms and, in particular, expansion of cashcrop production in the small-farm sector. The transfer of land to smallholders, a major focus of government activity in agriculture, further strengthened the small-farm sector, with the result that roughly two-thirds of the farmland was in small farms by 1979.

Kenya's agricultural leadership faced many of the same issues now confronting developing country governments in Africa and elsewhere: whether to emphasize food production and self-sufficiency or cash crops for export; whether to attempt to develop the industrial sector or to build on the nation's agricultural base; and whether to rely on expansion of agricultural area as the main engine of growth in production or to place greater reliance on technological improvements.

Like many other countries, Kenya initially chose to emphasize industrial development and import substitution through use of an over-valued exchange rate and other protective policies. These policies turned the terms of trade against agriculture, and particularly against export crops, during the late 1960s and early 1970s, undermining to some degree the announced policies for agriculture.

The situation was reversed in the 1972-82 period, when producer prices began to rise at a faster rate than input prices as a result of improved government procurement prices, better transport and marketing systems, and allowing rising international prices to be reflected in domestic prices for agricultural products. This pattern is in marked contrast to that prevailing in most countries that rely on administratively set prices for agricultural products. The reasons Kenya has been successful in using its agricultural price-setting mechanism to support rather than undermine its agricultural strategy are discussed below.

Performance of the Agricultural Sector

Kenya's agricultural sector grew rapidly throughout the post-independence period, despite occasional setbacks. The period can be divided into two parts: the first decade after independence (1964-1972), which was characterized by declining

domestic terms of trade for agriculture, and the 1972-1983 period when price incentives moved in a more favorable direction.

During the first period, agricultural production grew at an annual rate of 4.6 percent, making Kenya one of the few countries in Africa to achieve an increase in per capita production of food and other agricultural products. This excellent performance can be attributed to a combination of several factors: an increase in the area under production, improved yields for both cash and food crops, and a shift toward more high-valued cash crops on the part of small farms.

It is important to note that this high rate of growth was achieved in spite of the generally declining terms of trade facing farmers during this period. Technology-based improvements in yields and shifts in cropping patterns together were sufficient to overcome the impact of unfavorable price movements. Although the prices that farmers received for their crops fell relative to those of goods they purchased, government support to agricultural development nonetheless presented farmers with incentives for increased production. Government-financed improvements in the transport and marketing system for inputs and outputs, expanded access to land, and introduction of high-yielding varieties enabled farmers to lower their average cost of production, while assistance in shifting toward high-valued export and industrial crops opened new opportunities for increasing income. The import-substitution strategy, while hurting export crops, favored industrial and import-substituting crops such as sugar, and farmers responded by greatly increasing the acreage in these crops. Thus, farmers were able to achieve annual increases in real income of nearly 4 percent during this period, despite falling prices. This experience underscores the need to look beyond price levels alone in evaluating the incentives for expanded agricultural production.

During the second period, 1972-1983, the government moved away from import substitution and industrialization to give greater emphasis to food and export crop production by smallholders. Real producer prices rose by over 10 percent during the period, more than keeping pace with rising input prices. Exhibit 2-7 shows the changes in producer prices during this period.

Exhibit 2-7

Weighted Average Producer Price Indices for Major Crop Categories
in Kenya, Real Terms, 1975/76, 1979/80, 1982/83 (1972/73 = 100)

Crop Category	1975/76	1979/80	1982/83
<u>Export Crops</u>	<u>124.4</u>	<u>121.6</u>	<u>113.0</u>
<u>Domestic Crops</u>	<u>106.4</u>	<u>105.7</u>	<u>112.5</u>
Staple grains	107.0	104.8	110.9
Industrial crops	108.6	106.5	110.7
Oilseeds	99.3	140.9	101.6
Drought Crops	96.9	85.3	96.4
Pulses	89.6	120.5	125.5
<u>All Crops</u>	<u>119.5</u>	<u>117.8</u>	<u>112.8</u>
<u>Livestock Products</u>	<u>78.4</u>	<u>87.6</u>	<u>97.3</u>
<u>Total Crops and Livestock Products</u>	<u>112.6</u>	<u>112.7</u>	<u>110.2</u>

* Real prices are nominal output prices deflated by the index of prices for purchased agricultural inputs. Crop indices weighted by share in total marketed output computed for each year.

Source: Jabara.

Farmers responded to the favorable price situation and the availability of production technologies by increasing both total production and sales. Between 1970 and 1979, agricultural production grew at an average annual rate of 5.4 percent, one of the highest rates in Africa.* Marketed production of industrial crops grew 11 percent annually during the 1971-1983 period, while export crops grew by 2.8 percent per year and staple crops 3.7 percent per year. Exhibit 2-8 summarizes Kenya's progress in expanding marketed production of agricultural products.

As a result of rising prices and production, farmer incomes registered major gains during the period. It is estimated that the real incomes of small farmers grew by 87.7 percent between 1972 and 1983, an annual increase of 6.5 percent, while those for large farmers increased a total of 21.5 percent.

Exhibit 2-8

Trend in Marketed Production of Crops and Livestock Products, 1972/73, 1975/76, 1979/80, 1982/83^a

Crop Category	1972/3	1975/76	1979/80	1982/83
<u>Export Crops</u>	<u>204,005</u>	<u>210,383(3.1)^b</u>	<u>241,222(18.2)</u>	<u>268,647(31.7)</u>
<u>Domestic Crops</u>	<u>1,753,120</u>	<u>2,480,580(41.1)</u>	<u>3,579,464(104.2)</u>	<u>4,158,469(137.2)</u>
Staple crops	630,307	750,641(19.1)	325,113(-48.4)	910,509(44.4)
Industrial crops	1,101,814	1,706,778(54.9)	3,231,147(193.2)	3,152,281(186.1)
Beans ^c	11,173	10,400(-6.9)	1,313(-88.2)	92,350(726.5)
Other ^d	9,826	12,761(29.9)	21,891(122.8)	3,329(-66.1)
<u>All crops</u>	<u>1,957,125</u>	<u>2,690,963(37.5)</u>	<u>3,820,686(95.2)</u>	<u>4,427,116(126.2)</u>
<u>Livestock products^c</u>				
Milk ('000 litres)	268,437	230,607(-14.1)	240,559(-10.4)	260,336(-3.0)
Carcass beef (tons)	26,905	16,600(-38.3)	7,634(-71.6)	9,783(-63.6)

a/ Sale to marketing boards

b/ Figures in parentheses give the percentage change in marketed production from the 1972/73 base.

c/ Marketed production for these crops is biased downward due to unrecorded unofficial sales.

d/ Other crops include oilseeds and drought crops.

Source: Jabara

* Accelerated Development in Sub-Saharan Africa, An Agenda for Action, World Bank, 1981 (The "Berg Report").

Implementation of Agricultural Price Policies

Like many countries in Africa, Kenya relies heavily on administrative mechanisms to determine agricultural prices and on parastatals to store, transport and market basic crops. In most other countries, administrative price mechanisms have favored urban consumers at the expense of the farmers. Those governments' desire to keep prices low in urban areas, coupled with administrative inefficiencies in the marketing operation, have resulted in low prices for farmers, stagnating production and, in extreme cases, the withdrawal of farmers from the market. These policies are widely regarded as a major cause of agriculture's poor performance in sub-Saharan Africa. How has Kenya avoided this trap?

The answer appears to lie in the way that Kenya manages its administered pricing system. It differs in key respects from those of other countries that have not been successful in motivating their farmers to expand production. First, the government does not monopolize marketing and private traders are allowed to operate to a limited extent. Thus, if administered prices fall below the market-determined level, sales to the marketing organization fall off until the situation is corrected.

Second, government prices for most commodities are determined on the basis of the world market price and announced well in advance of the harvest season. This system provides stability and security to farmers, while keeping domestic prices in line with international comparative advantage.

Third, and perhaps most important, the Kenyan price-setting system operates as a sort of "political marketplace," in which both consumers and producers have a real voice through member organizations. Farmer cooperative unions, which act as intermediaries in the collection and sale of crops to parastatal marketing boards, are directly involved in the deliberations on price and present proposals for consideration along with those submitted by government bodies representing consumer interest. This approach is not perfect, however, and can lead to increasing divergence between domestic and world prices over time and may also institutionalize inefficiencies, as it has in Kenya in the case of sugarcane in Kenya.

The combination of reliance on world market prices and the "political marketplace" has enabled the Kenyan government to manage its administered pricing system more successfully than most. Although the parastatal system is by no means free of the inefficiencies and bureaucratization that generally characterize state-operated marketing systems, the rapid and sustained growth achieved in the agricultural sector demonstrates the success of the government's agricultural policies to date.

CHAPTER III

INPUTS AND INPUT MARKETING

There are two basic kinds of inputs:

- Factors of production are land, labor and capital; and
- Intermediate inputs are those consumed in the production of final products, such as fertilizer and chemicals.

This chapter discusses analysis of policy actions directed at the production, consumption and marketing of intermediate inputs. The focus is on policies directly affecting the input market, but the indirect impacts of these input policies on other parts of the food and fiber system need to be considered as well. This chapter is divided into five sections:

- Overview of inputs,
- Input policy interventions,
- Components of policy analysis,
- Analysis of interventions, and
- Selected case studies.

1. OVERVIEW OF INPUTS

The availability and prices of various inputs determine in part which commodities are produced, in what quantities and at what cost. The availability and prices of commodities for domestic consumption and export in turn affect the income of farmers, consumers, traders, input manufacturers and others involved in the input market.

The primary factors of production are very important. They are distinctive because they can be put to work in any sector of the economy, and because they are long-lasting and not immediately used up in the production process, which also means that they are slow to change. Changing the quantity and quality of land, labor and capital equipment takes time and involves issues that extend beyond the agricultural sector.

Discussion of government intervention in the primary factors of production is beyond the scope of these guidelines. Analyzing interventions and policies directed at secondary inputs, such as fertilizers, however, follows many of the principles are discussed in the earlier chapters. The goals of input policies are, in part, designed to further the goals of the food and agricultural sector, but also reach beyond that sector as well. The goals include:

- Reducing the cost of inputs for farmers, to increase their income,
- Increasing farmers' use of inputs in order to increase production, and
- Stimulating industrial development and employment by increasing domestic production of commercial inputs.

In some cases, input policies are in conflict with those designed to increase agricultural production and reduce food and fiber prices. In order to stimulate domestic production of inputs, some countries protect their input manufacturing industries against cheaper imports. These policies keep input prices high, reduce their use, and retard growth in agricultural output. They also perpetuate inefficient input industries.

On the other hand, input policies are used in some countries to reconcile conflicts between other food and agricultural policy objectives. A typical situation is where a country wants to maintain low food prices but at the same time increase domestic production. Increasing producer prices is inconsistent with low prices for consumers. The approach taken to increase output is to subsidize prices of key agricultural inputs (See the discussion of Pakistan's policies in Chapter 2).

2. INPUT POLICY INTERVENTIONS

There are a variety of interventions that can be used to further governmental purposes in relationship to secondary inputs. The discussion of these in this section falls into two parts:

- Types of policy interventions, and
- Implementation issues.

Input policy can be defined in a variety of ways. For the purposes here, an intervention in the input market refers to actions taken by government to affect the way a market operates or to affect market results in terms of prices and quantities. This is distinct from government simply participating in the market on a competitive, profit-making basis.

Exhibit 3-1 characterizes a number of different types of interventions and the frequency with which they are used.

Exhibit 3-1

Types of Government Interventions In the Input Market

<u>Taxes and Subsidies</u>	<u>Frequency of Use</u>
Taxes on input manufacture	sometimes
Taxes on input traders	common
Taxes on input consumption	sometimes
Subsidies on input manufacture	common
Subsidies on input traders	sometimes
Subsidies on input consumption	sometimes
 <u>Regulation</u>	
Regulation of prices from manufacturer	common
Regulation of quantities produced	rare
Regulation of number of licensed manufacturers	sometimes
Regulation of number of licensed traders	common
Regulation of retail prices	common
Regulation of quantities sold	sometimes
Regulation of amount consumers can purchase	common
 <u>Market Participation</u>	
Administrative monopoly for manufacturing	sometimes
Administrative monopoly for marketing	common
Price support programs via market intervention	rare

Taxes and Subsidies

This group of interventions is probably the most common. Taxes and subsidies transfer resources between the government and private participants in the market without the government actually buying and selling goods and services. A policy to tax or subsidize an input (e.g., the production of pesticides or fertilizer marketing) results in the supplier receiving a different net price than the

customer pays. The difference between these two prices is paid (in the case of a subsidy) or received (in the case of a tax) by the government.

Taxes have two impacts: they raise revenue for the government, and they discourage production and consumption of a particular product or service. Taxes on inputs or on services in the input market are generally imposed to raise revenue for the government, an objective not specific to this market. It is rare to find a tax specifically designed to discourage the use of a particular agricultural input.

Subsidies are used to encourage the production, marketing or use of a particular input and to raise incomes of a particular economic group, such as farmers, input manufacturers or merchants.

Taxes and subsidies can be implemented in a variety of ways, some explicit and some more subtle. The most obvious method is to assess a charge on or give a rebate to input suppliers for either imported or domestically produced inputs. It is normally fairly easy to work with suppliers, because they are usually few in number, readily identifiable and conveniently located in or near major cities. A tax or subsidy involves administrative work for both the supplier of the goods or services and the government. Collecting taxes or granting subsidies may require a substantial number of government employees and a considerable record-keeping effort to ensure proper enforcement.

Regulation

This category of policy intervention involves government promulgation of regulations or laws that determine the rules for participating in input markets. They can dictate who may participate, how much people may sell, the quality or characteristics of inputs, and the prices at which they are supplied.

As with taxes and subsidies, regulation does not require the government itself to undertake any market transactions. Other than the cost of enforcement, regulation usually does not cost nor earn the government significant amounts of money. It may, however, impose costs on market participants and society as a whole.

The usual purpose of regulation is to either influence or directly establish the market price by means other than taxes and subsidies. A common regulation in the input market involves fixing the price at which basic inputs like fertilizer or seed can be sold. Suppliers selling above this price are subject to penalty by the

government. Regulation may also limit the quantity of an input an individual farmer can buy or a firm can import.

A second type of regulation involves the licensing of input manufacturers or traders. Such a regulation restricts the production of inputs or their sale to only those suppliers that have official government approval.

Regulations require governmental decrees and, more importantly, enforcement. Enforcement consists of both identification of violations and imposition of penalties. Since many regulations prevent buyers and sellers from undertaking transactions they both would find profitable, the incentive to cheat may be strong. This means that the enforcement component of regulation is not trivial. Widespread cheating can seriously undermine the effectiveness of regulations, causes black markets to develop, and divert resources and management from productive activities to figuring out how to circumvent regulations.

Market Participation

There are several types of interventions that require the government to buy and sell in the marketplace. A common type of intervention involves government supply of an input (either by direct manufacture or import), or of input marketing services at a price below that which would prevail in the free market. To do this, government can either establish an administrative monopoly or a state-owned enterprise that competes with private suppliers. Governments engage in this type of intervention for the following reasons:

- The activity would be unprofitable for a private firm but the government believes there are social benefits that make it worth doing.
- The activity is risky, and private involvement is limited because of the degree of risk.
- The market is small and would be dominated by a private monopolist which could not be adequately regulated and would, therefore, exploit users of the product.
- The government can directly control the price or quantity of an input or marketing service.
- Administratively, it is often the easiest or most politically acceptable way to provide a subsidy or to collect a tax.

Policies that require governments to buy and sell inputs or provide marketing services can take a variety of forms. Examples include state-owned marketing boards that import inputs and resell them to wholesalers or directly to farmers; state-owned enterprises that manufacture fertilizers, chemicals, or farm equipment; government development banks that provide agricultural credit; government-run seed companies; and government agencies that distribute inputs to farmers.

There are a number of implementation issues that are common to all government activities that directly provide goods and services. While the government has much more control over the price and quantity of goods and services when it is the actual supplier, thus avoiding to some extent the problems associated with regulations or taxes and subsidies, government-run enterprises also have problems. Typically, they are not operated on a for-profit basis. Since profits are an important indicator of performance, and public nonprofit organizations do not have this indicator, operating efficiency may suffer as a consequence. In addition, government organizations may be required to achieve a variety of objectives not expected of private firms, such as increasing employment, collecting revenues for the government in lieu of taxes or granting subsidies. These additional functions compound the problem of measuring operating efficiency. Finally, nonprofit government organizations may be less responsive to farmers' needs, since the survival of these organizations is guaranteed by the government. As a consequence, input supplies may be inadequate or at least not available on a timely basis, and inputs may not get to those who need or want them, particularly if some form of rationing is involved.

3. COMPONENTS OF POLICY ANALYSIS

There are two areas in which the analyst must be well versed. The first is the basic economic theory underlying the operation of the input market. The second is actual knowledge of the input subsector. This section discusses both:

- Basic economic theory of the input market, and
- Description of the input sector.

A. Basic Economic Theory of the Input Market

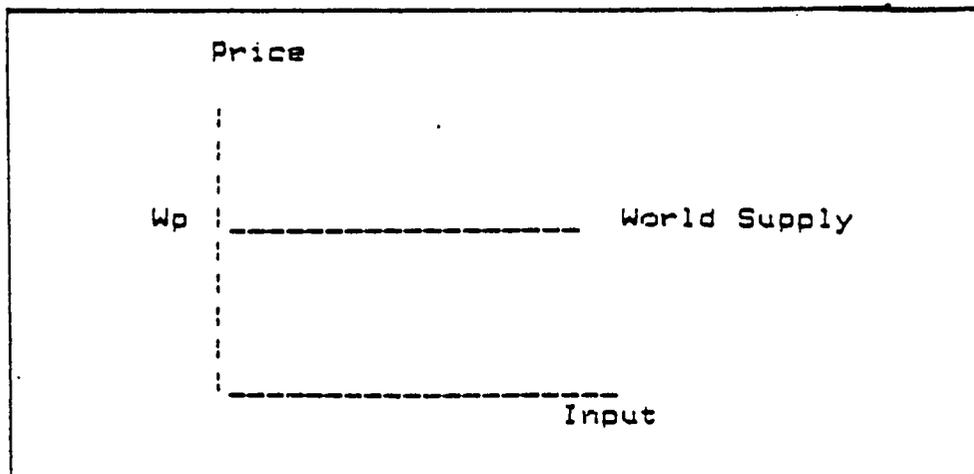
This review of the economic theory of the input market first examines input supplies and then input demand. This is followed by a brief discussion of the supply and demand for marketing services and of the structure of the input market.

Input Supplies

Agricultural inputs that are frequently imported include fertilizers; pesticides, insecticides and other chemicals; machinery such as tractors, combines, threshers; and irrigation equipment. These items can usually be bought in whatever quantity is needed on world markets. Such purchases rarely affect the world price. This means that the supply curve facing an individual for these goods is horizontal at the world price as shown in Exhibit 3-2.

Exhibit 3-2

Supply Curve for Imports

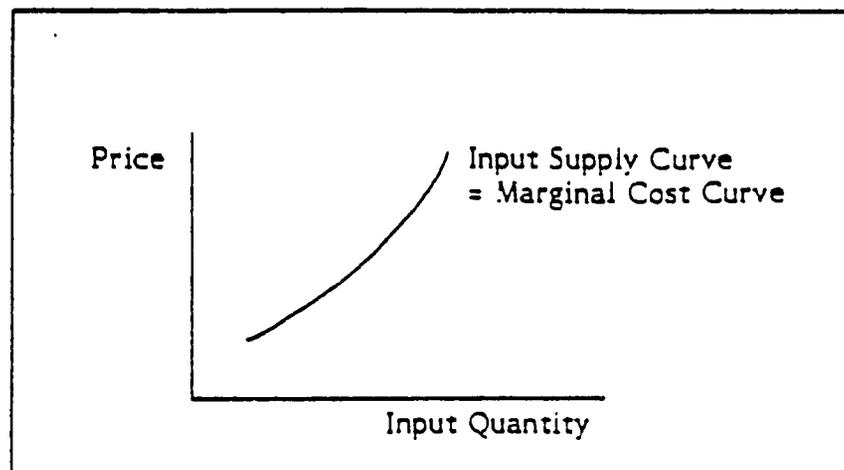


For domestically produced inputs, the quantity produced depends, for the most part, on the marginal cost of production and the selling price. In the competitive market situation, producers are willing to supply additional units of a given input up to the point where the revenue they receive per unit is just equal to the cost of producing that unit. A hypothetical supply curve is illustrated in Exhibit 3-3.

In the long run, profits as represented by prices above total average costs will induce input producers to invest in new capacity, and that will shift the supply curve to the right.

Exhibit 3-3

Supply Curve for Domestic Production



Input Demand

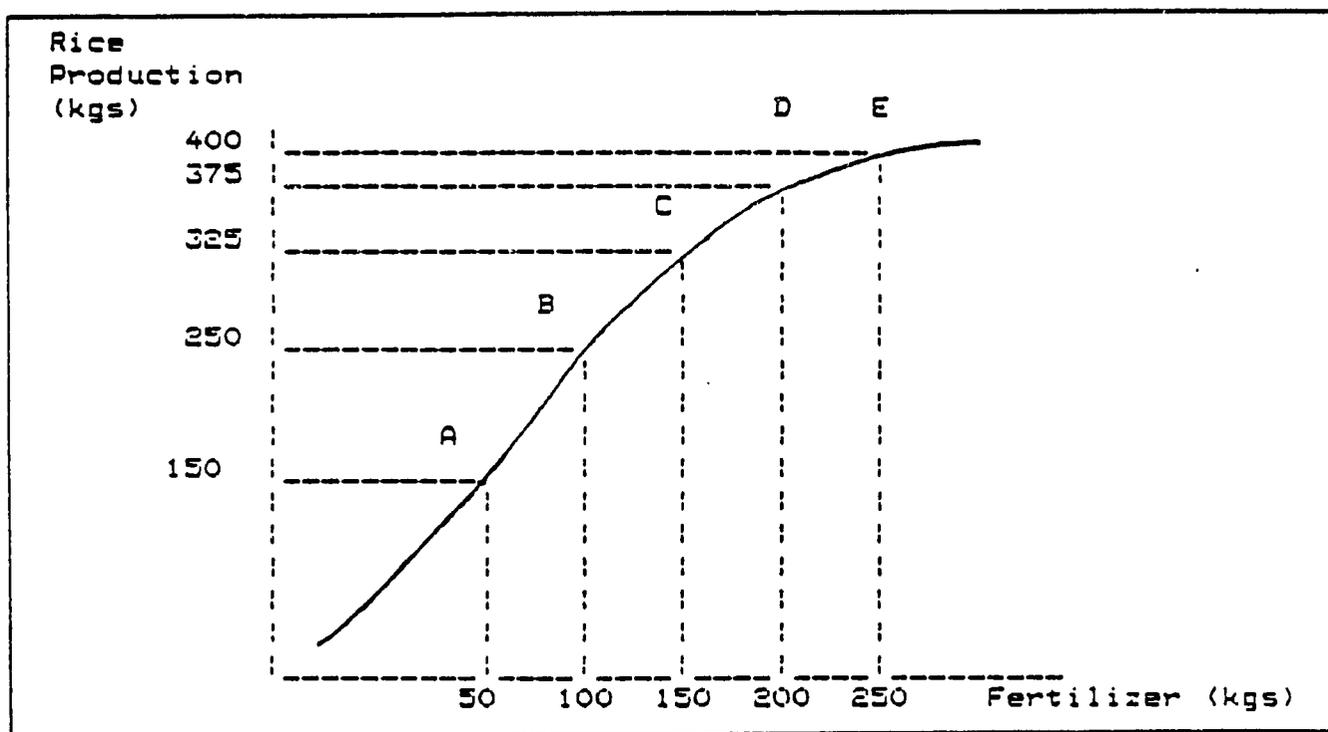
The factors that determine how much of a particular input farmers will want to buy are somewhat more complex than those that determine supply, because input demand is a derived demand relationship. A farmer is faced with two interrelated decisions with regard to his demand for inputs: What is he going to produce? How is he going to produce it? Each of these choices has both a technical and an economic component.

Year-to-year decisions on what to produce are determined primarily by shifts in relative prices, as discussed in Chapter 4. If the price of maize is up in relation to other commodities due to strong demand, the farmer will try to produce more maize, usually at the expense of producing smaller quantities of other crops or livestock products. To the extent that these other commodities require a different mix of inputs, relative demand for various inputs will be altered.

The technical relationship between one input, fertilizer for example, and one output, rice, is characterized in Exhibit 3-4. This is also known as a single input production function. It is shown with the usual property of diminishing marginal returns which means that equal increases in applications of fertilizer raise rice yields by smaller and smaller amounts.

Exhibit 3-4

Input-Output Relationships



Combined with this production function, information about the relative prices of fertilizer and rice will allow the farmer to calculate the optimal amount of fertilizer to purchase. Essentially the decision rule can be stated as follows: the farmer will apply more fertilizer as long as the additional cost of doing so is less than the total additional revenue it generates. For the most part, farmers follow these rules intuitively, without resorting to sophisticated calculations.

It should be clear that a shift in the technical relationship between fertilizer and rice (a shift of the production function) would affect the demand for the input. More important, any change in either the price of the input or the price of the commodity will also affect the total demand for the input due to its impact on the cost-benefit calculation. The dependence of input demand on conditions in the output market is what makes it a derived demand.

Normally there is more than one input, and the different inputs can frequently be substituted for one another, and be applied in varying combinations to produce the same amount of a given crop. Thus, the farmer must decide which combination of inputs to use.

There are two factors that the farmer will need to consider in making this decision:

- The technical possibilities for substitution between inputs (the different combinations of inputs that all yield the same level of production), and
- The prices of each input.

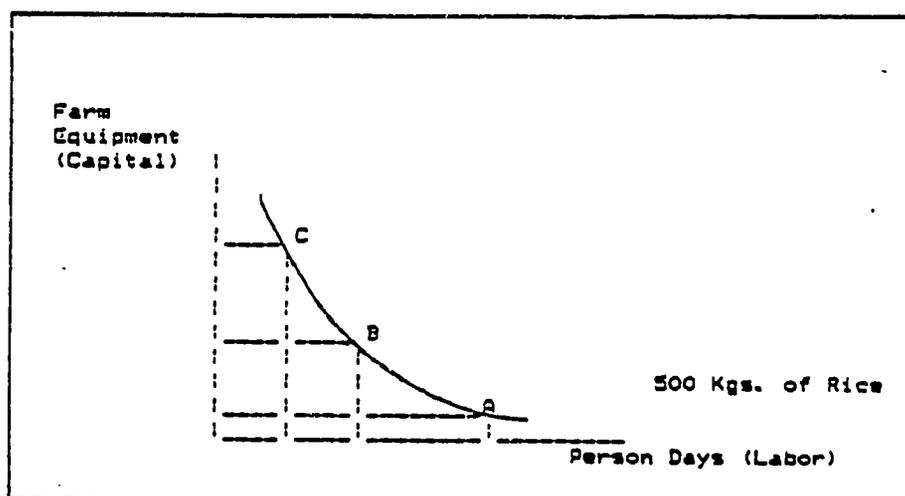
For a given level of output, the technical possibilities for substitution will determine how much the application of one input must be increased to compensate for a reduction in the use of another input. Input prices will determine whether a shift in the relative quantities of inputs raises or lowers costs.

The substitution possibilities depend on the technical relationship between the inputs. For example, a farmer may be able to produce 500 kilograms of rice if he and his workers use only hand labor. The farmer may be able to reduce his labor requirement by 80 days, yet attain the same level of output, if he substitutes a small tractor for this labor.

These technical tradeoffs are depicted in Exhibit 3-5. The curve ABC represents the different combinations of capital and labor that can be used to produce the same level of output, in this example, 500 kilograms of rice. Such a curve is called an isoquant.

Exhibit 3-5

Technical Possibilities for Substitution
Between Inputs



Information about the relative prices of the inputs must be combined with information about the technical possibilities for substitution to determine which point on the isoquant represents the least cost combination of inputs.

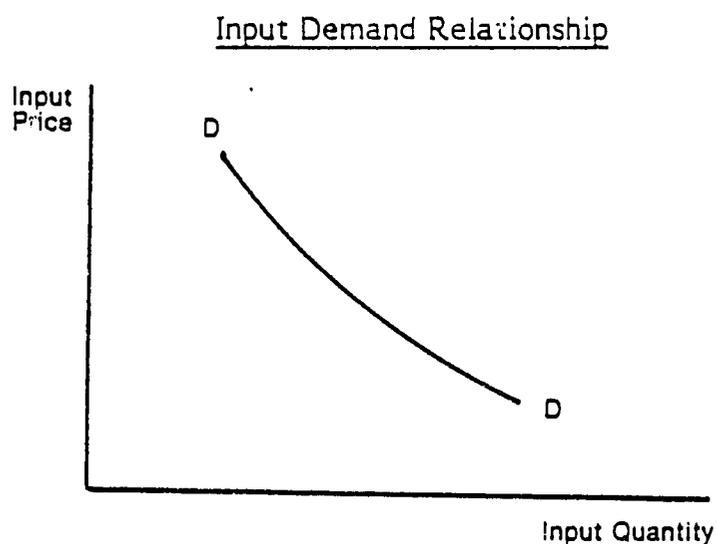
From a point such as A on the isoquant in Exhibit 3-5, farmers will increase their demand for capital relative to labor if the cost of adding one piece of capital equipment is less than the savings in labor costs such a capital acquisition would allow.

The demand curve for an input will have a negative slope, as shown in Exhibit 3-6. It represents the marginal value product of an input and is derived from the negatively sloped marginal physical product derived from Exhibit 3-4, times the price of the output.

Factors that shift the demand curve for an input are:

- A change in the output price. An increase in the output price shifts the input demand curve to the right and a decline in the output price shifts it to the left;
- An improvement in technology that shifts the production function upward increases the demand for inputs, shifting the curve to the right; and
- An increase in the price of a substitute input shifts the input demand to the right, while a decline in the price of a substitute shifts demand to the left.

Exhibit 3-6



Supply and Demand for Marketing Services

The purpose of the marketing process is to increase the value of the input to the farmer by changing its form, its location and the time when it is available. Marketing activities include bagging or packaging, transport, storage, treatments (seed), wholesaling and retailing.

There are obviously costs involved in making these services available. Just as for the supply of the input itself, marketing agents will be willing to provide increasing amounts of these services up to the point where the revenue they earn from each additional service is just equal to the cost of providing it. Farmers will pay for these services as long as their value exceeds their cost.

Supply and Demand and Marketing Structure

The "structure" of the market for inputs and for input marketing services will also have an impact on the prices and quantities that prevail in the market. The structure of a market refers to the degree of competitiveness of buyers and sellers. Thus a market characterized by many independent participants is usually considered to be "competitive."

At the opposite end of the spectrum is a market comprising only one supplier or only one consumer. There can be more than one monopoly within a country, if there exist regional submarkets that are effectively insulated from one another.

B. Description of the Input Subsector

Once the underlying theory of the input market is understood, the principal inputs in the input market should then be identified and described.

Importance of Individual Inputs

It is crucial to understand the relative importance of each input under examination so that policy interventions which have an impact on the production or consumption of that input can be evaluated in the appropriate context. For example, is a decrease in tractor use of 10 percent significant in the context of the entire input sub-sector? Is it significant in the context of the agricultural economy as a whole?

A first step in the description process is to list each major input in terms of quantities and values of domestic production and imports, as shown in Exhibit 3-7.

Exhibit 3-7

Quantities and Values of Domestic Production and Imports

	Production		Imports	
	Quantity	Value	Quantity	Value
Fertilizer				
Seed				
Small hand tools				
Seeders				
Plows				
Threshers				
Animal traction equipment				
Tractors				
Combines				
Irrigation equipment				

Each input category can also be disaggregated into an appropriate level of detail. For example, seed can be broken out by crop (millet, corn, wheat, rice, cotton, groundnuts, etc.) and by variety, if appropriate.

Location of Production and Consumption

A second category of descriptive information necessary for policy analysis involves looking at where each input is produced and consumed. The purpose of this information is to be able to look at the impact of alternative input policies on different areas of the country. A table such as Exhibit 3-8 can be constructed on regional utilization. A similar table can be constructed for the production of each input by region.

Exhibit 3-8
Utilization of Inputs by Region

	Utilization by Region		
	Region 1	Region 2	Region 3
Fertilizer			
Seed			
Small Hand Tools			
Seeders			
Plows			
Threshers			
Animal traction equipment			
Combines			
Irrigation equipment			

The information from these two tables helps the analyst to determine the regional impact of alternative policies on input availability or use. It is important to remember that even regional averages will conceal very different mixes of input use across farms within a region.

Importance of Individual Inputs for Different Crops

It is also useful to look at the share of each input used on different crops. Since the production of particular crops is often of immense concern to policy makers, it is important to understand the implications that a change in the use of a particular input will have for each crop. For example, suppose a proposed fertilizer subsidy will raise fertilizer use by 10 percent. How much will be allocated to food production? If the data are available, a table similar to those above can be developed showing the share of each input currently applied to different crops.

Size and Income of Producers and Consumers

The above tables can also be disaggregated to show the size of producing and consuming units. For producers, any of several variables can be selected to indicate size: number of employees, total sales in either units or value, total value added, etc. Input users can be categorized by size of farm either in terms of area in production or value of production.

This information will help the analyst determine the effect of alternative policy interventions on different income groups in both the input producing and consuming sectors. For example, one policy that might be proposed to increase farm income is a subsidy on fertilizer, yet an analysis of fertilizer purchases by

farm size might show that small farmers buy virtually none. While it is likely that some small farmers would be able to purchase fertilizer if such a subsidy were implemented, the disproportionate share of the income transfer would go to those who buy the most, namely the farmers in the highest income group.

The Marketing System

There are two components of the marketing process that must be understood before the effects of a policy intervention can be analyzed: the marketing structure, and the marketing margin for each link in the marketing chain.

Marketing Structure: The structure of any specific marketing activity can be characterized by the number and size of participants. Since the structure of a particular market affects equilibrium prices and quantities, such information is critical for policy analysis.

A useful measure of market structure is the number of firms involved in each marketing function and their relative importance. The degree of concentration can be measured by the percent of each marketing activity accounted for by the leading four or five firms as shown in Exhibit 3-9. Concentration measures can be developed nationally and for geographic regions as well if those regions are considered to be distinct markets.

Exhibit 3-9
Degree of Firm Concentration Across Marketing Activity

Market Participants	Number	Market Share of Four or Five Largest Firms
Producers		
Wholesalers		
Warehousers		
Transporters		
Retailers		

The nature of the firms involved is also important. One may find, for example, a simple monopolist dominating one or more aspects of marketing. But it makes a difference if this monopolist is a private profit-maximizing firm or a government agency operated on a non-profit basis.

Marketing Margins: The second component of marketing is understanding marketing margins. These equal the difference between the costs of the inputs as they leave the factory or port of entry and the prices paid by farmers.

The prevailing price of an input as it enters and exits each stage of the marketing chain can be assessed, and intermediate marketing margins can be calculated as shown in Exhibits 3-10 and 3-11.

Exhibit 3-10

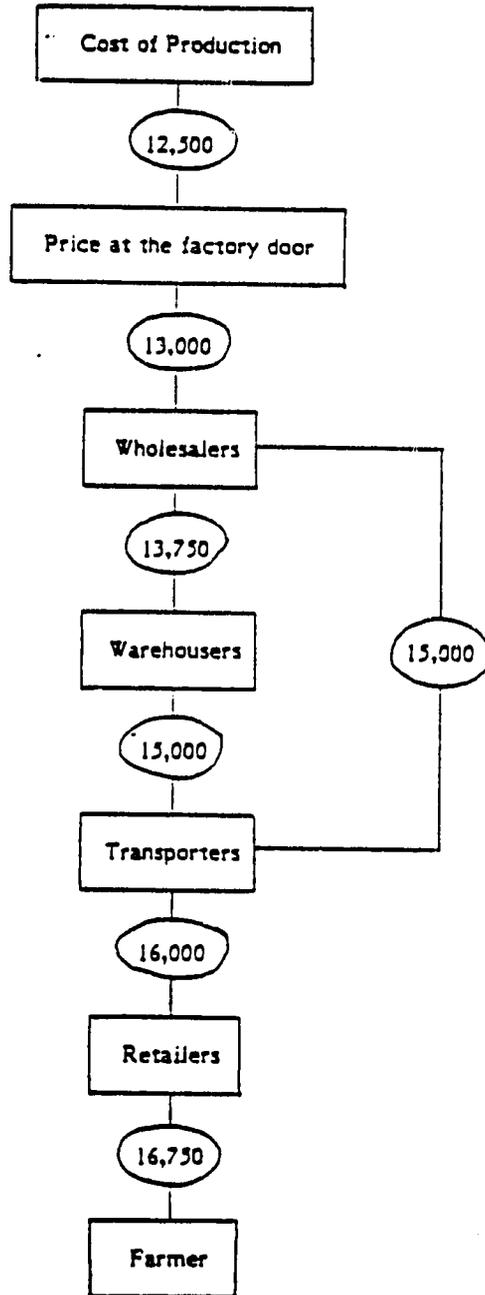
<u>Marketing Margins</u>	
Factory Margin	500
Wholesale Margin	750
Warehouse Margin	1,250
Transport Margin	1,000
Retail Margin	750
Total	<u>4,250</u>

A marketing margin is "reasonable" if it can be adequately explained by the total cost of all activity involved in marketing, plus some compensation for risk. There are no hard and fast rules for determining what these costs should be in a given situation. Some idea may be gained by looking at similar processes for other goods. For example, the cost per mile of hauling a full load of fertilizer by truck may be similar to that of shipping a full load of groundnuts or grain the same distance.

Marketing margins may be reasonable in terms of costs incurred, but may also be high because of technical inefficiencies in the marketing system. Poor transportation, as discussed earlier in Chapter 2, inflates marketing costs. So too does poor storage that leads to large losses in the marketing chain. One can obtain enough estimates of the magnitude of these problems either by comparing different situations within a country (e.g., costs under good and bad road conditions) or by comparing a country's experience with that of other countries that are judged to have better technical conditions.

Exhibit 3-11

Marketing Prices



4. ANALYSIS OF INTERVENTIONS

It is fairly common for developing countries to subsidize prices of a variety of agricultural inputs. As discussed earlier, they may do this to offset the adverse effects of policies that depress commodity prices or to stimulate agricultural production. Subsidies can take many forms: providing irrigation water at below cost; allowing inputs to be imported at the official exchange rate where a country's currency is seriously overvalued; and providing direct cash government subsidies.

Two approaches to subsidizing fertilizer prices are analyzed below. These are:

- Analysis of a subsidy to domestic fertilizer production, and
- Analysis of a government monopoly that sells below the world market price.

The frameworks used to analyze these subsidy policies can also be used to analyze the impact of reducing or eliminating subsidies.

A. Analysis of A Subsidy to Domestic Fertilizer Production

The Theory of a Per Unit Subsidy

A subsidy to domestic fertilizer producers enables them to make the same quantity of fertilizer available to the farmer at a lower price. If the fertilizer industry is competitive, competition will ensure that the subsidy reaches farmers. It is easier to make subsidy payments to suppliers rather than farmers since the former are usually few in number, readily identifiable and conveniently located.

General Imports

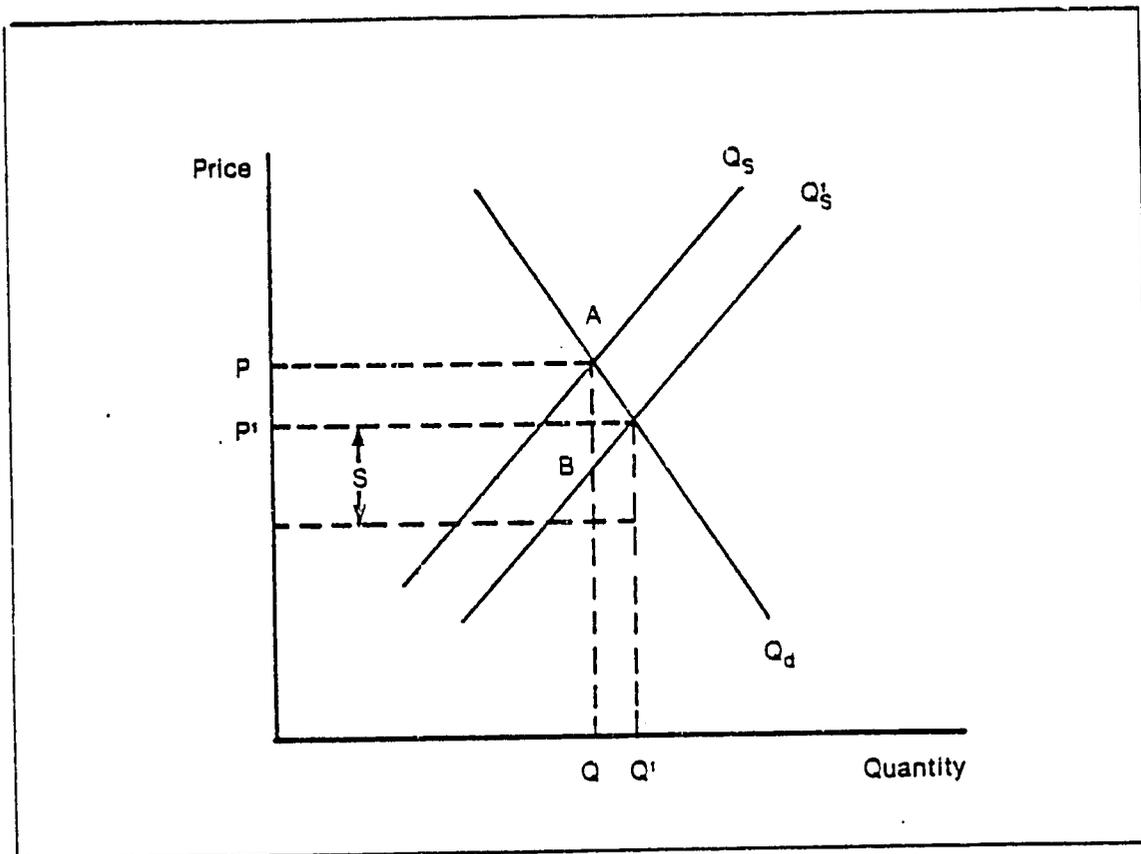
Exhibit 3-12 shows the effect of a subsidy on the domestic market when there is no trade in fertilizer. Every level of output becomes available at a lower price by the amount of the subsidy (e.g., a movement from P to P^1). The quantity consumed and produced increases from Q to Q^1 .

If the fertilizer subsidy causes the quantity demanded of fertilizer to increase, this is likely to raise agricultural production. This increase in production depends on the technical relationship between fertilizer and yield.

If there is no trade, the cost to the government is equal to the per unit subsidy AB , times the amount produced.

Exhibit 3-12

Effect of a Fertilizer Subsidy on the Domestic Market with No Trade



The transfer of resources from the government will be shared between suppliers and consumers. The factors that determine the relative share they each receive are the elasticities of demand and supply. The more elastic supply is relative to demand, the greater the share of the benefits that goes to consumers, and vice versa. Note in Exhibit 3-12 that the price decline, PP_1 , is less than the subsidy, AB . If the supply of fertilizer were perfectly elastic (horizontal), the price decline would be equal to the subsidy.

A second equity issue is the distribution of benefits among farmers. Obviously, the more fertilizer a farmer normally buys the more he benefits from the subsidy. Usually the more well-to-do farmers buy more fertilizer. Thus, larger farmers benefit more in absolute terms than smaller ones. (The same is true for increasing commodity prices, since large firms produce and sell more than smaller ones).

Measuring the Impact of a Subsidy

The diagrams and conceptual discussion presented above can help the analyst determine the likely direction of changes in variables affected by the subsidy. For example, the analyst knows that in a no-trade situation, a subsidy will probably increase domestic fertilizer manufacture, reduce fertilizer prices, and increase domestic fertilizer consumption, crop output and government costs.

To assess the magnitude of these changes, the analyst needs some estimates of key variables and parameters. It may be difficult to obtain complete and current data, and one may need to rely on informal sources, coefficients from other countries, and other means of estimation.

The basic information needed for analyzing the impact of a subsidy includes the following:

- the current price of the input,
- the proposed amount of the subsidy,
- the current level of input use,
- the elasticity of demand for the input,
- the elasticity of supply for the input,
- the world price of the input (if trade is a factor),
- the current level of output produced with the input, and
- the elasticity of production with respect to the input (at the current level of input application).

Price data are usually easy to obtain, as are data on fertilizer production. Aggregate fertilizer consumption should equal production less losses, adjusted for inventory change. Information about losses may be hard to get. The same may be true for inventory changes within the marketing system.

The most difficult data to obtain are those dealing with fertilizer use by region, size of farm and crop. Getting this information requires use of detailed surveys. Many countries do not do this type of survey work, or it is done infrequently. Where survey information is available, special attention has to be given to the quality and representativeness of the data.

Elasticities of demand and supply are also difficult to find. If they are not available in-country, or those that are available are not deemed to be of good quality, one might consider using estimates from neighboring countries with similar economic and environmental conditions, provided one has some confidence in their reliability.

Estimates of the impact of additional quantities of the input on yields are most commonly available from research institutions.

If none of these sources yield the necessary coefficients, the professional judgment of someone who knows the country well may be in order. For example, extension agents or farmers themselves may be able to provide a rough estimate of the impact on fertilizer use if its price were to decline by some specified amount.

If the analyst needs to expend resources to collect the data necessary for the analysis, priority in allocating those resources should be given to refining the estimates of those variables to which the analysis is most sensitive. This issue is discussed in more detail below.

The material below illustrates how one can calculate the effects of a fertilizer subsidy. One simplifying assumption made for the analysis is that the supply and demand functions are linear. Another is that a change in one input price does not significantly affect the use of other inputs. Moreover, this estimation technique should only be used when the change in the subsidy is small relative to the prevailing price (say 10 percent or less). Finally, we assume that all fertilizer is used to produce rice, so that we are dealing with only one output response. The basic information used in the analysis is contained in Exhibit 3-13.

Basic Information on Fertilizer Availability and Use

<u>Symbol</u>	<u>Item</u>	<u>Value</u>
P	Current fertilizer price	CFA 50,000/ton
S	Proposed subsidy	CFA 5,000/ton
$Q_s = Q_d = Q$	Current fertilizer production & consumption	20,000 tons
a	Fertilizer production response to price	400 tons/CFA 1,000
b	Fertilizer demand response	500 tons/CFA 1,000
X_0	Current rice production	450,000 tons
RPR	Rice production response	5 tons/ton of fertilizer

The objective is to calculate what the impacts of a government subsidy of CFA 5,000/ton will be in terms of fertilizer production and consumption, fertilizer price, rice production and the cost of the subsidy to the government.

First, characterize the demand curve for fertilizer. The shape of this curve is -2.0; i.e., a price decline of CFA 1,000 is required to increase fertilizer consumption by 500 tons. The demand relationship is:

$$P = 90,000 - 2.0 Q_d$$

or

$$Q_d = 45,000 - 0.5P$$

Next, characterize the supply curve for fertilizer, where the slope is 2.5; that is, a price decline of CFA 1,000 reduces the quantity supplied by 400 tons. The supply relationship is:

$$P = 2.5Q_s$$

or

$$Q_s = 4P$$

To calculate what the price of fertilizer will be and the quantity produced and consumed when a subsidy of CFA 5,000/ton is applied, the subsidy transforms the supply function into:

$$P = 2.5 Q_S^1 - 5,000$$

This says that manufacturers are willing to supply the same amount of fertilizer as before at a price CFA 5,000 below the pre-subsidy price. The supply equation can be rewritten as:

$$Q_S^1 = 2,000 + .4P$$

To calculate the new fertilizer price and the quantities produced and consumed with the subsidy, solve the demand and new supply equations as follows, remembering that the quantity demanded Q_D must equal the quantity supplied.

With respect to price:

$$P = 90,000 - 2.0 Q_D$$

and

$$Q_S^1 = 2,000 + .4P$$

Therefore:

$$\begin{aligned} P &= 90,000 - 2.0 (2,000 + .4P) \\ &= \text{CFA } 47,778 \end{aligned}$$

At the new price P^1 of CFA 47,778, the new quantity Q^1 produced and consumed is 21,111 tons.

The additional use of 1,111 tons of fertilizer will result in an increase in rice production of 5,555 tons, or 1.2 percent.

The results of the proposed fertilizer subsidy can be summarized as follows:

- Domestic fertilizer production and consumption increases by 1,111 tons or 5.6 percent.
- Rice production increases by 5,555 tons or 1.2 percent.
- the government now incurs a subsidy cost of CFA 105.6 million (CFA 5,000/ton x 21,111 tons).

The increased level of rice production, however, has a benefit that can take one of two forms. If the country is a rice importer, imports could be reduced by 5,555 tons, saving on foreign exchange. If the rice import price is CFA 120,000/ton, the import savings would be CFA 666.6 billion, CFA 561 million more than the subsidy incurred for fertilizer. Alternatively, if the country does not trade in rice, the domestic rice price would decline, benefitting consumers. Of course as rice prices declined, so too would prices received by farmers and this in itself would have some negative impact on rice production and fertilizer use.

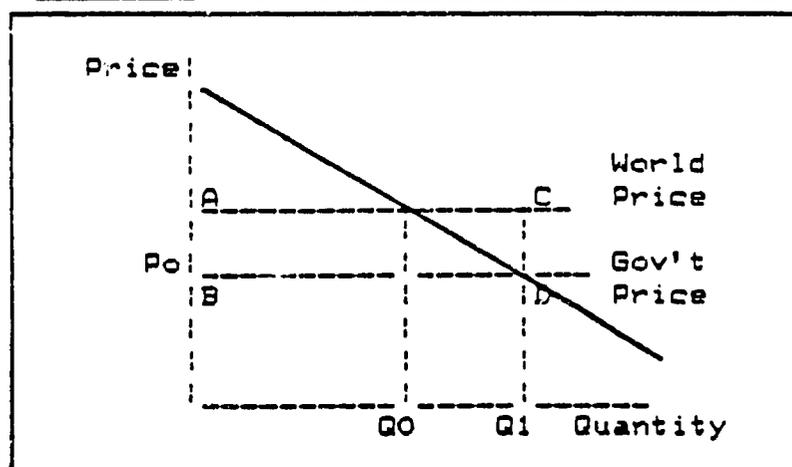
B. Analysis of a Government Monopoly That Sells Below the World Market Price

In this case, a government-owned monopoly is charged with the importation and distribution of fertilizer. The monopoly operates as if it were a competitive firm so that the demand curve it faces is the same as in Exhibit 3-12. Since in this case there is no domestic fertilizer production, the supply curve is perfectly inelastic at the world price.

Now suppose that, as in the previous case, the government wishes to subsidize fertilizer prices because it considers the world price to be too high. This situation is depicted in Exhibit 3-14.

Exhibit 3-14

Effect of Government Subsidy on Fertilizer Prices



At the world price, fertilizer consumption is Q_0 . With the subsidy, consumption increases to Q_1 . The value of the subsidy is equal to ABCD.

Using the basic analytical framework of the previous case, the results of the subsidy are shown in Exhibit 3-15. In this case, the subsidy is still CFA 5,000/ton, but all of the subsidy is passed on to farmers, because there are no domestic producers to share it.

Assume that the country is a rice importer and any increase in rice production would be used to reduce imports by an equivalent amount. As shown in Exhibit 3-15, the fertilizer subsidy cost is higher than in the previous example because fertilizer consumption is higher. But the increase in rice output is also larger. From the standpoint of the government, the fertilizer subsidy costs CFA 112.5 million, but the savings on rice imports equal CFA 1,500 million.

Exhibit 3-15

Subsidy on Imported Fertilizer

	<u>Base Situation</u>	<u>Subsidy Situation</u>
World fertilizer price	CFA 50,000/ton	CFA 50,000/ton
Domestic fertilizer price	CFA 50,000/ton	CFA 45,000/ton
Fertilizer consumption	20,000 tons	22,500 tons
Rice production	450,000 tons	462,500 tons
Fertilizer subsidy	•	CFA 112.5 million
Rice price	CFA 120,000	CFA 120,000
Savings on rice imports	•	CFA 1,500 million

C. General Comments

In both of the above examples, the estimated savings on rice imports are large relative to the subsidy applied to fertilizer -- an attractive situation. These results follow from the fact that the coefficients used imply that rice production is very responsive to fertilizer use.

A large response in rice production to fertilizer use is possible where production is irrigated and there is good water control, and where farmers use high-yielding varieties of rice whose yields are responsive to fertilizer. If these conditions do not exist, the production response would be much less than illustrated above, and the benefits of a fertilizer price subsidy would be correspondingly less attractive.

5. SELECTED CASE STUDIES*

A. Fertilizer Subsidies in Bangladesh

In order to provide an application of the material presented in this chapter, three case studies are presented that have a direct bearing on governmental interventions in input markets:

- Fertilizer subsidy in Bangladesh,
- Price stabilization and quantity restrictions in Egypt, and
- Reduction of a tax on indigenous fertilizers in India.

Rice Production: Situation and Objectives

Rice dominates the agricultural economy of Bangladesh. It constitutes 95 percent of domestic foodgrain production and accounts for 85 percent of average caloric intake. Similar orders of magnitude describe the production of rice, which covers 80 percent of total cropped and irrigated area. Yet, rice yields have been relatively low, roughly 1.9 tons of paddy per hectare in 1979, compared with nearly 3 tons in Indonesia and 6.24 tons in Japan.

The urgent need for Bangladesh to increase rice production is suggested by the fact that from 1961 to 1979 rice production grew by only 1.6 percent annually while the population increased at an annual rate of 2.7 percent. During the 1970s, even imports of 15 percent of total foodgrain consumption were insufficient to maintain per-capita rice consumption. The foreign aid required to finance these imports made Bangladesh the world's largest recipient of food aid at that time.

* This case study was drawn from information contained in: George Tolley, Vinod Thomas, and Chung Ming Wong, Agricultural Price Policies and the Developing Countries (Baltimore: The Johns Hopkins University Press, for the World Bank, 1982), chapter 3; and in a consultant report, Bangladesh Food Policy.

In light of these trends, the government made increased foodgrain production a top priority, and the Second Five-Year Development Plan (1980-1985) called for foodgrain self-sufficiency by 1985. Beginning from the 13.3 million tons of production in 1980 (12.5 million of which was rice), achieving foodgrain self-sufficiency by 1985 would require a 6 percent annual growth in production, over three times the earlier rate of increase.

Input Requirements and the Government Fertilizer Program

The use of chemical fertilizers in Bangladesh spread rapidly after their introduction in 1958. Output response to fertilizer use has been high, and its consumption has increased 17 percent annually since 1966. The government's call for foodgrain self-sufficiency by 1985 implied that fertilizer use must continue to grow at 18 percent annually.

In the early 1970s the government of Bangladesh had embarked upon an ambitious program of fertilizer subsidies, intended to stimulate farmers' demand for fertilizer and raise their output. The government administered its fertilizer subsidy program through the Bangladesh Agricultural Development Corporation, which was given a monopoly on fertilizer purchases and sales.

The size of the fertilizer subsidy increased sharply after 1975. Exhibit 3-16 shows that the per unit subsidy tripled between 1975 and 1978, growing from TK 20.5 per maund to TK 60.9. By 1979, the per-unit subsidy of TK 65.2 covered fully 50 percent of the purchase cost of fertilizer. The total cost of the subsidy grew even more rapidly because of the increase in sales prompted by the subsidized farm gate price. At their height, fertilizer subsidies consumed 30 percent of their country's development expenditures for agriculture.

A critical issue from the farmers' perspective in determining their economic incentive to grow rice is the ratio of fertilizer nutrient price to paddy rice price. A lower ratio implies greater profitability of production. Exhibit 3-17 illustrates the decline in this ratio during the late 1970s which the fertilizer subsidy helped to achieve. Bangladesh had lower fertilizer nutrients to paddy price ratio than Pakistan and India. Bangladesh also experienced more rapid growth in fertilizer consumption than in its neighbors.

Exhibit 3-16

Bangladesh Fertilizer Subsidy

<i>Fiscal year</i>	<i>Subsidy per unit of sales (taka per mounds)</i>	<i>Total (million taka)</i>	<i>Percentage of development expenditure for agricultural sector</i>
1974	n.a.	28	2
1975	20.5	150	9
1976	40.2	485	16
1977	46.5	644	19
1978	60.9	1,183	30
1979	65.2	1,301	25

n.a. Not available.

1. These subsidy rates indicate the differences between the sale price and the relevant world price.

Source: Bangladesh Agricultural Development Corporation.

Exhibit 3-17

Fertilizer Price Comparison, 1976-80, and Estimates for 1981

COUNTRY	YEAR	Fertilizer Nutrients Price To Paddy Price Ratio			Fertilizer Nutrient Price to Wheat Price Ratio		
		N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O
Bangladesh	1976	1.55	1.21	.70	1.31	1.18	.68
	1977	1.74	1.64	1.05	1.45	1.36	.87
	1978	1.76	1.39	.88	1.71	1.35	.86
	1979	1.74	1.35	.82	2.21	1.72	1.04
	1980	1.77	1.37	.83	1.81	1.41	.85
	1981	1.57	1.22	.73	1.73	1.35	.81
Pakistan	1976	—	—	—	3.12	2.30	1.25
	1977	—	—	—	2.82	2.08	1.51
	1978	—	—	—	—	—	—
	1979	2.11	1.45	.84	2.30	1.58	.92
	1980	—	—	—	—	—	—
	1981	—	—	—	—	—	—
India	1976	3.55	4.60	1.50	4.17	5.41	1.76
	1977	—	2.48	.97	—	3.24	1.27
	1978	—	—	—	—	—	—
	1979	3.70	4.07	1.57	2.80	3.08	1.19
	1980	3.32	3.66	1.41	2.69	2.97	1.15
	1981	4.14	4.55	1.75	3.34	3.68	1.41

— = None or negligible.

N denotes nitrogen type fertilizers.

P₂O₅ denotes phosphate type fertilizers.

K₂O denotes potash type fertilizers.

Sources: Monthly Statistical Bulletin of Bangladesh, selected issues, and The Fertilizer Association of India. Fertilizer Statistics 1981-82. New Delhi, 1982.

Effects of the Fertilizer Subsidy

The fertilizer subsidy succeeded in stimulating rapid growth in fertilizer use in Bangladesh. Exhibit 3-18 shows that total fertilizer consumption increased dramatically during the late 1970s period of high subsidies, from 129,111 mt in 1974 to 337,300 mt by 1978, and peaked at 415,320 mt in 1980. The increase in fertilizer use per hectare doubled between 1973 and 1980. This intensified production followed in part from the favorable trend in the nutrient to paddy price ratio.

Exhibit 3-18

Bangladesh: Area of Agricultural Crops, Total Fertilizer Use Per Hectare, Annual, 1973/74 - 1981/82

Year	Area of crops 1,000/ha	Total fertilizer used	Fertilizer use per hectare
		--Metric tons--	Kg
1973/74	12,356	182,013	14.7
1974/75	12,121	129,111	10.6
1975/76	12,530	215,514	17.1
1976/77	12,346	237,432	19.2
1977/78	12,638	337,569	26.7
1978/79	12,629	377,800	29.9
1979/80	12,945	401,232	31.0
1980/81	13,166	415,320	31.5
1981/82	13,000	394,097	30.3

Source: Monthly Statistical Bulletin of Bangladesh, selected issues.

The fertilizer subsidy affected virtually all types of farmers, though there is some question as to whether the poorest farmers benefitted. A 1978 survey revealed that 64 percent of landowners and 63 percent of tenants used chemical fertilizers. The frequency of use was consistent across farm sizes, with applications per hectare generally higher on small and medium-size farms.

The fertilizer subsidy, and consequent increases in fertilizer use, also contributed to increased yields and production of rice and other grains in Bangladesh. Exhibit 3-19 shows the upward trend in yields per acre during the years of the subsidy program. Rice yields grew from the 1970-1975 average of 12.15 maunds per acre to an average of 13.54 maunds per acre during the second half of the decade.

Bangladesh: Foodgrain Acreage, Yields, Production

FISCAL YEAR	Acreage (thousand acres)						Yield (maunds per acre)						Production (thousands long tons)					
	Aus	Aman	Boro	All Rice	Wheat	All Grains	Aus	Aman	Boro	All Rice	Wheat	All Grains	Aus	Aman	Boro	All Rice	Wheat	All Grains
1961	6,300	14,578	1,007	21,885	140	22,025	10.79	12.27	12.11	11.84	6.22	11.80	2,497	6,574	448	9,519	32	9,551
1962	5,874	14,082	1,007	20,963	145	21,108	10.79	12.86	13.11	12.29	7.32	12.26	2,328	6,652	485	9,465	39	9,504
1963	6,192	14,221	1,071	21,484	182	21,666	9.68	11.57	12.35	11.06	6.58	11.02	2,202	6,046	482	8,730	44	8,774
1964	6,586	14,604	1,069	22,259	142	22,401	10.98	13.59	12.96	12.79	6.52	12.75	2,657	7,290	509	10,457	34	10,491
1965	6,645	15,107	1,053	22,805	132	22,937	10.24	13.08	14.84	12.34	6.39	12.30	2,501	7,262	574	10,337	31	10,368
Five-Year Average	6,319	14,518	1,041	21,879	148	22,027	10.50	12.68	13.07	12.07	6.62	12.03	2,437	6,765	500	9,702	36	9,738
1966	7,321	14,672	1,137	23,130	136	23,266	10.85	12.61	14.80	12.16	7.01	12.13	2,918	6,799	618	10,335	35	10,370
1967	6,965	14,059	1,390	22,414	168	22,582	10.45	11.46	16.27	11.44	8.59	11.42	2,674	5,919	831	9,424	53	9,477
1968	8,221	14,672	1,534	24,427	192	24,619	10.16	12.64	19.77	12.25	8.22	12.22	3,069	6,812	1,114	10,995	58	11,053
1969	7,658	14,895	2,015	24,568	290	24,858	9.54	12.55	21.78	12.37	8.64	12.33	2,683	6,870	1,612	11,165	92	11,257
1970	8,462	14,841	2,183	25,486	296	25,782	9.53	12.56	23.73	12.52	9.47	12.48	2,963	6,850	1,903	11,716	103	11,819
Five-Year Average	7,725	14,628	1,652	24,005	216	24,221	10.08	12.38	20.04	12.16	8.57	12.13	2,861	6,650	1,216	10,727	68	10,796
1971	7,885	14,184	2,425	24,494	311	24,805	9.88	11.35	24.60	12.19	9.63	12.16	2,863	5,912	2,192	10,967	110	11,077
1972	7,418	13,372	2,185	22,975	314	23,289	8.59	11.59	21.65	11.58	9.80	11.56	2,341	5,695	1,738	9,774	113	9,887
1973	7,241	14,121	2,434	23,796	297	24,093	8.54	10.77	23.16	11.36	8.25	11.32	2,273	5,587	2,071	9,932	90	10,002
1974	7,681	14,133	2,596	24,410	305	24,715	9.93	12.90	23.28	13.07	9.73	13.03	2,802	6,699	2,220	11,721	109	11,830
1975	7,857	13,469	2,871	24,197	311	24,508	9.90	12.13	21.33	12.50	10.07	12.47	2,859	6,000	2,250	11,109	115	11,224
Five-Year Average	7,616	13,556	2,502	23,974	308	24,282	9.39	11.75	22.78	12.15	9.46	12.12	2,628	5,979	2,094	10,701	107	10,808
1976	8,452	14,236	2,837	25,525	371	25,896	10.40	13.47	21.93	13.40	15.77	13.43	3,230	7,045	2,286	12,561	215	12,776
1977	7,952	14,355	2,112	24,419	395	24,814	10.31	13.10	21.27	12.89	17.57	12.97	3,011	6,906	1,650	11,567	255	11,822
1978	7,814	14,261	2,703	24,778	467	25,245	10.81	14.17	22.55	14.02	19.99	14.13	3,104	7,422	2,239	12,765	343	13,107
1979	7,995	14,347	2,650	24,992	654	25,646	11.19	13.90	18.82	13.66	20.23	14.04	3,268	7,326	1,929	12,543	486	13,029
1980	7,505	14,762	2,839	25,106	1,071	26,177	10.18	13.47	23.27	13.59	20.59	13.88	2,809	7,303	2,427	12,539	810	13,349
Five-Year Average	7,944	14,392	2,626	24,964	592	25,556	10.58	13.66	21.82	13.54	19.43	13.68	3,088	7,221	2,106	12,416	422	12,837

a - One longton = 27.32 maunds

b - Gross production, expressed in long tons of rice equivalent.

c - Estimate

Source: Bangladesh Bureau of Statistics

Total production of rice increased from an annual average of 10.7 million tons in the 1970-75 period to an annual average of 12.4 million tons from 1976-1980.

The results for wheat (which also benefitted from the fertilizer subsidies) were particularly impressive. Wheat yields per acre more than doubled between 1970 and 1980, and total wheat production more than quintupled during the same period. This difference in rates is due to the rapid expansion of acreage under wheat production during the 1970s, which was partially a result of the fertilizer subsidy as well.

Fertilizer subsidies alone do not fully explain the impressive growth of food production in Bangladesh. The introduction of high-yield seed, improved local varieties, flood control and irrigation have contributed in varying degrees to production increases. Moreover, questions of fertilizer supply (which did not keep pace with demand in Bangladesh), distribution networks, and supporting extension programs are critical to increased fertilizer use. Yet, the program of fertilizer subsidies did succeed in stimulating rapid increases in fertilizer consumption, and thus must be credited with a substantial contribution to the overall increase in foodgrain production in Bangladesh.

B. Price Stabilization and Quantity Restrictions on Fertilizer in Egypt*

Like many developing countries, Egypt sought self-sufficiency in food production. Towards that end, the Egyptian government intervened in nearly every aspect of the country's agricultural economy by setting production goals, manipulating factor and product prices, and directly allocating investment resources through the State Plan. In order to stimulate fertilizer consumption, the government acted to maintain low and stable production costs for farmers.

* Sources: William Cuddihy, Agricultural Price Management in Egypt, World Bank Staff Working Paper #388; Table 4-15 is from Alan Richards, Egypt's Agricultural Developments, 1800-1980 (Boulder: Westview Press, 1982).

Nature of Egyptian Fertilizer Market Intervention

The State controlled all production, importation and distribution of fertilizer in Egypt. The Agricultural Credit Bank monopolized fertilizer purchases by acquiring domestically manufactured fertilizer from local manufacturers and imported supplies from public trading companies. The Bank then distributed fertilizers to a nationwide system of agricultural cooperatives, which marketed directly to the farmers.

The Agricultural Credit Bank and local cooperatives rationed fertilizer in accordance with pre-determined fertilizer application rates published by the Ministry of Agriculture. Rations were a function of farm size and crop mix. (Despite prescribed application rates, farmers often reallocated inputs to maximize profits.)

The Ministries of Agriculture and Industry, along with the Agricultural Prices Stabilization Fund, predetermined fertilizer price levels, equalizing them across all areas and sources of supply. The Stabilization Fund then defended those prices by subsidizing fertilizer imports when world prices exceeded a given level, and taxing imports when world prices were low.

The Agricultural Prices Stabilization Fund did succeed in maintaining stable retail fertilizer prices (See Exhibit 3-20). The increase in superphosphate prices reflected quality improvements. This market intervention buffered Egyptian farmers from fluctuations in world fertilizer prices. Over this period world prices fell initially, reaching their lowest point in 1971, then rose sharply until 1975, after which point they declined to earlier levels.

Exhibit 3-21 illustrates how tax receipts in years of low world prices gave way to subsidy payments when border prices rose above the predetermined retail prices, and shows the rates of taxation and subsidy implied by these payments. The tax reached 87 percent in 1971 (the year of lowest world prices) and the subsidy amounted to 60 percent in 1975 (the year of highest world prices). These rates were calculated at official exchange rates, which are highly overvalued. Similar calculations made with parallel market rates reduce the apparent rates of taxation and increase the apparent rates of subsidy.

Exhibit 3-20

Retail Price of Fertilizers*
(Farmgate prices, LE per ton)

Year	Calcium Nitrate 15.5%	Ammonium Sulphate 20.5%	Urea 46%	Super-phosphate 15%	Potassium Sulphate 20.5%
1965	26.053	29.000	64.000	12.500	27.368
1966	26.053	29.000	64.000	12.500	27.368
1967	26.053	29.000	63.000	12.500	27.368
1968	26.053	29.000	64.000	12.500	27.368
1969	26.053	29.000	64.000	12.500	27.368
1970	26.053	29.000	64.000	12.500	27.368
1971	26.053	29.000	64.000	14.650	27.368
1972	26.053	29.000	64.000	15.650	27.368
1973	26.053	29.000	64.000	15.650	27.368
1974	-	29.000	64.000	15.895	27.368
1975	-	29.000	64.000	15.895	27.368
1976	-	29.000	64.000	15.895	27.368

* Not including the 5% discount to cooperatives.

Source: Choksi, A., Meerans, A. and Stoucjedijk, A. (1977), "A Planning Study of the Fertilizer Sector in Egypt", World Bank Staff Working Paper No. 269, Washington DC.

Exhibit 3-21

Aggregate Taxes and Subsidies of Imported Fertilizer

Year	Tax - Receipts LE m.	Subsidy - Payments LE m.	Implied Tax/ Subsidy Rate %
1965	1.7	-	19
1966	1.0	-	9
1967	3.1	-	41
1968	6.4	-	58
1969	4.1	-	42
1970	8.8	-	85
1971	13.0	-	87
1972	-	0.02	0
1973	-	-	0
1974	-	0.3	n.a.
1975	-	69.3	60
1976	-	29.9	50
1977	-	6.0	n.a.

Source: Calculated from data supplied by Agricultural Credit Bank and Agricultural Prices Stabilization Fund.

Effects of the Intervention

The Egyptian scheme to stabilize fertilizer prices had several significant effects. One was to provide farmers with stable supplies of fertilizers at declining real prices (since farmgate product prices rose during the late 1970s, when input subsidies were highest). Yet because fertilizer supplies were rationed, the declines in real prices did not result in increased use. As one might expect in a situation of fixed quantities and prices, a secondary market for fertilizer did develop in Egypt, though there is no reliable data on its extent or net impact.

During the 1960s, the protection of domestic fertilizer markets also facilitated the growth of the domestic fertilizer industry, which in turn lowered the foreign exchange burden of fertilizer imports.

Exhibits 3-22 and 3-23 show yields and production of major foodstuffs. Overall, output growth was slow. Numerous factors influence agricultural output, making it difficult to isolate the contribution of fertilizer use.

Exhibit 3-22

Annual Growth Rates of Yields of Main Crops Egypt 1971-1976

Crop	Unit	1971/72	1973	1974	1975	1976	Annual Growth Rate (%)
Wheat	Ardeb	8.69	9.82	9.17	9.72	9.36	1.9
Maize	Ardeb	10.82	10.82	10.75	10.85	11.51	1.15
Rice	Ton	2.23	2.28	2.13	2.3	2.12	-1.1
Bean	Ardeb	6.92	6.51	6.20	6.14	6.32	-2.1
Unginned Cotton	Quantar	5.9	5.43	5.26	4.98	5.4	-2.1
Sugar Cane	Ton	38.9	38	33.7	36.25	38.3	-0.38
Fruit	Ton	5.0	5.57	5.73	5.80	5.80	4.0

Source: A.R.E. "The Five-Year Plan, 1978-1982," Volume IV.

1/ Price Planning Agency, Ministry of Planning, Cairo, Memo No. 86, 1975.

2/ Egyptian Gazette, Cairo, July 5, 1979.

Exhibit 3-23

Production of Major Food Stuffs, 1970-78

<u>Crop</u>	<u>1970</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>
<u>Cotton.</u>									
<u>unginned</u>	1,404	1,418	1,422	1,368	1,204	1,061	1,084	1,260	1,381
<u>Maize</u>	2,393	2,342	2,417	2,507	2,640	2,781	3,047	2,724	3,117
<u>Sorghum</u>	874	854	831	853	824	775	759	648	681
<u>Beans</u>	277	256	361	273	234	234	234	270	231
<u>Rice (paddy)</u>	2,605	2,534	2,507	2,274	2,247	2,423	2,300	2,272	2,351
<u>Wheat</u>	1,516	1,729	1,616	1,837	1,884	2,033	1,960	1,697	1,933
<u>Vegetables</u>	5,159	5,232	5,415	5,688	6,006	6,520	6,922	6,750	7,746
<u>Sugarcane</u>	6,945	7,498	7,713	7,349	7,018	7,902	8,446	8,379	8,296
<u>Citrus Fruit</u>	706	883	825	923	963	1,013	889	797	990
<u>Dates</u>	294	340	396	380	396	415	417	461	377
<u>Other Fruit</u>	384	441	522	515	612	640	705	644	718
<u>Livestock products</u>									
<u>Meat</u>	284	288	295	299	302	n.a.	313	321	324
<u>Milk</u>	1,589	1,514	1,640	1,666	1,692	n.a.	1,750	1,780	1,801
<u>Poultry</u>	90	98	102	102	112	n.a.	129	121	115
<u>Eggs</u>	50	53	54	58	56	n.a.	76	n.a.	n.a.

n.a. Not available.
Source: Ministry of Agriculture.

C. Reduction of a Tax on Indigenous Fertilizers in India *

This case describes the evolution of a tax on certain domestic fertilizer—the Fertilizer Equalization Charge—and how the subsequent reduction of that tax resulted in lower fertilizer prices, increased fertilizer use and increased agricultural output.

To promote greater use of fertilizers for agricultural production, the government of India assured smooth movements of fertilizer prices by statutorily controlling the prices of some types, while establishing guidelines to determine the price of other types of fertilizers. In general, these controls took the form of price ceilings, though the structure of the ceilings varied somewhat with fertilizer type.

* This study is drawn from Balu Bumb, A Survey of the Fertilizer Sector in India, World Bank Staff Working Paper #331, June 1979. Table 5-19 is from J.S. Sarma, Growth and Equity: Policies and Implementation in Indian Agriculture, IFPRI Research Report #28, November 1981.

Evolution of the Intervention

From its creation in 1944 until 1969, India's Central Fertilizer Pool acquired and distributed all of the ammonium sulphate (AS), urea, calcium ammonium nitrate (CAN) and other straight nitrogenous fertilizers (imported and domestic) at prices chosen to minimize the Pool's profits and losses. In the late 1960s, however, the government of India reduced its control of nitrogenous fertilizer distribution, gradually reducing the quantity of domestic fertilizers acquired by the Central Pool. By 1969, the Pool did not acquire any domestically produced fertilizers, and private manufacturers fixed their own prices, however, the Pool continued to determine price ceilings for urea, AS, and CAN.

The price ceiling took into account the land cost of imported fertilizers, the cost of production of indigenous fertilizers, handling charges at ports for imported fertilizers, six-month interest on investment, overhead charges and transportation. This "Pool price," which was consistent across states, also included a predetermined margin for wholesalers and retailers.

From 1969 to 1974 the Pool succeeded in keeping the prices of these fertilizers relatively constant (see Exhibit 3-24). However, the global fertilizer crisis of the early 1970s forced heavy losses on the Pool, and in June 1974, after two years with subsidies of Rs.400 crores* annually, the Government increased the prices of urea, AS and CAN by 90, 56 and 78 percent, respectively (over the May 1974 prices). While the Pool continued to lose money on imported fertilizers, domestic manufacturers realized windfall margins over their "fair delivery prices."

*One crore equals ten million rupees.

Exhibit 3-24
India -- Prices of Urea, 1966-1977

<u>DATE</u>	<u>PRICE *</u> (Rs./ton)	<u>REMARKS</u>
February 1, 1966	680.00	Increase in distribution margins
April 1, 1967	840.00	Withdrawal of the subsidy introduced in June 1966.
April 10, 1968	860.00	Increase in distribution margins
April 17, 1969	943.00	Imposition of 10% advalorem excise duty in March 1969.
March 9, 1971	923.00	Increase in excise duty (15%)
March 30, 1985	959.00	Rise in the price of naphtha
October 11, 1973	1050.00	Increase in oil prices due to global energy crisis
June 1, 1974	2000.00	
July 18, 1985	1850.00	
March 16, 1985	1750.00	
February 8, 1977	1650.00	Reductions in the Fertilizer Pool Equalization Charge.
October 12, 1977	1550.00	

* Prices are in rupees per long ton till October 22, 1961, and in rupees per metric ton thereafter.

Source: Fertilizer Statistics, 1965-66 to 1976-77.

The Fertilizer Equalization Charge

The Fertilizer Pool Equalization Charge was introduced in June 1974 in order to compensate the Pool for losses on imports. The government required domestic manufacturers to pay the difference between the statutory price and the fair delivery price. In effect, the Fertilizer Pool Equalization Charge imposed a substantial tax on domestic fertilizers. Exhibit 3-25 presents the evolution of this charge, which began at Rs. 610, Rs. 195 and Rs. 295 per ton on urea, AS and CAN respectively.

Exhibit 3-25

India: The Fertilizer Pool Equalization Charge, 1974-77

(Rs. per ton)

Date	Fertilizer Pool Equalization Charge on		
	Urea	Ammonium Sulphate	Calcium Ammonium Nitrate
June 1, 1974	610.0	195.0	295.0
July 18, 1975	335.0	135.0	155.0
September 15, 1975	265.0	100.0	115.0
March 16, 1976	165.0	100.0	115.0
November 1, 1977	65.0	100.0	115.0

Source: Handbook on Fertilizer Marketing. The Fertilizer Association of India, New Delhi, 1976.

The Fertilizer Equalization Charge significantly increased the farm prices of indigenous fertilizers. Subtracting the Fertilizer Equalization Charge from the statutory prices for these products reveals that domestic manufacturers were in a position to supply urea, AS and CAN at increases over the May 1974 prices of only 32, 23 and 30 percent, respectively, rather than the larger price increases which farmers actually faced.

The effect of these large price increases on fertilizer consumption was severe. Exhibit 3-26 shows a decrease of 266 thousand tons in fertilizer consumption in 1974/75 from the 1973/74 level. In the absence of the Fertilizer Equalization Charge, the effects of world fertilizer price increases on domestic consumption would have been less drastic. This argument assumes that domestic manufacturers could have increased supplies to compensate for reduced fertilizer imports. Given the low capacity utilization of domestic manufacturers—urea plants operated at 53 percent of capacity in 1973/74—the incentive presented by the price differential between indigenously produced and imported fertilizer provides a reasonable basis for this assumption.

Exhibit 3-26

Fertilizer Consumption, 1961-62 to 1977-78

Year (1)	Consumption ('000 tons)				Annual Change ('000 tons)				Annual Change (percent)			
	N (2)	P (3)	K (4)	Total (5)	N (6)	P (7)	K (8)	Total (9)	N (10)	P (11)	K (12)	Total (13)
1961-62	250	60	28	338	-	-	-	-	-	-	-	-
1962-63	333	83	36	452	83	23	8	114	33	33	38	34
1963-64	377	116	51	544	44	33	15	92	13	40	42	20
1964-65	555	149	69	773	178	33	18	269	47	28	35	49
1965-66	575	133	77	785	20	-16	8	12	4	-11	12	2
1966-67	738	249	114	1,101	163	116	37	316	28	87	48	60
1967-68	1,035	335	170	1,540	297	86	56	439	40	35	49	40
1968-69	1,209	382	170	1,761	174	47	0	221	13	14	0	14
1969-70	1,350	416	210	1,982	147	34	40	221	12	9	24	13
1970-71	1,479	541	236	2,256	123	125	26	274	9	30	12	14
1971-72	1,798	558	300	2,656	319	17	64	400	22	3	27	18
1972-73	1,839	581	348	2,768	41	23	48	112	2	4	26	4
1973-74	1,829	650	360	2,839	-10	69	12	71	-1	12	3	3
1974-75	1,766	471	336	2,573	-63	-179	-24	-266	-3	-28	-7	-9
1975-76	2,149	467	278	2,894	383	-4	-58	321	22	-1	-17	12
1976-77	2,457	635	319	3,411	308	168	41	517	14	36	15	18
1977-78	2,915	868	505	4,287	458	233	186	876	19	37	59	27

Sources: Dwa.1, op cit, for 1961-62 to 1976-77 period, and Fertilizer News July 1978 for 1977-78.

Recognizing the sensitivity of farmers to fertilizer prices, the government of India reduced the Fertilizer Equalization Charge as a means of lowering the prices of controlled fertilizers. Exhibit 3-25 shows the reductions in the Equalization Charge in July 1975, March 1976, and February and November 1977.

The Effect of Reducing the Intervention

By reducing the Fertilizer Equalization Charge--in effect reducing the tax on indigenous fertilizers--the government of India succeeded in lowering the ceiling price of CAN by 7.5 percent and urea by 16.2 percent between July 1975 and October 1977.

These price reductions had the intended effect of increasing fertilizer consumption. Consumption increased rapidly, growing by 321, 517 and 876 thousand tons in the three following growing seasons. As Exhibit 3-26 shows, annual rates of increase were 12, 18 and 27 percent, respectively, in those years.

Foodgrain production figures reflect these increases in fertilizer consumption (Exhibit 3-27). Between 1974/75 and 1978/79, foodgrain production increased from 99.8 to 131.4 million tons. Other factors also contributed to production growth. Yet, given the estimate that increased fertilizer use accounted for over 50 percent of production increases between 1970/71 and 1973/74, it is reasonable to credit increased fertilizer use with a substantial portion of the growth in foodgrain production after 1974/75 as well.

Exhibit 3-27

Progress of Foodgrain Production Programs, 1964/65 - 1978/79

Year	Area Sown with High-Yielding Varieties			Total Fertilizer Consumption	Irrigated Area Sown with Foodgrains	Area Sown with Foodgrains	Production of Foodgrains	Production of Wheat	Production of Rice
	Cereals	Wheat	Other						
	(million hectares)			(million tons)	(million hectares)		(million tons)		
1964/65	...	...	...	0.77	23.94	118.11	69.37	12.25	39.32
1966/67	1.89	0.54	0.02	1.10	25.79	115.50	74.23	11.39	30.44
1967/68	4.04	2.94	1.78	1.54	26.10	121.42	95.05	16.54	37.61
1968/69	9.30	4.80	2.60	1.75	26.05	130.43	94.01	18.63	39.76
1969/70	11.40	4.92	4.34	1.98	29.55	123.57	99.50	20.09	40.43
1970/71	13.34	6.48	3.59	2.26	30.12	124.32	108.42	22.83	42.23
1971/72	18.17	7.86	7.41	2.66	30.54	122.82	105.17	26.41	43.07
1972/73	22.09	10.09	6.11	2.77	30.74	119.28	97.03	24.74	39.23
1973/74	26.00	11.00	10.00	2.84	31.17	126.54	104.67	21.78	44.05
1974/75	27.30	11.20	11.20	2.58	33.26	121.08	99.83	24.10	39.58
1975/76	31.30	13.30	12.60	2.80	34.08	128.18	121.03	28.83	46.74
1976/77	33.60	14.50	13.30	3.43	34.24	124.56	111.17	29.01	41.92
1977/78	36.00	15.50	15.60	4.28	34.25 ^a	127.52	126.41	31.73	52.67
1978/79 ^b	41.10	16.10	16.00	5.12	34.6	128.12	131.37	34.98	53.83

SOURCE: (INDIA: Ministry of Agriculture and Irrigation, Directorate of Economics and Statistics, *Annual Agriculture in India* various editions) (DHEW: Controller of Publications, various years).

NOTE: Where U.S. appears, the figure was not available.

^a These are provisional figures.

^b This is an estimate.

CHAPTER IV

CONSUMER DEMAND AND FOOD POLICY

The central problem addressed by food policy is how to alleviate hunger and malnutrition among low-income households. Common goals addressing these problems are to increase food intake by low-income households; stabilize prices and supplies, within and between years; provide for food security; and ensure the sufficiency of the nutritional intake of vitamins and minerals and the safety of foods consumed.

There are different policies for addressing these goals. While many involve price in one form or another, there are other policies as well, such as maintaining reserve stocks, providing input subsidies and overvaluing exchange rates, that also address these goals. Depending on the circumstance, some policies will be more appropriate than others. The policy selected should depend on the causes of the problem, the affected population, and the resources of the country for dealing with the problem.

This chapter examines the methods for analyzing the causes of hunger and malnutrition, identifying vulnerable groups and developing and implementing governmental interventions. It is divided into four sections:

- Goals of food policy,
- Analysis underlying consumer demand,
- Food policy interventions, and
- Selected case studies.

1. GOALS OF FOOD POLICY

Behind any nation's food policy there are at least one of four goals:

- Increasing the quantity and quality of food,
- Stabilizing prices and supplies,
- Providing food security, or
- Ensuring proper nutrition and food safety.

These goals form the basis of most food policy decisions; they are the benchmarks against which the success of food policy is judged.

A. Increasing the Quantity and Quality of Food

The basic goal of food policy is very simple: make people better off by providing them with more food of better quality. "Better quality" means upgrading the nutrient content of diets (e.g., more protein) and providing a greater variety of wholesome foods that people want to eat.

Increasing food intake by low-income households may be particularly important and generally implies providing these families with an adequate supply of foodstuffs. An adequate supply of food can be defined as that which assures minimal nutritional needs in terms of calorie and protein intake.

B. Stabilizing Prices and Supplies

Stabilizing prices and supplies, within and between seasons, can be an important government objective. Sharp seasonal fluctuations in the prices and availability of basic foodstuffs typically prevent low-income households from attaining minimum intake of foodstuffs during some seasons or in years when crops are poor and supplies are limited.

Due to the seasonality of production, price and supply variations for foodstuffs are commonplace. As a rule, prices are at their highest during the pre-harvest season, because supplies from the previous year are at their lowest level. During the harvest, prices fall as new supplies come onto the market. Then, during the post-harvest season, prices tend to stabilize in response to the relative abundance of supply, but then rise again into the pre-harvest period as a result of dwindling supplies and storage costs.

It is usually a food policy goal to prevent sharp fluctuations in prices and supplies.

C. Providing Food Security

Providing food security means having at the country's disposal all the food that it needs. Food requirements can be satisfied from three principal sources: domestic production, commercial imports and food aid. If a country is self-sufficient in food production, food security is much less of a problem. Most developing countries, however, are not self-sufficient and are therefore faced with having to import food or rely on food aid. Imports are dependent on the availability of foreign exchange, which is generally in short supply for these countries. And food

aid is not always available in sufficient quantities. Thus, countries are often faced with the difficult problem of increasing supply and controlling demand.

D. Ensuring Proper Nutrition and Food Safety

Two goals less frequently pursued in developing countries are to promote good nutrition and food safety. The former involves ensuring that low-income households are consuming sufficient levels of the major nutrients required for human growth and good health. The latter concerns ensuring that foods consumed are free from spoilage, contamination, and adulteration.

Developing policies to satisfy these goals is usually difficult. These issues require the involvement of demographers, nutritionists, food technologists and health specialists, in addition to people concerned about the availability and prices of foodstuffs. Since we are concentrating here on the economic dimensions of food policy, we deal primarily with food and nutrition as it relates to availability. Other nutritional and safety aspects of food consumption are not analyzed in this chapter.

Nevertheless, food policy analysts should be conscious of these other aspects of food consumption. Analysts may also want to review studies which discuss the nutritional and safety issues since they can provide additional insight into measuring the adequacy of food intake and identifying the probable causes of chronic hunger or poor health. Nutritional surveys are also helpful in measuring how well food policy goals have been met as they indicate whether a population group is achieving minimum dietary requirements.

2. ANALYSIS UNDERLYING CONSUMER DEMAND

Before policy recommendations can be offered, a number of analytic steps must be completed. These include identifying the forces causing changes in food consumption patterns; consumer response to changes in food prices and income; who are the hungry and malnourished, and where they are located; food consumption patterns of low-income households; and causes of hunger and malnutrition. This information will assist analysts in identifying the segments of the population toward which policy should be directed; feasible program interventions to increase their food intake; times of the year and geographic areas in which food policy interventions are especially important; and whether a particular problem can even

be solved by food policy. In order to help the analyst with these tasks, this sections discusses:

- Theoretical explanation of food consumption, and
- Identifying food commodities important to food policy.

A. Theoretical Explanation of Food Consumption

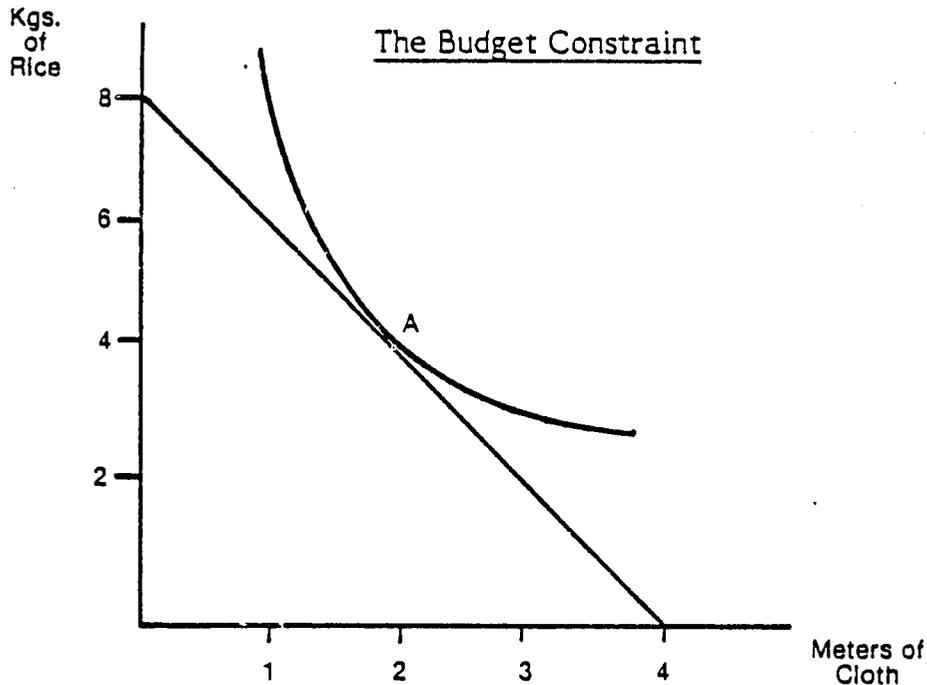
This theoretical explanation of food consumption involves six elements:

- The budget constraint and relative prices,
- Budget share devoted to food,
- Economic effects on consumer demand,
- Consumption by farming households,
- The use of elasticities, and
- Non-economic influences on consumer demand.

The Budget Constraint and Relative Prices

A basic economic concept underlying food policy analysis is the budget constraint. Faced with limited resources, the consumer must make choices about how to spend the money. This fact of life is illustrated graphically in Exhibit 4-1. The straight line represents the alternative quantities of rice and cloth that can be bought, given their relative prices and the consumer's budget. In practice, of course, the consumer is choosing among a large number of goods but the two-dimensional representation more clearly captures the underlying economic concept. The curved line (an "indifference curve") represents the consumer's preferences, that is, the alternative combinations of rice and cloth between which he is indifferent. Assuming the budget and relationships shown in this diagram, the consumer would choose the combination at point A -- 4 kg. of rice and 2 square meters of cloth. Other combinations of rice and cloth on the budget line would yield less satisfaction, and therefore the consumer would be on a lower indifference curve. The straight line is the budget line and any combination of rice and cloth along this line uses up all the consumers income.

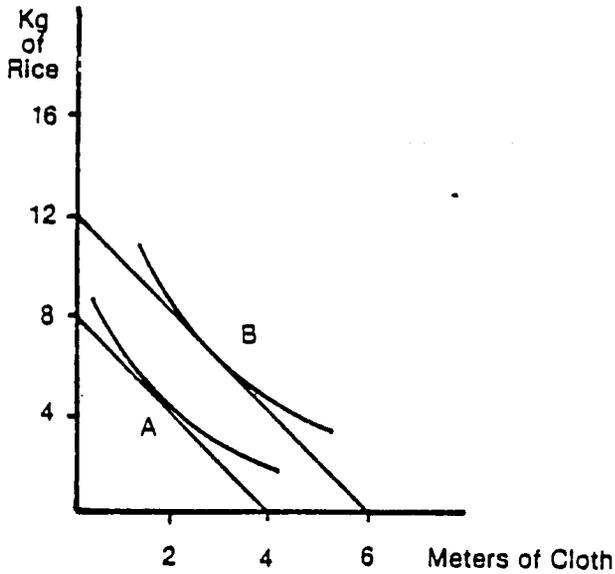
Exhibit 4-1



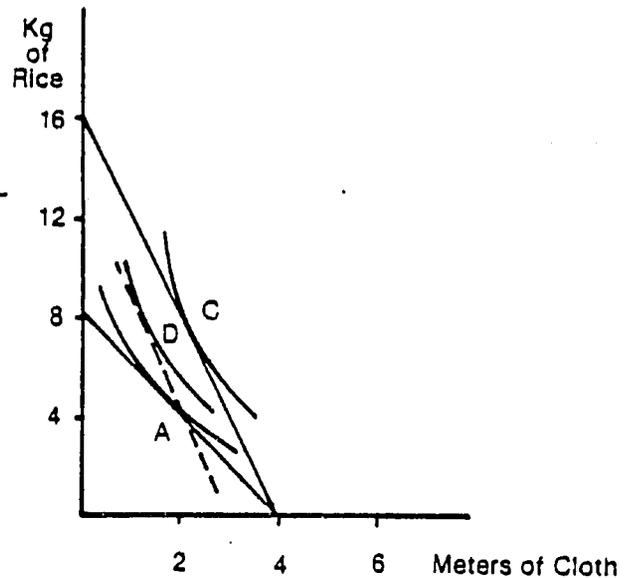
There are only two ways to make a consumer better off in terms of the quantity of goods consumed. One is to give him more money income so he can buy more of everything; the other is through a change in relative prices that involves both an income and substitution effect. Exhibit 4-2 illustrates these two options.

In the graph on the left, the budget line has been shifted to the right, representing a 50 percent increase in income. This does not, however, necessarily mean that the consumer increases his purchases of rice and cloth proportionately. In fact in our example, he increases cloth purchases by 75 percent but rice purchases by only 25 percent, the combination shown as point B. This particular combination is dictated by the consumer's personal preferences as represented by the shape of the curved lines.

Income Effect



Income and Substitution Effect



In the graph on the right, the price of rice has been cut by 50 percent so that if he spends all his income on rice, he can now buy 16 kg. instead of 8 kg. Notice again that the budget line has shifted to the right, indicating that a price cut effectively increases real income. The consumer can buy not just more rice but more cloth as well. Conceptually, one can identify two components in these changes: the price effect and the income effect. Normally, the price effect is an increase in purchases of the good that becomes relatively cheaper and a decrease in purchases of the good that becomes relatively more expensive.

The income effect arises from the fact that after the substitution based only on the change in relative prices, the consumer still has some money left and buys an additional quantity of both goods. This is shown for the new price relationship that goes through points A and D. At the new prices, the consumer could buy the same bundle of goods as before. But he can do better by moving to point D on a higher indifference curve, which represents the substitution effect of the price change. The move from D to the commodity mix at point C reflects the income effect.

There are a couple of lessons here for food policy analysts. First, for poor populations that spend a large proportion of their income on food, the income effects of price changes can be considerable. And, of course, these changes can move in both directions. Second, for rural populations producing their own food

plus a marketable surplus, one is confronted with a complicated situation if rice prices fall. As a consumer of rice, the producer will want to eat more rice at the lower price. But the lower price also may reduce output and the amount for sale. The combination of a lower price and smaller sales reduces cash income and therefore cloth purchases.

The budget share devoted to basic food consumption is likely to be large for low-income households and becomes smaller as household income rises. Exhibit 4-3 illustrates the share of total income spent on food for various income percentiles for Sri Lanka in 1969-70. For example, the poorest 10 percent of the population spent 64 percent of their income on food, while the richest 10 percent of the population spent 46 percent of their income on food. In some developing countries the disparity is even greater. Because low-income households spend a larger percentage of their income on food, their consumption is more responsive to price changes of basic foodstuffs than higher income households because the income effect of a price change is so much larger. As a result, most of the adjustment to higher food prices will be made by low-income households rather than by middle or high-income ones.

Exhibit 4-3

Sri Lanka: Food Expenditure As A Share of Income For Various Income Percentiles, 1969-70

Income Percentile (percent)	Total Income (rupees) (per month)	Food Expenditure (rupees per month)	Food Expenditure As Share of Total Income (percent)
10	33.08	21.13	63.90
20	35.64	22.57	63.30
30	38.52	24.09	62.50
40	42.01	25.80	61.40
50	46.45	27.79	59.80
60	51.88	29.99	57.80
70	59.28	32.66	55.09
80	69.60	35.87	51.53
90	88.58	40.67	45.90
Average	51.67	28.95	56.00

Source: James D. Gavan and Indrani Sri Chandrasekera, The Impact of Public Foodgrain Distribution on Food Consumption and Welfare in Sri Lanka. Research Report No. 13, Washington, D.C.: International Food Policy Research Institute (IFPRI), December 1979. Table 18.

Economic Effects on Consumer Demand

Faced with high price levels or reduced income, low-income households adjust by either buying less of the food they formerly consumed, or purchasing cheaper, and sometimes less nutritious food. Empirical studies have found that when a commodity's price rises, consumption of substitutes for the commodity rises, assuming the price of the substitute does not increase as well. This substitution effect tends to be strong at low-income levels than at higher income levels, but for many very poor people, their diets are already limited to a few basic foods, and substitution possibilities are limited. Consequently, an increase in the price of basic foods may reduce food consumption and intensify hunger and malnutrition.

As incomes rise, households diversify consumption to include higher quality calories and reduce consumption of starchy staples (mostly grain and root crops). This reflects a general preference by consumers for variety in their diets and for high quality protein.

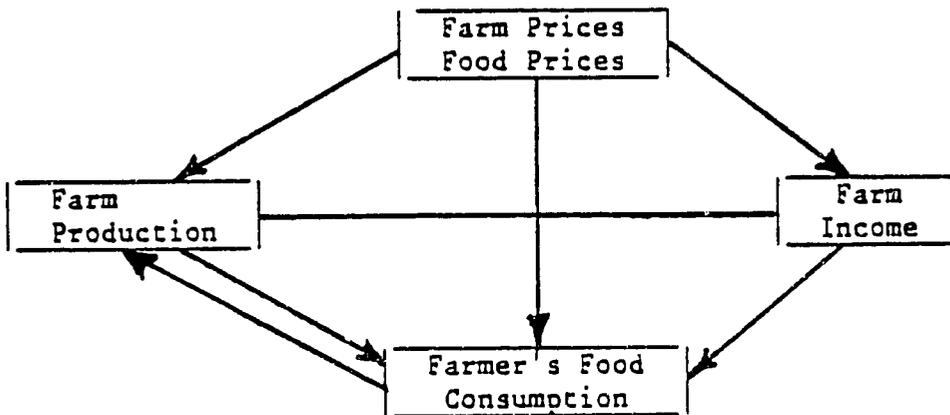
Consumption by Farming Households

In most developing countries, the consumer is also more often than not a farmer. Because farming households are able to produce some of the food they need, what they ultimately consume will be determined not only by prices for purchased food but also by prices received for what they sell. As illustrated by Exhibit 4-4, prices received will determine not only the farm household's production but also its income. Together, they determine what the farm household will consume.

What the farm household decides to produce for the market and for home consumption will be largely determined by three factors: prices, risk preferences and efficiency of input use. Prices tend to dominate, but are constrained by the other two factors. What the farm household produces will depend on what the farmer views as being more advantageous to produce on the farm rather than to acquire on the open market. In this respect, the consumption behavior of the farm household is not fundamentally different from that of the urban household. Given a certain income, the consumer will allocate it among goods based primarily on relative prices.

Exhibit 4-4

Functional Relationship of Prices, Production, and Income on Consumption for a Farming Household



Source: University of Michigan, Center for Research and Economic Development. Consumption Effects of Agricultural Policies: Cameroon and Senegal.

The Use of Elasticities

Various coefficients are used to measure the relationship between changes in consumption levels and price and income changes. They include the price elasticity of demand, income elasticity of demand, and cross-price elasticity of demand.

In the current context, price elasticity indicates the degree to which food consumption changes when food prices change and money income remains constant. Overall food intake is generally less responsive to changes in price than is the demand for most individual consumer foods. As a rule, the price elasticity for basic foodstuffs is larger in absolute terms for poor households than for middle or upper income households; i.e. as the price for basic foodstuffs increases, there is likely to be a proportionately sharper decline in consumption of basic foodstuffs among low-income households than among middle and high income households. A decrease in prices for basic foodstuffs will lead to an increase in consumption.

Income elasticity indicates the degree to which food consumption changes in response to income changes when food prices remain constant. Elasticity of demand for food in low income households is usually larger than for middle and high income households and often approaches one. Thus, when income changes, there are likely to be quite noticeable changes in food consumption. Exhibit 4-5 illustrates income elasticity by income percentiles for Sri Lanka in 1969-1970.

Exhibit 4-5

Sri Lanka: Income Elasticity of Demand by
Income Percentile, 1969-1970

Income Percentile (percent)	Income Elasticity of Demand for Food
10	0.91
20	0.86
30	0.81
40	0.77
50	0.72
60	0.67
70	0.61
80	0.56
90	0.49

Source: IFPRI Report No. 13, Table 18.

Cross-price elasticity of demand indicates the degree to which consumption of a particular food will change when its price changes relative to other foods. For instance, cross-price elasticity can be used to indicate by how much rice consumption will change when the price of close substitutes such as millet or sorghum changes.

Elasticity coefficients are derived from demand equations that model the functional relationship between food consumption, and prices and income, and that predict what the consumption of a particular food will be when prices or income change. Demand equations can be derived by regression analysis using observed data.

The following is an example of one such demand function.* It shows the relationship between the consumption of rice and the price of rice, the price of millet or sorghum, and consumer income:

$$Q_r = 55.74 - 1.79P_r + 0.53P_m + 0.0031Y$$

Where:

Q_r = Per capita rice consumption

P_r = Price of rice

P_m = Price of millet or sorghum

Y = Income per capita

By substituting different values for P_r , P_m , and Y , respectively, an analyst can estimate what the resulting consumption of rice would be. For instance, if CFA 50 per kilo is used for the price of rice, CFA 30 per kilo for the price of millet or sorghum, and CFA 10,000 is used for income, resulting consumption would be 13.14 kilos of rice.

If the analyst wants to see the effect of changes in one variable on consumption, the values of all the other variables can be held constant. For example, if the price of rice is held at CFA 50 per kilo and the price of millet or sorghum remains at CFA 30 per kilo, and income increases to CFA 12,000, consumption would be 19.34 kilos of rice. The individual effects of changes in the price of rice and millet or sorghum on consumption could be similarly observed.

To calculate the actual income elasticity of demand, one divides the percentage change in consumption by the percentage change in income. In the example above, the calculations would be as follows:

$$\text{Percent change in consumption} = \frac{16.24}{13.14} - 1 \times 100 = 23.6$$

$$\text{Percent change in income} = \frac{11,000}{10,000} - 1 \times 100 = 10.0$$

$$\text{Income elasticity} = \frac{23.6}{10.0} = 2.36$$

* Consumption Effects of Agricultural Policies: Cameroon and Senegal. Ann Arbor, Michigan: University of Michigan, August 1982, p. 292.

What this means is that for every 1 percent increase in income, rice demand will rise by 2.36 percent. Thus, in this example demand is very responsive to income changes and is said to be "elastic."

It is important to note though that elasticity is not constant when demand functions are linear in terms of actual values of the variables. At higher income levels, the income elasticity of demand declines with this particular equation form. Similarly, the price elasticity declines as price decreases.

Noneconomic Influences on Consumer Demand

Some consumption behavior is not explainable by factors of price and income but instead is attributable to culture, taste and convenience. These are the noneconomic influences on consumer demand. They are important to observe in food policy analysis, because they explain differences in consumption patterns among groups within a country as well as among countries. Noneconomic factors also can alert analysts to special problems in implementing policies to raise consumption.

An example of the influence of culture on consumption is found in Mali, where it is the belief that no food other than milk should be given to young children. This has been identified as one of the primary cause of infant malnutrition there.*

The perception of quality of a commodity can strongly influence consumer demand. Certain foods are termed "inferior" since as the income of the household increases, consumption shifts from these foods to other so-called "superior" foods. This explains why at higher income levels, "inferior" goods such as potatoes or cassava become less important in the diet.

Noneconomic considerations by individual consumers will vary according to individual tastes and preferences. This helps explain why for any given level of income and set of prices, the selection of combinations of food differs among consumers.

*Jaqueline Mondot-Bernard and Michel Labonne, Satisfaction of Food Requirements in Mali to 2000 A.D. Paris: OECD, 1982.

B. Identifying Food Commodities Important to Food Policy

While economic theory is helpful in explaining general consumer behavior, for the operational phases of policy planning and implementation and for identifying policy priorities, it is important to develop other types of information. This includes identifying those individuals most vulnerable to inadequate food intake; where they are located geographically; during what seasons hunger occurs; and what commodities are important to the consumption of low-income households. Such information is critical in targeting policy. By knowing how low-income households spend their money, it becomes easier to select the commodity that can be more efficiently manipulated. Analyzing the level of food consumption by households can indicate whether nutritional problems are caused by inadequate food intake or the composition of the diet.

There are two main sources of information that provide answers to the above questions. They are food balance sheets and household budget surveys.

Food Balance Sheets and Household Budget Surveys

A food balance sheet is the primary device for measuring average food consumption levels for a nation. It indicates the average per-capita consumption of calories and proteins on a daily and annual basis, and which foods provide them. It also provides information regarding self-sufficiency in food by indicating the sources of supply and domestic consumption of various food items; change in stocks; and the level of exports and imports. Exhibit 4-6 provides an example of a food balance sheet for Sri Lanka.

Many countries construct food balance sheets on an annual basis. Another source is the Food and Agriculture Organization of the United Nations, although its balance sheets are not available on an annual basis.

By applying factors reflecting the nutrient composition of each food, one can estimate the nutritional adequacy of the average diet. Balance sheets do not, however, provide information on how food is distributed among consumers; they do not indicate the consumption patterns of households at different income levels. Because consumers at different income levels will react differently to income and price changes, it is important to have disaggregated information on food consumption. For this, food policy analysts must turn to household budget surveys.

Household budget surveys generally indicate average household expenditures for food and expenditures for individual food items by income groups. Occasionally, these surveys will indicate quantities of food items consumed, and home produced amounts. Exhibit 4-7 is an example of a household budget survey for Colombo, Sri Lanka.

Ideally, household budget surveys should be conducted for several income classes so that comparisons can be made between food consumption patterns of low-income households and other income groups. This gives food policy analysts a clearer picture of what food consumption changes to expect with rising or falling income levels. Budget surveys should also be done for different parts of the country to provide information on how consumption patterns vary as a result of geographic or sociological factors, such as urban versus rural and among different social or cultural groups.

Exhibit 4-6

Standardized Food Balance Sheet

Population 14822000

Sri Lanka
Average 1979-1981

Information Available as of 29 June 1983

	Pro- duc- tion	Im- ports	Stock chan- ges	Ex- ports	Proc- ess- ed	Domes- tic Supply Trade (E-1)	Domestic Utilization			Per Caput Supply								
							Feed	Seed	Manufacture	Waste	Food	Per Day						
												Use	Mon Food Use	Kilo- grams /Year	Calo- ries Grams	Pro- tein Grams	Fat Grams	
----- 1,000 metric tons -----																		
Grand Total												2251	44.0	47.4				
Vegetable Products												2156	35.5	42.3				
Animal Products												95	8.5	5.1				
Grand Total Exc Alcohol												2245	43.9	47.4				
Cereals												186.5	511.0	1275	26.3	3.3		
Wheat		279			-394	673	6											
Paddy Rice	2093		105		-282	2270	4	104		16	652	44.1	120.8	310	8.0	1.0		
Barley					-2	2			2			84	2077	140.1	383.7	945	17.7	3.1
Maize	22	1				23	1											
Millet	15			3		12				1	21	1.4	3.8	12	.3	.1		
Sorghum	1					1						11	.7	2.0	6	.2		
Cereals Mes		1				1								1	.1			
Prepared Cereals Mes		2				2								2	.1	.4	1	.1
Roots and Tubers																		
												34.4	94.1	93	.8	.3		
Cassava	520				-2	522												
Potatoes	52	7			-1	60		11		1	6	2.8	7.6	5	.1	.2		
Beet Potatoes	145					145												
												43	101	6.8	18.7	19	.2	.1
Sugars and Honey																		
												23.4	64.1	173				
Sugar Cane	320					320		228										
Raw Sugar	25		24		-251	252			3			92	6.2	17.0	5			
Sugar Confectionery	4					4												
Sugar and Syrups Mes		2				2												
												2	.1	.3	1			
ulses																		
												2.5	6.7	23	1.5	.1		

Exhibit 4-6 (continued)

Standardized Food Balance Sheet

Population 14822000		Sri Lanka Average 1979-1981				Information Available as of 29 June 1983								
Proc- duc- tion	Im- ports	Stock chan- ges	Ex- ports	Proc- cess- ed Trade (E-1)	Domes- tic Supply	Domestic Utilization				Per Caput Supply				
						Food	Seed	Manufacture	Waste	Food	Non Food	Pro- tein	Fat	
						Use	Use	Use	Use	grams /Year	Calo- ries Grams	Mac	Grams	Grams
----- 1,000 metric tons -----														
Fruit										78.8	215.8	152	1.2	.4
Plantains	1477				1477			517	960	64.9	177.7	137	1.1	.2
Oranges	10				10			2	5	.3	1.0			
Lemons and Limes	49				49		4	7	42	2.8	7.8	2		.1
Grapes				-1	1				1		.1			
Mangoes	70				70				11	4.0	11.0	5		
Pineapples	61				61				9	3.5	9.5	3		
Dates		5			5				5	.3	.9	2		
Fresh Tropical Fruit Nec	1			1							.1			
Fresh Fruit Nec	49				49				7	2.8	7.7	3		
Meat and Offals										2.4	6.6	9	.9	.6
Beef and Veal	12				12				12	.8	2.2	4	.3	.3
Buffalo Meat	7				7				7	.4	1.2	1	.1	
Pigmeat	1				1				1	.1	.2	1		.1
Chicken Meat	11				11				11	.7	2.0	2	.2	.2
Eggs										1.2	3.2	3	.4	.3
Hen Eggs	19				19		1		1	1.2	3.2	5	.4	.3
Fish and Seafood										14.1	38.6	31	4.7	1.2
Freshwater Diadrom	22				22				22	1.5	4.1	3	.5	.1
Demersal Fish	34				34				34	2.3	6.2	3	.6	
Pelagic Fish	121			-29	150	2			147	10.0	27.3	24	3.6	1.0

Exhibit 4-6 (continued)
Standardized Food Balance Sheet

Population 14822000

Sri Lanka
 Average 1975-1981

Information Available as of 29 June 1983

	Pro- duc- tion	Im- ports	Stock chan- ges	Ex- ports	Proc- essed Trade (X-1)	Domes- tic Supply	Domestic Utilization			Per Caput Supply					
							Food	Seed	Manufacture Waste	Per Day			Pro- tein Grams	Fat Grams	
										Food Use	Non Food Use	Kilo- grams /Year			Calo- ries Nos	Grams
----- 1,000 metric tons -----															
Milk											26.3	72.0	48	2.5	2.7
Whole Cow Milk	183				-135	318		1	9	307	20.8	56.9	35	1.8	1.8
Skim Cow Milk	1				-21	22				22	1.5	4.2	2	.1	
Buffalo Milk	56					56			3	54	3.6	9.9	11	.5	.8
Goat Milk	6					6				5	.4	1.0	1		
Oils and Fats											3.5	9.5	82		9.2
Vegetable Oils and Fats											3.3	9.1	79		9.0
Soya Bean Oil		1				1				1		.1	1		.1
Coconut Oil	80		3	18		59		18		41	2.8	7.5	67		7.5
Palm Oil		1				1				1	.1	.2	1		.2
Cotton Seed Oil	1					1				1		.1	1		.1
Margarine, Shortening	7					7				6	.4	1.2	9		1.0
Animal Oils and Fats											.2	.3	3		.3
Cattle Fat												.1	1		.1
Butter of Cow Milk		1				1				1	.1	.2	1		.2
Spices											2.9	7.8	27	1.0	1.1
Pepper, White/Long/Black	15			1		14				14	.9	2.6	8	.3	.2
Anise, Badian, Fennel		7				7				7	.5	1.4	6	.3	.3
Pimento, Allspice		8				8				7	.5	1.4	4	.2	.2
Cinnamon (Canela)	31					23			23						
Cloves, Whole-Stems	2				1	1				1		.1			
Nutmeg, Mace, Cardamoms	4				1	3				3	.2	.6	3	.1	.2
Spices Mes	8	1				9				10	.6	1.8	5	.2	.1

Exhibit 4-6 (continued)

Standardized Food Balance Sheet

Population 14822000

Sri Lanka
Average 1979-1981

Information Available as of 29 June 1981

Pro- duc- tion	Im- ports	Stock chan- ges	Ex- ports	Proc- cess- ed	Domes- tic Supply Trade (E-1)	Domestic Utilization			Per Caput Supply						
						Feed	Seed	Manufacture Use	Waste Food Use	Per Day					
										Kilo- grams /Year	Calo- ries Nos	Pro- tein Grams	Pa- ram		
----- 1,000 metric tons -----															
Dry Beans	7				7			6		.4	1.1	4	.2		
Cow Dry Peas	16				16		1	14		1.0	2.6	9	.6		
Pulses Mes		18		1	17				1	1.1	3.0	10	.7		
Nuts and Oilseeds											74.2	203.3	312	3.5	28.
Cashew Nuts	1			1							.1				
Nuts Mes	17			4	13				13	.9	2.4	6	.2		
Soybean:	1				1				1	.1	.3	1	.1		
Groundnuts in Shell	7				7		1		6	.4	1.1	4	.2		
Coconuts	1692		-2	2	114	1578		500	1077	72.7	199.1	299	3.0		
Sesame Seed	11		-3	12	2		1		1	.1	.1	1	.1		
Mustard Seed	1				1				1	.1	.2	1	.1		
Cottonseed	5				5			5							
Vegetables											17.3	47.4	15	.7	
Cabbages	42				42				6	36	2.4	6.6	1		
Tomatoes	26				26				4	23	1.5	4.2	1		
Pumpkins, Squash, Gourds	23				23				4	20	1.4	3.7	1		
Cucumbers and Gherkins	22				22				3	19	1.3	3.5			
Green Chillies Peppers	45				45				7	38	2.6	7.1	2		
Dry Onions	65				71				5	65	4.4	12.1	5		
Garlic		5			5				5	.3	.9	1			
Green Beans	19				19				3	16	1.1	3.0	1		
Carrots	5				5				1	5	.3	.9			
Fresh Vegetables Mes	36			1	35			5	5	25	1.7	4.6	1		
Dried Vegetables Mes		3			3				3	.2	.5	1	.1		

Exhibit 4-6 (continued)

Standardized Food Balance Sheet

Population 14822000 Sri Lanka Average 1979-1981 Information Available as of 29 June 1983

	Pro- duc- tion	Im- ports	Stock chan- ges	Ex- ports	Proc- ess- ed Trade (E-1)	Domes- tic Supply	Domestic Utilization			Per Caput Supply						
							Feed	Seed	Manufacture	Per Day						
										Waste	Food	Use	Kilo- grams /Year	Calo- ries Mos	Pro- tein Grams	Fat Grams
----- 1,000 metric tons -----																
Stimulants												2.1	5.7	3	.5	
Green Coffee	11			2		9					10	.6	1.8	1	.1	
Cocoa Beans	2			1		1					1	.1	.2			
Tea	203			183		20					20	1.3	3.7	1	.4	
Alcoholic Beverages												1.1	3.0	5		
Beer of Barley	6					6					7	.5	1.3	1		
Distilled Alcohol	6	2				8					9	.6	1.6	5		

Source: Food and Agriculture Organization of the United Nations. Food Balance Sheets, 1979-81 Average. Rome: Food and Agriculture Organization of the United Nations. 1984, pp. 219, 220.

Household budget information should be gathered for the entire year rather than for one individual season. A budget survey reflecting a whole year's data captures important seasonal influences, such as food availability. Unfortunately, conducting surveys for an entire year is generally costly and time consuming. A less intensive approach is to conduct food surveys during the "lean" season when low-income households are more vulnerable to inadequate food intake. Thus, the analyst can examine seasonal food consumption levels during the worst season to determine the impact of food shortages on consumption during the most seriously affected part of the year.

Aside from food balance sheets and household budget surveys, a wealth of information can be obtained from various ministries and institutions concerned with food issues. These might include the Ministries of Agriculture, Commerce and Health, statistical bureaus, hospitals and clinics. Another type of information that is potentially useful are anthropometric measurements of household members, such as age, weight, and height information. This information can be a useful supplement to household budget surveys and provide reasonably accurate indicators of both short-term and long-term energy and nutrient deficits. It is also helpful in judging the extent to which the level of food resources available to households contributes to the nutritional status of the population.

Exhibit 4-7

Colombo - Estimated Household Food Expenditure
(Rupees Per Household Per Month)

Items	Average	EXPENDITURE PER HOUSEHOLD PER MONTH IN RUPEES					
		UP TO 199	200- 399	400- 599	600- 799	800- 999	1000 & OVER
NUMBER OF HOUSEHOLDS	69600	1154	7936	13328	11547	12611	23024
TOTAL EXPENDITURE	1037.84	134.00	318.09	499.51	693.38	894.85	1457.15
TOTAL FOOD EXPENDITURE	567.77	109.54	231.37	343.30	420.61	540.17	693.57
CEREALS	143.42	42.64	73.15	107.01	129.05	158.57	197.15
TAMS	8.35	1.02	2.05	3.74	5.49	7.19	13.84
SUGAR AND SWEETS	34.20	9.49	13.99	16.58	24.31	31.83	66.24
PULSES	7.31	0.00	1.10	2.92	6.43	6.33	14.64
VEGETABLES	35.96	5.52	15.73	22.52	30.43	32.59	57.73
FRUIT	12.13	0.28	1.02	2.29	5.12	8.60	18.25
MEAT	27.39	1.17	3.95	8.41	12.95	19.34	60.20
EGGS	10.07	0.00	0.55	1.63	5.62	6.72	23.25
FISH	40.72	7.11	20.66	36.69	53.32	61.41	97.61
MILK AND DAIRY PRODUCTS	33.66	2.25	8.17	14.93	27.11	29.60	61.65
FATS AND OILS	20.65	3.39	7.73	10.69	16.28	17.99	37.03
OTHER COMMODITIES	139.77	27.27	63.47	91.62	113.53	140.93	215.66
SPICES AND CONDIMENTS	66.11	11.71	33.94	46.97	58.59	72.06	99.73
NON-ALCOHOLIC BEVERAGES	15.89	4.32	6.73	8.42	10.65	13.00	28.56
ALCOHOLIC BEVERAGES	12.57	0.29	0.82	3.50	5.28	12.66	26.87
OTHERS	43.20	10.95	23.93	32.73	39.03	43.21	60.50
MEALS AWAY FROM HOME	32.14	8.70	17.80	24.07	32.97	43.07	38.22
TOBACCO	28.44	3.15	6.76	17.98	26.92	33.13	41.94
CLOTHING	70.54	3.96	8.91	21.89	42.27	45.59	148.55

SOURCE OF DATA: DEP. OF CENSUS AND STATISTICS, REPORT ON THE URBAN FAMILY BUDGET SURVEY 1977. COLOMBO: NOVEMBER 1978.

Source: Food and Agriculture Organization of the United Nations. Review of Food Consumption Surveys, 1981. Rome: Food and Agriculture Organization of the United Nations. 1983, p. 222.

3. FOOD POLICY INTERVENTIONS

Understanding the possible effects of governmental intervention in food policy requires three steps:

- Description of policies,
- Selection of policies, and
- Implementation of policy.

A. Description of Policies

Food Subsidies and Price Controls

Food subsidies involve lowering consumer prices for food below prevailing market prices. The government pays the difference in cost between the market price and the price charged the consumer. Food subsidies are very effective in raising the food intake of low-income households, because they not only lower the cost of food to consumers but also result in a transfer of real income to consumers through the amount of money saved from the reduced food price. As a result, consumers are able to increase their consumption of all products, not just those subsidized.

Despite their effectiveness in raising food consumption, food subsidies can be very costly to maintain, particularly if the subsidy goes to all consumers regardless of need. Targeting subsidies to only the poor, while less costly, is administratively complex. For these reasons, governments often resort to price controls rather than subsidies as a means of holding food prices at low levels. A below-market price is maintained by government regulation rather than subsidized. Needless to say, this is a powerful disincentive for producers and has the potential for creating a black market in the controlled commodity.

Food Ration Schemes

Food ration schemes involve the distribution of fixed quantities of particular food items to consumers. The intention behind food rationing is to provide consumers with an equal share of society's food supply regardless of household income level. Rationing is often used to distribute limited supplies of an important commodity where low-income households would not be able to compete in the market.

Rationing is often implemented in conjunction with food subsidies in order to control subsidy costs. This is achieved by regulating the amount of subsidized food made available to consumers.

Reserve Stocks

Maintaining reserve stocks of grain or other key foods enables a government to stabilize prices and supplies, to provide food from these stocks to low-income households, and to respond to emergencies. Reserve stocks can be maintained in several ways. Grains can be purchased from domestic production when surpluses exist; they can be imported on commercial terms; or they can be obtained through food aid.

Stocks may be costly to build, maintain, and administer, particularly if they are large. In some situations, the level of stocks which can be maintained will be limited by a country's domestic output or limited storage capacity, in which case imports are required to meet shortfalls in supplies. If foreign exchange is scarce, a government might have no other alternative but to rely on foreign aid to meet its needs.

Other Direct and Indirect Approaches

Besides the three main food policies mentioned above, there are other mechanisms that can be used to increase consumption. They include food stamps, food-for-work programs, production subsidies and overvalued exchange rates.

Food stamps are coupons that consumers may exchange for food and sometimes cash. These coupons represent an income subsidy that can be used only to buy food.

Food-for-work programs require a consumer to exchange work for a certain quantity of food.

Supplementary feeding programs are arrangements whereby vulnerable groups such as children and pregnant women are given quantities of food at either special centers or in their homes.

Subsidies for such inputs as fertilizer, water, seed and machinery lower production costs and market prices and thereby indirectly increase food consumption.

When exchange rates are overvalued, imported commodities are made artificially cheap and benefit consumers through lower food costs.

B. Selection of Policies

Selection of the appropriate policy or policies to realize food consumption goals is determined by the problem that must be resolved and available resources. Selection also depends on the costs and benefits of the alternative policies, and the potential impact of the policy on the rest of the food system and the economy as a whole.

There are several ways in which food policies affect the food system and the economy. For example, large-scale price controls act as a disincentive to producers, encouraging them to divert production of the commodity being controlled to a commodity not controlled. This may lead to reduced self-sufficiency in the commodity whose price is being depressed by increased consumption and reduced production.

Another potential impact on the food system is that costs required to maintain these food policies may have a detrimental effect on the growth of agriculture by forcing the government to reduce its spending in other areas that would increase production, such as for input subsidies, research, extension, irrigation development, and price support programs.

As for impact on the overall macro economy, price distortion may result in efficiency losses that reduce real incomes. Also to be considered is the drain on public resources and its effect in lowering government investment in directly productive assets. For example, the decision to subsidize food commodities may discourage production of these and other commodities and increase imports. Consequently, foreign exchange required for food imports increases, leaving less to import other goods, especially those required to promote development.

Once the food policy analyst has considered the costs and benefits of various policies, and has presented the conclusions to the policymaker, the policymaker must decide which mix of policies will best accomplish the goals.

C. Implementation of Policy

There are implementation issues associated with each policy approach that bear on the effectiveness of policy. These include the population that should be reached by the interventions; what commodities should be involved; for what season of the year should interventions be implemented; and the size of adjustments in terms of how much prices should be lowered to encourage consumption,

how much to ration if rationing is being used, or how much grain should be set aside for reserve stocks.

The first three issues are quite important and concern the question of targeting or limiting the scope of interventions. Non-targeted programs distribute benefits among the entire population and are extremely costly to operate. Targeted interventions, on the other hand, limit the number of recipients or the foods that are subsidized. Targeting achieves goals at a lower budget cost and may least affect production disincentives resulting from food interventions.

Food consumption targeting requires substantial knowledge about who needs help and where they are located, what foods low-income households consume, and how low-income households will change their food consumption patterns when prices or incomes change. Ideally, all these questions can be answered from results of the analysis that has been performed; that is from examining price and income elasticities, cross-price elasticities, and examining food balance sheets, and budget surveys.

To succeed, targeted interventions must have mechanisms for restricting eligibility for the program. There are various mechanisms that can be used:

- Means test -- A means test requires setting an income threshold above which individuals or families do not qualify for a program. Means tests can be graduated, with benefits declining as income rises. Their one big disadvantage is that they are expensive to administer and require good recordkeeping and adequate staffing to monitor every participant's income.
- Geographic targeting -- Geographic targeting requires identifying urban and rural areas where the poor reside and locating special distribution centers in these areas; benefits are available to everyone in the area, although this method of targeting can be combined with means testing.
- Temporal targeting -- With temporal targeting food is released into the market at certain times of the year, such as just before a main harvest to dampen seasonal high price increases and to reduce seasonal hunger. This approach is less costly than when the government attempts to maintain uniform prices for the entire year.
- Sex and age targeting -- Food programs can be targeted on selected members of the population, such as small children, pregnant women, and elderly people.

- Commodity targeting -- Commodity targeting involves determining which foods are consumed primarily by the poor and selecting those commodities to serve as a vehicle for a subsidy intended to increase the food intake of low-income households. Knowledge of income and price elasticities for individual products is very important for selecting the commodity to be subsidized. It is preferable to select a commodity that has high income and price elasticities for low-income households but which has low price elasticities for high income households. Exhibit 4-8 illustrates the income elasticity for rice for various income percentiles in Sri Lanka. The government there has successfully subsidized rice to raise the food consumption level of low-income households.

Exhibit 4-8

Income Elasticity of Demand for Rice
in Sri Lanka by Income Percentile, 1969-1970

Income Percentile (percent)	Income Elasticity
10	0.44
20	0.39
30	0.34
40	0.29
50	0.24
60	0.19
70	0.14
80	0.08
90	0.01

Source: IFPRI Report No. 13, Table 18.

4. SELECTED CASE STUDIES

In order to provide an application of the material presented in this chapter, two case studies are presented that have a direct bearing on governmental interventions in food policy areas:

- Sri Lanka's food-rationing program, and
- Egypt's subsidy and rationing program.

A. Sri Lanka's Food Rationing Program*

Sri Lanka is often cited as a country that has successfully implemented a food rationing program to raise the food consumption level of low-income households. (Subsequently, the rationing approach was transformed into one using food stamps.) Although the program has not been able to totally erase the calorie deficit in low-income households, there has been measurable success in increasing calorie intake and evening out consumption at different income levels. This is said to have improved social well-being for the entire population compared to the situation in other Asian countries.

The success of the program is attributed to the rationing of one product, rice, which is of major importance to low-income households, and to targeting of rations to low-income households. Through the years, however, the Sri Lankan government has had to experiment with different pricing and rationing schemes in order to control costs.

The rice ration program has been operating in Sri Lanka since World War II. Exhibit 4-9 shows the changes made to the program since 1960. Major cuts in the program were made in December 1966, October 1973 and April 1974.

The cuts in December 1966 and October 1973 reflect the government's efforts to reduce program costs. October 1973 marked a pivotal year for the program, as income tax payers were restricted from eligibility for free rationed rice. It was the first time in the history of the program that part of the population was excluded from being eligible for the rice ration.

The ration cut in April 1974 was precipitated by other causes that ultimately affected the cost of the program. First, there was a series of bad rice harvests in 1972 and 1973 that reduced the domestic supply. At the same time, world market rice prices rose sharply, increasing the cost of importing rice. This situation was exacerbated by price increases for wheat, sugar and other products on the world market, which also adversely affected Sri Lanka's terms of trade.

*For additional information on the food program in Sri Lanka refer to James D. Gaven and Indrani Sri Chandrasekera. The Impact of Public Foodgrain Distribution on Food Consumption and Welfare in Sri Lanka. Report No. 13. Washington, D.C.: International Food Policy Research Institute. December 1979.

Exhibit 4-9

Changes In the Allotment of Free and Paid
Ration Rice, 1960 to 1975

Date of Change	Rice		Total
	Free	Paid	
- pounds/person/week -			
April 1960	0	4.0	4.0
December 1966	2.0	0	2.0
September 1970	2.0	2.0	4.0
February 1973	1.0	2.0	4.0
October 1973	1.0	2.0	3.0
April 1974	1.0	1.0	2.0
August 1974	1.0	1.0	2.0
December 1974	1.0	1.0	2.0
March 1975	1.0	1.0	2.0
November 1975	1.0	1.0	2.0

Source: IFPRI Report No. 13, Table 9.

The increase in wheat and sugar prices had the added effect of narrowing the profit margin between the imported price and the price which the government charged consumers for wheat and sugar. Revenues from sale of these commodities had been used to finance the rice subsidy. When world prices of wheat and sugar rose sharply and these price increases were not passed on to consumers, revenues available for the rice subsidy declined sharply.

Exhibit 4-10 depicts the gross and net fiscal cost of the food subsidies from 1967 to 1975. Net fiscal costs reflect the subsidy costs of the program, less the profit margin from sales of sugar and flour. Although the net food subsidy as a percent of GNP had been held fairly constant in the early 1970s, its share began to increase rather dramatically in 1974 and 1975. Of particular interest is the impact that reduced sugar and flour profits had on increasing this share.

Exhibit 4-10

Gross and Net Fiscal Food Subsidies, 1967 to 1975

Year	Gross national product	Rice subsidy	Distribution charge	Total rice subsidy	Other food subsidies	Sugar and flour profit	Net food subsidy with distribution charges	Net food subsidy as percent of GNP
				-million Rs-				-percent-
1967	8,264	424.6	34.6	459.2	3.6	260.6	202.2	2.4
1968	9,876	530.2	37.6	567.8	10.9	290.5	298.2	3.0
1969	10,725	545.3	51.8	597.1	14.0	288.5	322.6	3.0
1970	11,562	505.6	48.5	544.1	14.5	313.5	226.5	2.0
1971	11,786	474.8	47.1	521.9	4.2	286.8	239.3	2.0
1972	12,616	468.7	36.7	505.4	21.6	224.8	302.2	2.4
1973	15,168	498.7	41.8	540.5	25.9	201.8	364.6	2.4
1974	19,694	635.6	66.0	701.6	34.6	22.6	713.7	3.6
1975	21,935	718.8	41.5	760.3	11.9	-164.0	936.2	4.3

Sources: IFFRI Report No. 13, Table 19.

Despite the ration cuts, the program continued to benefit poor people, and perhaps the population as a whole. Exhibit 4-11 compares the per-capita daily calorie consumption in Sri Lanka with that of other Asian countries. During the 1966-1971 period, calorie intake was among the highest in Asia. It declined in the 1972-77 period, but was still at a respectable level for a poor country.

Clearly, the ration cuts reduced the calorie intake of all income levels but the rations continued to benefit low-income households, as illustrated by Exhibit 4-12. The paid ration also benefited low- to middle-income households, although it benefitted middle-income households more.

Another effect of the rice ration was to contribute to a relatively even distribution of calorie intake across income levels, despite higher monthly food expenditures by higher income levels. This is illustrated by Exhibits 4-13 and 4-14, which depict calorie intake for various income levels in 1969/1970 and 1973.

Exhibit 4-11

Per-Capita Daily Calorie Intake
in Low-Income Countries in Asia, 1967-71 and 1972-77

Country	Calories	
	1966-71	1972-77
Bangladesh	1,974	1,932
India	1,958	1,964
Pakistan	2,136	2,230
Sri Lanka	2,306	2,071
Indonesia	1,895	2,080
Thailand	2,286	2,232
Philippines	2,062	2,139
Malaysia	2,454	2,559
Average	2,134	2,151

Source: IFPRI Report No. 13, Table 2.

Exhibit 4-12

Per-Capita Monthly Average Ration Rice Consumption
by Household Income Group, 1973

Household income group (rupees)	1969-70	
	Monthly food expenditure (rupees)	Calorie intake
0-99	19.44	1,941
100-149	23.05	2,103
150-199	25.12	2,157
200-399	29.79	2,272
400-599	37.09	2,437
600-799	41.84	2,512
800-999	48.36	2,540
Above 1,000	59.46	2,641
Average	30.34	2,264

Source: IFPRI Report No. 13, Table 4.

Exhibit 4-13

Per-Capita Monthly Food Expenditures
and Calorie Intake by Income Group, 1969-70

Household income group (rupees)	Per capita ration rice consumption (pounds)			Ration as percentage of total rice consumption (percent)	
	Total ration	Free ration	Paid ration	Free ration	Paid ration
0-25	5.94	2.09	3.85	26.1	48.1
26-50	8.48	6.20	2.28	77.5	28.5
51-100	10.23	6.65	3.58	83.1	44.7
101-200	12.28	7.32	4.96	91.5	62.0
201-400	12.26	7.49	4.77	93.6	59.6
401-800	12.01	6.96	5.05	87.0	63.1
801-1,000	9.29	4.77	4.52	59.6	56.5
1,000-1,500	8.11	3.16	4.95	39.5	61.9
More than 1,500	6.06	2.29	3.77	28.6	47.1
Average	11.96	7.14	4.82	89.2	60.2

Source: IFPRI Report No. 13, Table 16.

Exhibit 4-14

Per-Capita Monthly Food Expenditures
and Calorie Intake by Income Group, 1973

Household income group (rupees)	1973	
	Monthly food expenditure (rupees)	Calorie intake
0-25	27.49	1,157
26-50	19.93	1,622
51-100	22.66	1,752
101-200	22.37	1,900
201-400	26.63	1,879
401-800	34.68	2,049
801-1,000	49.30	2,334
1,001-1,500	53.06	2,210
Above 1,500	70.17	2,276
Average	28.65	1,936

Source: IFPRI Report No. 13, Table 5.

Exhibit 4-15

Estimates of Per-Capita Contribution
of Rice Ration to Consumption by Income
Percentile, 1969-1970

Income percentile (percent)	Total calories consumed per day	Ration contribution (calories per day)
10	2,013	115
20	2,065	101
30	2,123	88
40	2,170	74
50	2,227	61
60	2,284	49
70	2,346	38
80	2,409	26
90	2,486	16
Average	2,236	63

Source: IFPRI Report No. 13, Table 18.

In addition, the ration benefitted the low-income households relatively more than it benefitted the high-income households. Exhibit 4-15 shows that the contribution of the rice ration to calorie intake of the low-income households was higher than for high-income households.

A sequel to the ration cuts discussed above is that in 1978 the government again reduced rations as budget costs rose to high levels. This time, the government administered a means test and removed approximately half of the population from eligibility for rice distribution.

B. Egypt's Subsidy and Rationing Program

Egypt is an example of a country using an extensive subsidy and rationing program that is non-targeted and that applies to the majority of the population. Approximately 90 percent of the population is registered in the ration system with only certain categories of landholders, families of emigrant workers and stockholders in joint venture companies being excluded from the program. The food subsidy system is part of a large consumer welfare program that subsidizes energy, transportation, housing and some nonfood consumer items, such as cloth and soap. This has resulted in a large fiscal burden for the government, created distortions in resource allocation and reduced economic growth.

The following is a discussion of the impact of the subsidy and rationing program on the government's budget and economy. The main goal of the program has been to protect consumers from high food prices and major price fluctuations in the market. This goal has been achieved by subsidizing prices for a whole array of food items, including wheat, rice, sugar, oil, beans, lentils, maize, flour, beef and chicken. The most important subsidized food items have been wheat and rice. With the exception of wheat flour, which is available to all consumers without restriction, all the other products have restricted distribution.

Exhibit 4-16 shows the products that are rationed by the government and their subsidized prices from 1971 to 1981. Subsidized prices remained quite stable throughout this period, while the urban and rural consumer price indexes were steadily rising. This illustrates the level of protection given to consumers from rising costs.

* For additional information on the food program in Egypt refer to Harold Alderman, Joachim von Braun, and Sakr Ahmed Sakr. Egypt's Food Subsidy and Rationing System: A Description. Report No. 34. Washington, D.C.: International Food Policy Research Institute. October 1982.

Exhibit 4-16

Development of Rationed Prices, 1971-81
(piasters per kilogram)

Commodity	1971	1972	1973	1974	1975	1976	1977	1978	1979	Nov. 1980	Nov. 1981
Rationed sugar	10	10	10	10	10	10	10	10	10	10	10
Regulated sugar	15	15	15	15	16	25	25	25	25	30	30
Rationed oil	n.a.	n.a.	n.a.	n.a.	10	n.a.	n.a.	10	n.a.	n.a.	10
Regulated oil	n.a.	n.a.	n.a.	n.a.	10	n.a.	n.a.	30	n.a.	n.a.	30
Rationed rice	5.5	5	5	5	5	5	5	5	5	5	5
Regulated rice	n.a.	n.a.	n.a.	n.a.	15	n.a.	n.a.	15	n.a.	n.a.	14
Beans	7	7	7	7	10	10	10	10	10	10	10
Lentils	9	10	10	10	10	10	10	10	10	10	11
Yellow maize	3	3	3	3	3	3	3	6	6	6	6
Flour (refined)	5.5	5.5	7.5	7.5	7.2	7.2	7.2	7.2	7.2	9/12 ^a	9/12 ^a
Frozen beef	—	—	—	68	68	68	68	68	68	68	68
Frozen chicken	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	68	n.a.	n.a.	105
Urban consumer price index											
All items	113.6	116.3	122.4	135.7	148.9	171.2	191.1	122.6	133.5	178.9	311.5
Food	117.0	120.8	130.8	152.9	171.5	209.2	231.3	254.7	277.3	344.8	401.3
Rural consumer price index											
All items	117.9	117.6	131.2	149.6	167.9	195.9	220.7	238.4	265.8	325.8	273.7
Food	120.2	119.1	138.3	162.2	185.4	221.0	253.1	275.2	305.2	380.4	438.9

Note: n.a. denotes "not available."

a. Nine piasters per kilogram reflects price for loose flour; and 12 piasters per kilogram reflects price for packed flour.

Source: IFPRI Report No. 34, Table 5.

Giving consumers such a high level of subsidy has created a tremendous fiscal burden. Exhibit 4-17 shows the cost of the food subsidies, as well as their share of total public expenditures and gross domestic product. The food subsidy costs have risen quite steadily since the early 1970s from LE 3 million to LE 380 million in 1979. The sharp increase in food subsidies from 1973 through 1975 was due to a major rise in the prices of imports, and the increase in the 1977-1979 period was due to devaluation of the Egyptian pound.

Exhibit 4-17

Food Subsidies As a Share of Government Outlays
and GDP, 1970/77 - 1980/81

Year	Food subsidies (LE million)	Total public expenditures (LE million)	Share of total public expenditures (percent)	Gross domestic product	Share of total domestic product
1970/71	3	1,190	0.2	3,203	0.1
1972	11	1,428	0.4	3,390	0.3
1973	89	1,628	5.5	3,808	2.3
1974	329	2,223	16.5	4,339	7.6
1975	491	3,670	16.9	5,218	9.4
1976	322	3,957	9.8	6,727	4.8
1977	313	4,512	10.9	8,293	5.3
1978	450	5,930	11.9	9,671	6.6
1979	880	6,831	16.2	12,409	8.1

Source: IFPRI Report No. J4, Tables 1 and 3.

The program has also resulted in reduced production of rice and wheat, because of low prices received by farmers. Reduced production has made Egypt even more reliant on imports of wheat and has reduced rice exports, traditionally a major export commodity. On occasion, rice has even had to be imported. Reduced rice exports represent lost foreign exchange earnings. Exhibits 4-18 and 4-19 show the effect that the subsidies on wheat and rice have had on production of these products and the resulting impact on imports and exports.

Exhibit 4-18

Wheat and Flour Production, Imports and Consumption, 1970-80

Year	Wheat			Imported flour	
	Production	Imports	Consumption	Imports	Consumption
	-1,000 metric tons-				
1970/71	1,516	2,207	3,338	260	581
1971/72	1,729	1,992	3,566	569	553
1972 ^a	1,616	2,082	3,739	432	541
1973	1,837	2,534	4,060	459	546
1974	1,804	2,739	4,300	600	557
1975	2,033	2,939	4,473	702	646
1976	1,960	2,822	4,743	639	679
1977	1,697	3,392	5,069	764	811
1978	1,933	3,974	5,425	1,145	967
1979	1,856	3,382	5,519	1,097	1,079
1980	1,796	4,351	5,829	899	1,142

a. The fiscal year did not coincide with the calendar year before 1972.
Source: IFPRI Report No. 34, Table 22.

Despite the high cost of the food subsidy program, it has not had much impact on increasing per-capita food consumption. Only the urban sector has benefited with per-capita food consumption declining in the rural sector (see Exhibit 4-20).

Exhibit 4-19

Production, Consumption and Exports of Rice, 1970 - 1980

Year	Paddy Production	Rice	
		Consumption	Exports
1970-71	2,604	1,006	646
1971-72	2,524	1,111	539
1972 ^a	2,505	1,208	493
1973	2,507	1,330	306
1974	2,272	1,334	172
1975	2,239	1,336	100
1976	2,418	1,340	228
1977	2,352	1,352	200
1978	2,272	1,319	154
1979	2,350	1,342	175
1980	2,511	1,452	100

a. The fiscal year did not coincide with the calendar year before 1972.

Source: IFPRI Report No. 34, Table 23.

Exhibit 4-20

Per-Capita Food Consumption in Urban and Rural Areas
1958/59, 1964/65, and 1974/75

Food	Rural areas			Urban areas		
	1958/59	1964/65	1974/75	1958/59	1964/65	1974/75
	---kilograms per capita---					
Wheat	69.7	69.9	59.5	13.1	12.3	7.7
Maize	75.9	66.8	45.2	12.5	13.5	5.8
Sorghum	34.6	30.4	11.4	5.3	4.1	1.8
Rice	23.8	24.6	21.1	19.5	21.2	25.0
Wheat flour	16.1	22.5	40.7	33.4	8.0	25.4
Bread	6.0	14.6	18.8	96.7	115.8	117.9
Noodles	0.8	2.0	2.7	4.5	5.6	6.7
Beans	5.3	6.9	4.5	4.0	4.6	4.3
Lentils	1.2	4.5	3.1	3.3	4.2	4.1
Meat and poultry	9.7	9.5	9.1	13.5	12.6	10.0
Fish	2.8	3.7	4.5	5.9	7.3	6.0
Eggs	0.9	1.4	1.4	1.7	1.4	1.6
Vegetable oils, fats	2.7	5.0	7.8	6.6	8.7	8.1
Butter, butter oil	2.3	2.6	3.1	3.2	2.2	2.1
Milk	24.6	8.7	8.8	18.3	17.5	18.7
Cheese	0.8	8.8	7.5	4.2	5.0	4.9
Potatoes	6.6	10.4	8.7	9.9	13.4	11.1
Onions	8.4	7.6	8.0	9.1	7.9	8.9
Tomatoes	10.2	11.3	14.0	17.1	18.9	24.0
Citrus	3.6	5.0	7.1	9.7	10.3	12.0
Dates	5.0	4.8	2.3	4.1	4.2	2.1
Sugar	10.0	11.6	13.4	11.4	12.2	13.0
Syrup	2.2	2.9	--	1.4	1.8	--
Honey	0.5	0.2	0.2	1.3	0.4	0.4
Sesame	--	0.7	0.5	--	1.3	1.2
Calories per capita per day	2,729	2,898	2,590	2,252	2,327	2,423

Source: IFPRI Report No. 34, Table 12.

Per-capita food consumption measured in terms of calories increased by about 8 percent from 1958/59 to 1974/75 in urban areas, while rural households experienced a 5 percent decline. Except for rice and bread, there was little increase in consumption of other food items by urban consumers, and consumption actually declined for quite a few food items. The only notable increase in consumption by rural people was in wheat flour. Consumption of other food items increased very little and in several cases decreased. Most of rural household consumption is met from domestic production.

Realizing that the program was having little impact in raising the food consumption level of the population and in an effort to reduce budget costs and to correct distortions to production, Egypt has tried to reduce eligibility for subsidized rations. But this has been a difficult political task since consumers have been accustomed to the subsidies. In early 1977, the government tried to increase prices of bread, flour, sugar and rice, however, price increases were quickly cancelled when riots broke out.

The government again tried in 1980 to reduce subsidies by restricting eligibility for the ration program, but the number of eligible people was reduced by only 3.7 percent. The government also attempted to raise bread, flour and sugar prices. In response, bakers went on strike, because the price increases reduced their profit margins. There was also widespread consumer unrest. Again, most of the price increases were cancelled.

CHAPTER V

AGRICULTURAL TRADE

This chapter deals with the major ways governments intervene in the trade of their countries in terms of both commodities and farm inputs, whether the primary objective is to influence trade or to achieve some other purpose. It has five sections:

- Overview of the trade subsector,
- Trade interventions,
- Components of policy analysis,
- Analysis of trade interventions, and
- Selected case studies.

1. OVERVIEW OF THE TRADE SUBSECTOR

Governments have a variety of goals that they hope to achieve through trade intervention:

- Protect domestic producers against competition of imports;
- Earn or save foreign exchange in order to influence balance of payments;
- Raise government revenues;
- Provide inexpensive food and fiber to the nation's consumers or inputs to farmers;
- Increase income and employment; or
- Ensure adequate nutrition for all social groups.

While the Ministry of Agriculture may have a clear set of priorities regarding agriculture, these may be in conflict with those pursued under trade policies.

The combined effects of several policies used within a government may be far different than any one policy considered in isolation. For example, an intervention implemented by the Ministry of Agriculture to subsidize imported fertilizer may be undermined by a devaluation instituted by the Ministry of Finance.

The Ministry of Agriculture is attempting to provide imported inputs at a reduced price to farmers to increase fertilizer use and agricultural production. The Ministry of Finance is discouraging imports of all kinds and increasing the domestic price of imports through devaluation.

2. TRADE INTERVENTIONS

The discussion on governmental trade interventions in this section is divided into two parts:

- Relevant policies, and
- Implementing trade interventions.

A. Relevant Policies

Policies a government may adopt to intervene in a nation's foreign trade can be divided into three major categories:

- Import interventions,
- Export interventions, and
- Foreign exchange adjustments.

Import Interventions

There are two basic import interventions, through price and quantity. One of the more critical aspects of import interventions is to recognize the different types that can be used, the ways in which they are administered and the degree to which they will affect either import prices or quantities.

Intervening through Price. A government can change the price of imported goods through several different types of trade interventions:

- Ad Valorem or Specific Duties -- Duties act as a tax to raise the price of imported goods within a country. An ad valorem duty is a fixed percentage tax on import value. A specific duty is expressed in terms of an absolute amount of money per unit.
- Variable Levies -- Importing countries that desire to maintain a fixed domestic price above world market levels for a certain commodity can impose a variable levy. It is a fluctuating amount of duty added to the landed cost of a commodity to bring the total unit cost up to the desired domestic level. This intervention shelters domestic prices from fluctuations in world prices.

- Advance Deposits on Imports -- In order to increase revenue, governments may require domestic traders to pay a deposit before getting permission to import some commodities. The deposits are usually assessed on an ad valorem basis, with the percentages varying among commodities.
- Import Subsidies -- Governments may subsidize imports to keep domestic prices below the landed price.

Intervening Through Quantity. Governments can restrict the volume of goods and services imported. This type of intervention often results in increased domestic prices:

- Import Quotas -- Quotas are commonly used to place limits on the amount that can be imported. They are implemented by either issuing licenses to authorized importers for specified quantities or by government doing the importing itself. The most extreme form of a quota is a total ban on imports of a particular commodity.
- Import Licenses -- Licenses to authorize imports are often issued even in the absence of quotas. They can be used to control the flow of imports.
- Technical and Health Regulations -- Technical and health regulations may also be used to control imports.

Exhibit 5-1 illustrates the variety of restrictions imposed on wheat imports by Colombia between 1976 and 1984.

Export Interventions

Export interventions are also through price or quantity.

Intervening Through Price. The most prevalent export interventions are those which directly affect the domestic price of exported commodities:

- Export Subsidies -- General export subsidies, which usually cover all exports, are used to achieve macroeconomic objectives such as improving balance of payments. They include tax exemptions for exporters, low interest loans to finance exports, tax rebates, import entitlements and favorable foreign exchange rates. Specific subsidies, applied only to selected products are often used to provide economic assistance to exporting industries. They tend to take the same form as general subsidies. Subsidies of this type maintain or increase the domestic price of the exported goods above world market levels.
- Export Taxes -- Export taxes can be either on an ad valorem or specific basis, and are used either to raise revenues or depress domestic prices below world market levels.

Exhibit 5-1

Import Restrictions Used by Colombia for Wheat

Year	Importer	Import Levy	Import License Required
1975	The Government of Colombia (GOC) subsidized wheat imports. Institute de Mercado Agricola (IDEMA) controlled wheat imports and prices and realized a profit from sales.	.5% ad valorem	
1976	Through unilateral resale of imported wheat at higher prices IDEMA controlled imports as well as prices. Made a profit from wheat to finance other operations.	30% ad valorem	
1977	IDEMA authorized imports.	30% ad valorem	Prior license with deposit.
1978	IDEMA imported hard red winter wheat and paid no duty. Other importers paid duties.	15% ad valorem + 5% for export promotion + 1.5% for coffee fund	
1979	Soft wheat imported by private industry who paid duty.	15% ad valorem + 5% for export promotion + 1.5% for coffee fund	
1980	IDEMA sole importer of HRW wheat. Imported wheat sold at IDEMA port outlets and established consumption quotas to millers. During local harvest, millers had to buy from growers.		

Exhibit 5-1 (Continued)

Import Restrictions Used by Colombia for Wheat

Year	Importer	Import Levy	Import Licence Required
1981	Millers authorized to import, but IDEMA still controlled private mill imports and collected a surcharge equal to 12.5% of c.i.f. value of imports. IDEMA also imported for itself.		Prior license
1982	IDEMA and millers both imported.	12.0% ad valorem c.i.f.	Prior license
1983	Wheat imported by private millers but IDEMA handled import licenses on their behalf.	14.0% ad valorem c.i.f. import duty.	Prior license
1984	Wheat imported by private millers but IDEMA handled all import licenses.	20% ad valorem c.i.f. import duty & 2.1% f.o.b. value.	6 month import quota

The IDEMA is a semi-official national agency with broad responsibility for the pricing and marketing of agricultural products.

Source: Bollings, H.C. Colombia: An Export Market Profile. Washington, D.C.: U.S. Department of Agriculture, Economic Research Service, 1985.

Intervening Through Quantity. Several interventions directly affect the quantity of a commodity exported:

- Export Quotas -- An export quota is the most commonly used method for limiting the volume of exports. Quotas are usually imposed to increase supplies of the commodity available for domestic consumption and depress domestic prices below world levels.
- Market Development and Promotion -- Export promotion of certain commodities or products often includes market information, trade fairs and advertising activities.

Foreign Exchange Adjustments

Foreign currency is obtained from exports and foreign loans and investments. These earnings are used to pay for imports, service the foreign debt and invest in foreign countries. The market exchange rate is the price of a country's currency in terms of another currency.

Most developing countries, through their central banks, fix exchange rates rather than let them be determined by international currency markets. Some forbid open trading in their currencies. Rates are not, however, fixed forever. Most governments make periodic adjustments to accommodate significant changes in their trade and foreign exchange balances, and major differences between the free market and fixed currency rates cannot be sustained for an extended period of time.

Adjustments in the exchange rate have two results that are especially important to a food and fiber sector that is trade-oriented. A devaluation of the currency tends to make (1) imports more costly and (2) exports cheaper for foreign buyers. Both of these effects tend to increase domestic food prices. At the same time, however, the balance of payments is improved and the foreign debt is eased. These same forces also tend to favor the export of labor-intensive products, since the price of imported capital increases. Agriculture benefits relative to industry, and employment increases.

B. Implementing Trade Interventions

Implementation of trade interventions involves many different governmental institutions, each with its own set of priorities. In the case of agricultural products or inputs, participants include:

- The Ministry of Agriculture, whose main priority is protecting the interests of domestic producers, and possibly consumers;
- The Ministry of Finance, whose primary concern is with the balance of payments;
- The Central Bank, which monitors currency flows into and out of the country;
- Customs officials, who monitor the implementation of the intervention; and
- Agricultural parastatals which have responsibility for controlling flows of specific commodities.

Although cooperation among all of these participants is necessary to successfully implement trade interventions, the effectiveness of direct interventions rests primarily with customs officials, who monitor the physical flows of goods and services into and out of the country. Many countries do not have sufficient resources to monitor successfully all potential points of national entry and exit, and "leakage" can be a serious problem. For example, Senegal's tariff on wheat and sorghum for the purpose of raising government revenues and keeping producer prices of local grains high may easily be undermined by bringing grain across the long and largely unguarded borders with Mali and Mauritania.

3. COMPONENTS OF POLICY ANALYSIS

Understanding the components of policy analysis in terms of agricultural trade calls for three discussions:

- Fundamental relationships for a country's imports and exports,
- Commodities and inputs commonly affected by trade interventions, and
- Marketing systems.

A. Fundamental Relationships for a Country's Imports and Exports

Trade interventions drive a wedge between the world and the domestic prices of commodities. Regardless of the direction of the price change, signals are sent to producers, consumers, importers and exporters, which influence their behavior.

Developing countries generally have too small a share of world markets to be able to set world prices for specific commodities. Therefore, in the absence of government intervention in trade or domestic markets, the domestic price for a commodity is generally the same as the world price (the c.i.f. price for imports or the f.o.b. price for exports), adjusted by the prevailing exchange rate. Domestic consumers decide how much to consume, and domestic producers determine their production levels on the basis of this price. If domestic production at the world price is less than the amount demanded by domestic consumers, the difference is made up through imports. If domestic production at the world price is more than the amount demanded by domestic consumers, the difference is used up through exports. These relationships are illustrated in Exhibits 5-2 and 5-3.

The fundamental relationship for imported goods and services is expressed in the supply-utilization identity for imports:

$$\text{Quantity Imported} = \text{Domestic use} + \text{Exports} \pm \text{Change in stock} \\ - \text{Domestic production}$$

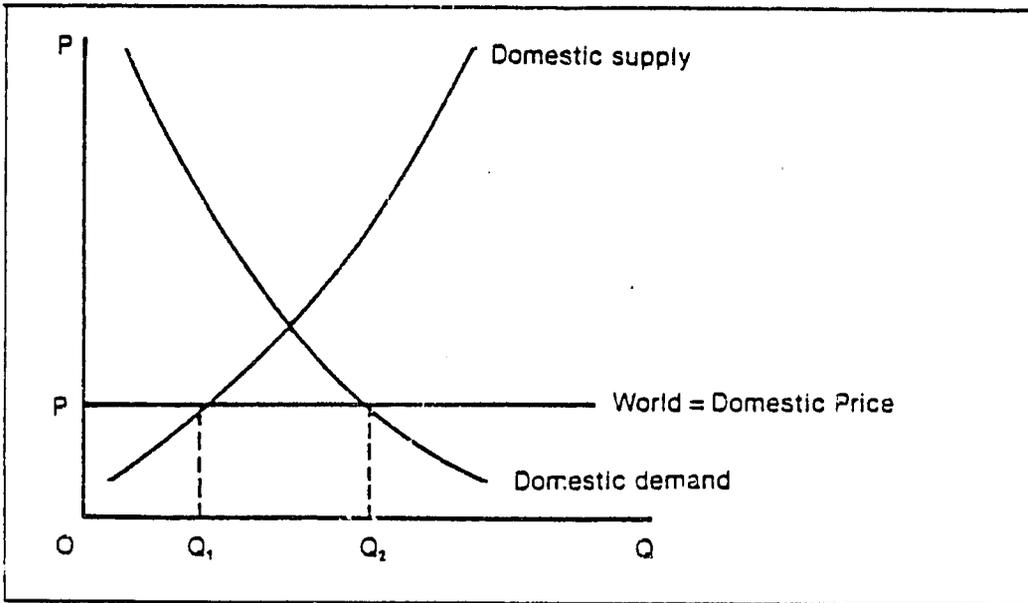
Exhibit 5-4 illustrates the effects of a specific tariff on imported rice. The domestic price of rice becomes the world price plus the amount of the tariff. Consumers respond to the higher price by buying less rice. On the other hand, producers grow more rice in response to a higher price. Since consumers use less rice and producers supply more than before the tariff, less rice will be imported. The government benefits by collecting the revenue from the tariff.

The effects of a tariff can be broken down into several components. If there were no tariff, rice would be imported freely at the world price of P_1 . At this price, domestic consumers would buy a total of OQ_2 , consisting of OQ_1 from domestic producers and Q_1Q_2 from importers.

A tariff raises the price of rice from P_1 to P_2 . Consumers, who now must pay more for their rice, decrease their consumption from OQ_2 to OQ_4 and due to the higher price experience a welfare loss of $A+B+C+D$. Producers, who now receive the higher price of P_2 for their output, increase production from Q_1 to Q_3 . Area A is a direct transfer of income from consumers to producers. The government gains revenues from the tariff, equal to tariff times the volume of imports or Area C. There is also a national economic loss from imposing a tariff. Area B is the welfare loss from shifting from imports to more expensive home production. Area D shows the loss to consumers that corresponds to the forced cut in total consumption of rice.

Exhibit 5-2

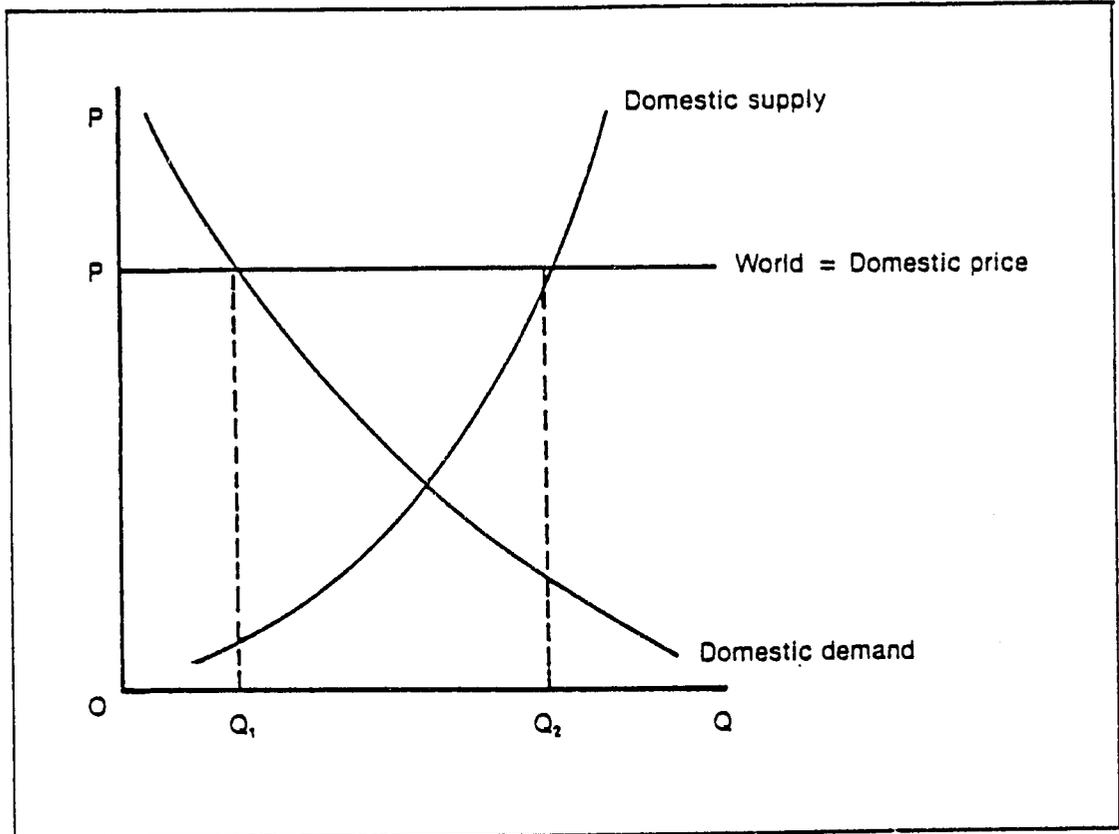
Imports: World Price Less Than Consumer Demand



- OQ_1 = domestic production
- OQ_2 = domestic consumption
- Q_1Q_2 = imports

Exhibit 5-3

Exports: World Price Greater Than Consumer Demand



Where:

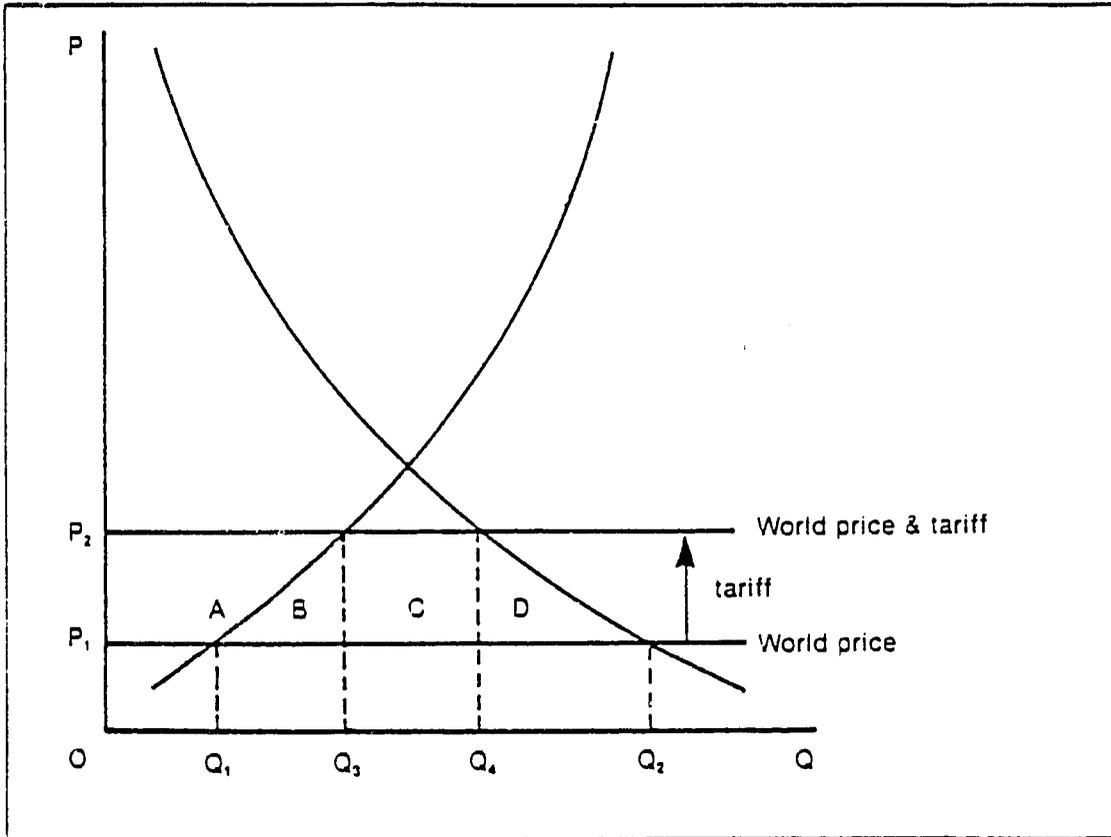
OQ_1 = domestic consumption

OQ_2 = domestic production

Q_1Q_2 = exports

Exhibit 5-4

A Tariff on Rice



In order to measure the exact magnitude of the responses in this example and in other cases of trade intervention, it is necessary to know the supply and demand elasticities for the commodities involved.

A further response to a change in the prices of commodities may be the substitution of one commodity for another in both consumption and production. For example, if the price of rice increases, consumers may eat less rice and more of another grain such as sorghum. Similarly, producers may produce more rice and less of another crop. To measure the exact magnitude of these responses to price changes, it is necessary to know the cross-price elasticity of demand and supply for substitutable commodities.

B. Commodities and Inputs Commonly Affected by Trade Interventions

Exported Commodities

Agricultural exports loom large in the total exports of developing countries. Often, one export crop may account for more than 50 percent of all exports. This gives that crop particular significance in the country's economy. Because it is a major source of foreign exchange earnings and government revenues, such a crop is often the target of trade interventions.

Interventions must be applied judiciously, since they sometimes can produce results that are the opposite of what was intended. An example of this is the tax on exported cocoa in Ghana. At one point, Ghanaian cocoa producers received only 11 percent of the world price of cocoa. The remaining 89 percent was absorbed by the government and the parastatal that buys cocoa from producers. Given the low price they received for their output, Ghanaian cocoa producers provided minimum maintenance to existing cocoa trees and had little incentive to plant new trees. The tax on cocoa transformed Ghana from once being the major exporter of cocoa to a minor supplier, and seriously eroded the government's revenue base.

When planning trade interventions for exports, it is important to remember that producer responses may be small in the short-run but very substantial over time. With annual crops, producers will make decisions at the start of the cropping season. Therefore, interventions can affect output within a year or two.

For tree crops, the only flexibility producers have in the short run is in crop maintenance, such as annual applications of fertilizers or varying the level of effort in harvesting the crop; however, over a number of years major changes in production can occur as tree numbers are either increased or decreased. It may take 5-10 years for a supply response to be fully realized. Therefore, long-term stability is an important consideration when designing policy interventions for these commodities.

Imported Commodities

The two most important categories of commodities affected by import interventions are food grains and agricultural inputs.

Food Grains. Imported food grains are often in direct competition with domestic production while also an assured supply to urban consumers, especially the poor. Therefore, trade intervention that is not well planned may have the effect of either causing a shortage in domestic supply or a loss of incentive to domestic producers.

The most common trade interventions imposed on imported food grains are import subsidies, import tariffs or import quotas, depending on a country's policy goals. Sometimes two or more of these policies are pursued at the same time. For example, a government may impose a 25 percent tariff on imported rice in order to increase production incentives. At the same time, large quantities of imported wheat and sorghum are sold at a 50 percent subsidy. Many domestic consumers shift from eating rice to eating subsidized wheat and sorghum, thereby reducing the demand for rice. It is often important to simultaneously look at trade policies for all commodities that are significantly substitutable.

Agricultural inputs. Policy interventions for agricultural inputs have a direct impact on domestic agricultural production through their effects on input prices and availabilities (see Chapter 4). Import subsidies will lower the domestic price of inputs, increase use, and lead to larger agricultural production. Import quotas or tariffs will increase input prices and reduce agricultural output.

In reality, importers of inputs often face a combination of interventions, and sorting out their separate and combined effects can be complicated. In one developing country, for example, an importer of tractors must go through several procedures. First, there is a quota on imports, so he must apply for a license.

This request is registered on a published quota list. After that, all applications are considered and quota allocations are made. This process takes a month. Once the quota license is received, the importer must make an advanced deposit with an authorized bank equal to 50 percent of the import value. Upon certification that the deposit has been received, the importer applies to the Central Bank for permission to buy the needed foreign exchange. Since tractors are considered a necessity, foreign exchange can be obtained at a reduced rate. After receiving authorization to buy foreign exchange, the importer places his order for the tractors. When they finally arrive in customs, the importer must show all the authorizations, licenses and proof of payment before taking delivery. At this point, the importer has been subjected to four distinct interventions: a quota, an advanced deposit, foreign exchange restrictions, and preferential exchange rates. The whole process has taken over six months.

Some of the interventions in the foregoing case are offsetting. While the quota and advance deposit tend to limit the quantity of imported tractors and increase the price to users, the preferential exchange rate tends to offset these effects and serve as a subsidy.

Two sets of costs are implicit in the case of the tractor importer. On the one hand, there are the government's costs of administering and enforcing the import programs. Often these costs are offset by income from duties, license fees, or stamps on legal documents. On the other hand, there are the direct costs to the importer of tractors. These include not only the cost associated with the advance deposit but also the costs of inconvenience and time spent in navigating through the bureaucratic maze, which can be substantial.

C. Marketing Systems

In developing countries, there are three primary mechanisms by which traded commodities are transferred between producers and consumers: private firms operating in open markets, parastatals and private firms operating in black markets. Some countries have a combination of all three. When analyzing the effects of a trade intervention, it is important to identify the marketing mechanism most frequently used for the targeted commodities.

Open Markets

In a system in which private firms operate in both import and export markets, they serve as the linkage between producers and foreign markets in the case of exports and consumers and foreign markets in the case of imports. In a competitive environment, it is in the interest of private traders to keep their costs as low as possible in order to ensure that they will be able to stay in business. Since the costs incurred by traders are ultimately passed to the consumers, this system is also in the best interest of the latter.

Trade interventions directly affect the operations of private firms and those they serve:

- Tariffs and duties raise operating costs and these are passed on to the consumer.
- Licenses, used with quotas or as a separate intervention, limit the number of firms allowed to import or export a particular commodity and may permit license holders to make monopolistic profits.
- Prior deposits for imports require large advance payments and increase the cost of doing business. They also discriminate in favor of firms who have large capital reserves.
- Restrictions on foreign exchange, like licensing, limit entry into the market and may confer monopoly power to those who get the foreign exchange.

Private traders often play an important role in the export and import markets of a country. Depending on the intervention chosen, their operations may be hampered or even eliminated.

Parastatals

In many countries, the operations of the private market for some commodities are taken over by government-funded parastatals. This is particularly true in the case of basic foods and commodities of strategic importance to the economy, such as leading export crops. Parastatals are formed for a variety of reasons:

- Stabilization of commodity prices. Parastatals can insulate domestic markets from dramatic fluctuations in world prices. In the case of export crops, domestic prices are usually, but not always stabilized below world market levels.

- Protection from monopolistic practices of private traders. In cases where one or a few traders would control the marketing of key commodities, parastatals may be used to protect consumers and producers against monopoly profits. In some instances, excessive operating costs of parastatals can exceed potential monopoly profits of private firms.
- Perform marketing operations. Parastatals sometimes have been established to perform marketing operations in cases where no significant private sector activity existed.

Parastatals often directly implement trade policies, since the prices they pay or charge and the quantities handled are directly under their control. For example, when the world price of rice increases sharply, a parastatal responsible for rice imports can isolate the domestic market from the price increase and keep consumer prices from changing. The government pays the difference between the domestic and world prices.

The impacts of controlling prices and flows of commodities are often the same as would be realized by imposing other forms of trade intervention. For example, when a parastatal imports and distributes food grains at a subsidized price, the effect on consumers is the same as if a subsidy was paid to private importers. In the case of exports, when a parastatal sets the price of cotton below the world price, the impact on the producer is the same as it would be in the case of an equivalent export tax.

One difference between using trade interventions that affect private marketing decisions and establishing parastatals that arbitrarily set prices is the excessive operating costs of the latter. Parastatals have no competition and no incentive to keep operating costs low. In addition, some governments force them to employ too many people in pursuit of employment objectives or for political patronage reasons, further increasing operating costs. Since parastatals are often huge bureaucracies with endemic inefficiencies, it is often argued that the private sector could more efficiently perform the same services operating under appropriate government policies.

Black Markets

Interventions can lead to black markets which, in turn, can undermine trade interventions.

One example of a policy intervention thwarted by black market operations is the case of a wheat tariff imposed by an Asian country. The tariff on wheat increased the domestic price by 25 percent. Neighboring countries sold wheat at the world price along the lengthy, unguarded borders. Citizens of the neighboring countries were able to profit handsomely by selling large supplies of wheat in the country with higher wheat prices without paying the tariff.

Another typical case is where a country sets artificially low domestic prices, but domestic production and imports are insufficient to make these prices generally effective. While some portion of supplies are sold at official prices, the remainder may sell at very high black market prices.

4. ANALYSIS OF TRADE INTERVENTIONS

This discussion of analyzing trade interventions has two parts:

- Preliminary analyses, and
- Analyzing the direct and indirect effects.

A. Preliminary Analyses

General Procedure

A first step is to describe the existing trade environment. The following indicators provide useful information about specific goods:

- Existing trade interventions,
- Value and volume of trade and its relationship to total trade,
- Methods of marketing, and
- Principal producers and consumers.

A simple measure of protection is the nominal protection coefficient (NPC), discussed in Chapter 2. The NPC will help the analyst determine whether or not there is currently intervention in the trade of specific goods. If intervention is indicated, the analyst should identify those mechanisms causing it.

An Example

In a West African country, for example, the government and outside donors have expressed concern over the lack of producer price incentive for rice. The domestic production of rice has not increased, despite an increase in rice production infrastructure over the past five years.

The analyst is asked to examine the country's trade situation in rice and possible trade interventions that may help to increase the price of rice. The following preliminary analysis is conducted:

Step 1. Data requirement.

- The Border Price: The price of rice that would prevail in the absence of government intervention, adjusted for quality and location.
- The Domestic Price: The price of rice at which it actually sells, adjusted for quality and location.

Step 2. Calculation of the NPC.

$$\text{NPC} = \frac{P_d - P_f}{P_f} \times 100$$

Where: P_d = domestic price
 P_f = border price

For example if the domestic wholesale price of rice is CFA 125 per kilo and the border price, adjusted for quality and transportation is CFA 167 per kilo, the NPC would be:

$$\text{NPC} = \frac{\text{CFA } 125 - \text{CFA } 167}{\text{CFA } 167} \times 100 = -25$$

Step 3. Interpretation

- If the NPC is positive, the domestic price is higher than the border price. This means that the commodity is protected. Producers receive a higher price than they would in the world market; consumers pay more than the world price.
- If the NPC is zero, the domestic price is equal to the border price. This means there is not intervention in the market for the particular commodity.

- If the NPC is negative, the domestic price is lower than the border price. This means that producers of the commodity are, in essence, "taxed," and consumers are subsidized, since they pay less than the world price.

In our example, the NPC is negative. Producers of rice receive a price 25 percent lower than they would if free market conditions prevailed. Consumers, on the other hand, benefit from low prices. Rice is imported in sufficient quantities and subsidized to keep domestic prices below world market levels.

Based on this information, the analyst may consider proposing the following alternative interventions as possible solutions to the problem:

- Eliminate the subsidy on imports, thereby increasing the domestic price to world levels,
- Impose a quota on rice imports to limit the quantity of rice which can be imported, or
- Increase the existing subsidies on inputs used for rice production to offset the rice price subsidy.

B. Analyzing the Direct and Indirect Effects

Data requirement

As shown above, trade policy interventions generally either drive a "wedge" between domestic prices and world prices or, in some cases, eliminate existing interventions. The price change due to the policy action causes a chain reaction throughout the economy that affects producers, consumers, traders and the government. Analysis of interventions measures these impacts. Some of the information required includes:

- Current trade volumes. How many tons or units of the commodity are currently imported or exported?
- Current consumption. How many tons or units of the commodity are consumed?
- Current production. How many tons or units are produced?
- "Before" intervention price. What are the domestic and world prices of the commodity?
- Measure of the intervention. What is the quantifiable value of the intervention? For example, with an import quota, how many units or tons of the commodity will be imported? With a tariff, what is the size of the tariff?

- Price elasticities of demand and supply. What are the producer and consumer response to changes in prices or quantities?

Having accumulated the relevant data, the analyst next must determine the economic responses that will result from the policy trade action. Certain expected directions of responses can be predicted for each major type of trade intervention. These are summarized in Exhibit 5-5.

Analytical Example

Suppose, for example, that a West African country is considering eliminating a subsidy on imported rice.

The analyst collects data on prices, consumption, production and imports of rice. The responsiveness of producers to either an increase in price or a decrease in the supply of rice is considered to be high. At the present time, only 50 percent of the irrigated land suitable for rice cultivation is planted with rice. Some of this land lies idle; other parts of it are planted with other crops. Higher prices would readily encourage farmers to grow more rice on this land. There is underemployed labor in the rice-producing areas that could be used for rice cultivation. Furthermore, many of the farmers now cultivating rice do not use fertilizers and improved varieties of seeds but would with a higher rice price.

The responsiveness of consumers to a higher price of rice is assumed to be relatively low. Rice consumers are primarily high-income, urban residents for whom consumption is insensitive to price. Lower income urban residents and rural population primarily rely on sorghum and wheat, which are priced below rice.

The basic information available is as follows:

- Domestic consumption = 145,000 tons of rice
- Domestic production = 25,000 tons of rice
- Imports with the subsidy = 120,000 tons of rice
- Average domestic price with the subsidy = CFA 125,000 per ton of rice
- Average world (cif) price = CFA 167,000 per ton of rice.
- The price elasticity of rice supply is 1.0.
- The price elasticity of rice demand is -0.3.

Exhibit 5-5

Illustrative Effects of Trade Policy Interventions

Intervention	Main effects on major participants
Import tariffs and duties	Domestic output increases Domestic consumption decreases Imports decrease Income transfer to producers Government revenue increases
Import subsidy	Domestic consumption increases Domestic production decreases Imports increase Welfare transfer to consumers Government expenditures increase
Import Quota	Price of good increases Domestic consumption decreases Imports decrease to amount of quota Income transfer to producers
Export Tax	Domestic production decreases Domestic consumption increases Exports decrease Welfare transfer to consumers Government revenues increase
Export Subsidy	Domestic production increases Domestic consumption decreases Exports increase Income transfer to producers Government expenditures increase
Exchange rate depreciation	Agricultural output increases Imports decrease Exports stimulated Resource shift to traded goods

- The current subsidy results in the domestic price being 25 percent below the world price.

Eliminating the subsidy has the following effects:

- The domestic price increases by 33 percent, from CFA 125,000 to CFA 167,000 per ton.
- Consumption is reduced by 9.9 percent or by 14,355 tons.
 - Percent Change in Consumption = Percent Change in Price X Price Elasticity of Demand
= (+33) (-0.3)
= -9.9 percent
 - Change in Consumption = $(-.099)(145,000) = 14,355$ tons
- Production is increased by 33 percent or 8,250 tons.
 - Percent Change in Production = Percent Change in Price X Price Elasticity of Supply
= (+33) (1.0) = 33 percent
 - Change in Production = $(.33) (25,000) = 8,250$ tons.
- Imports decline from 120,000 tons to 97,395, or by 19 percent.
- Total producer returns increase from CFA 3,125 million to CFA 5,553 million.
- Consumer expenditures on rice increase from CFA 18,125 million to CFA 21,818 million.
- By eliminating the subsidy, the government saves CFA 5,040 million by not paying the subsidy.

In this example, income is shifted from consumers to producers and the government by eliminating the subsidy. Given that rice consumers in this country are primarily high income urban people, the policy of eliminating the subsidy on imported rice transfers income from high-income people to both the government and domestic rice producers who may be on average substantially poorer than rice consumers.

5. SELECTED CASE STUDIES

In order to provide an application of the material presented in this chapter, two case studies are presented that have a direct bearing on governmental interventions in the trade subsector:

- Trade and exchange rate policies: The case of Colombia, and
- Trade policies: The case of the Philippines.

A. Trade and Exchange Rate Policies: The Case of Colombia

Colombia is a country that changed its trade and exchange rate policies from ones that inhibited economic growth in the agricultural sector to ones that promoted its agricultural growth in terms of both domestic production and exports.

Until 1967, Colombia pursued policies that resulted in fixed exchange rates and protection of domestic manufacturing industries, and a policy of import substitution. The fixed exchange rate policy led to an increasingly overvalued currency that discouraged agricultural exports and made imports of food grains relatively cheap. The import substitution policy generated a complex system of tariffs, quotas, import licenses and foreign exchange controls. These interventions amounted to a substantial tax on agricultural exports and on the agricultural sector in general, dampening growth in the sector as well as in the entire economy.

Things came to a head in 1967, when Colombia faced a balance of payments crisis. In response to this crisis, Colombia adopted export-oriented foreign exchange and trade policies consisting of:

- Frequent adjustments in exchange rates that greatly reduced the overvaluation of its currency;
- Rationalization of tariffs and import quotas to make them more uniform and less onerous;
- A reduction in the degree of protection given domestic industries to levels that continued to provide some protection to existing industries but not high enough to encourage further investments in new ventures that were noncompetitive in world trade; and
- The introduction of a system of subsidies to promote export production.

The results of the new policies were very favorable to economic growth, particularly in the agricultural sector. Colombian agriculture grew at an average annual rate of 4 percent from 1967 to 1982, accounting for about one-fifth of total economic growth.

Well over one-half of the growth in the agricultural sector since 1967 was accounted for by increased exports, which in the early 1980s accounted for about 70 percent of all exports. Colombia's agricultural exports also became more diversified, away from coffee to include tobacco, cotton, sugar, bananas and flowers (see Exhibit 5-6). This diversification made Colombia less dependent on the boom-bust cyclical nature of coffee and helped stabilize the country's balance of payments position.

Exhibit 5-6

Value of Agricultural Exports

Commodity	1953	1967	1976	1982
-----Millions of U.S. dollars-----				
Coffee ^a	492.3	322.4	967.7	1,561.5
Bananas	11.5	25.0	40.5	131.1
Tobacco	2.6	4.4	25.5	21.7
Cotton	0.0	15.4	59.4	66.5
Sugar	0.0	11.3	24.1	54.7
Flowers	0.0	0.0	21.6	111.5
All major commodities	605.6	509.9	1,745.2	2,055.6

a. The data for coffee must be interpreted with caution because of the cyclical nature of coffee prices and revenues

Since agriculture and export-oriented industries that benefitted from the policy changes are more labor intensive than previously favored industries, employment also grew rapidly after 1967. The combination of rapid economic growth and improved employment further contributed to an expansion in the agricultural sector by increasing demand for food and fiber.

B. Trade Policies: The Case of the Philippines*

Since 1970, the trade policies pursued by the government of the Philippines have changed from ones in which agriculture prices are determined primarily by the world market to ones in which prices are controlled by the government through trade intervention. This shift in policies has created a price incentive structure that favors nonagricultural sectors at the expense of agriculture.

Prior to 1970, the government rarely intervened in agricultural trade except indirectly through foreign exchange regulations and an overvalued currency. Producers of primary export crops such as sugar and copra received border price equivalents for their outputs and were able to increase production at an annual rate of approximately 4 percent during the decade of the 1960s.

In the early 1970s, largely in response to acute balance of payment difficulties, a complex series of trade interventions were adopted. These included taxes and quotas on primary export crops in an attempt to move away from volatile world markets for raw materials and into the more stable markets for processed goods, tariffs on imported inputs to favor locally produced goods, and internal price controls to provide more stability for domestic producers. To achieve the latter goal, national marketing agencies and parastatals were given monopoly power in the purchase, resale and trade of different crops including cereals, sugar, and copra. These many policies were not well coordinated and they were often in conflict with each other.

The new interventions favored import substitution over exports and tended to encourage a resource flow from agriculture to manufacturing. Domestic prices for major export crops -- copra, sugar and forest products -- were reduced below levels that had prevailed during the previous policy regime. Producers received only 77 percent of the world price of sugar. The subsidized consumer price of sugar was only 69 percent of the world price. Similarly, copra producers face an implicit export tax equivalent to 22 percent of the world price. As in the case of

* This discussion draws heavily on Christina David's An Analysis of Agricultural Policies in the Philippines, University of the Philippines, February 1982; and Malcolm D. Bale's Agricultural Trade and Food Policy: Experience of Developing Countries, World Bank, September 1984.

sugar, revenues from this tax supported a direct subsidy on domestic consumption of coconut oil products. Forest products, which counted for 30 percent of total export receipts in the late 1960s were subject to export taxes of at least 10 percent of the world price for logs and 4 percent for processed wood products such as plywood and lumber. Furthermore, a partial export quota on logs was imposed in 1975.

Although agricultural output continued to grow during the past 15 years despite reduced price incentives, the growth was less than it could have been, resulting in lower farm incomes. Furthermore, the level of domestic consumption of traditional export crops was somewhat higher than it would have been with no interventions. Exports and foreign exchange earnings have been consistently lower than they would have been otherwise.

One way of measuring the effects of government intervention through pricing mechanisms is by comparing border prices with domestic prices for traded goods using the net protection coefficient (NPC). Exhibit 5-7 compares NPCs from 1955 to 1969 with NPCs for 1970 through 1980. It shows the degree to which domestic prices were undervalued during the 1970s. In contrast, during the same period the manufacturing sector as a whole had an NPC of 44 percent. Furthermore, implicit tariffs for agricultural inputs such as fertilizers, machinery, and feed mixes ranged from 24 to 26 percent in an attempt to protect domestic producers of these inputs. High prices for inputs acted as a further disincentive for domestic producers. Thus, trade interventions undervalued agricultural production through lower producer prices for most commodities and through higher input prices.

Exhibit 5-7

Nominal Protection Coefficients in Philippine Agriculture,
1955-1980

(Percent)

	1955-1969	1970-1980	
	Nominal protection coefficient	Net effective rate of protection ^{b/}	Nominal protection coefficient
Food crops			
Rice	4	-19	-7
Corn	2	--	1
Other crops	0	--	0
Export crops			
Sugar	60 ^{a/}	-36	-23
Copra	-8	-47	-22
Other exports	0	--	-4
Forestry	0	-32	-27

^{a/} Due to U.S. sugar quota policy which favored Filipino sugar and provided an export price much higher than world prices from 1955-1969.

^{b/} The net effective rate of protection accounts for undervalued or overvalued intermediate inputs and overvaluation of the official exchange rate.

Sources: Malcolm D. Bale, Agricultural Trade and Food Policy: Experience of Developing Countries, World Bank, September 1984. Christina C. David, An Analysis of Agricultural Policies in the Philippines, prepared for AID, February 1982.

ANNEX 1

The following paper presents the results of a recent analysis of Liberian rice policies. The work was done under the Agricultural Policy Analysis Project as a joint effort by agricultural economists at Oklahoma State University and Liberian analysts. The results of this analysis were discussed with policymakers in Liberia.

COST BENEFITS AND INCOME REDISTRIBUTION FROM LIBERIAN RICE POLICIES

by

Luther Tweeten and Boima Rogers*

This paper estimates the contribution of rice policies to the level and distribution of income among producers, consumers, and the public sector. The results show that rice market policies transferred income from consumers to producers and to the public sector. Losses to consumers more than offset gains to producers and the public sector, however. Thus, rice market interventions reduced total income in Liberia.

This paper also suggests agricultural policy alternatives that would accomplish objectives of income redistribution and rice price stabilization while adding to income of Liberia. These alternatives can help in formulating an overall Liberian agricultural policy.

Redistribution and Social Costs

The redistribution of income among sectors and the net social cost of Liberian rice policy in 1982, 1983 and 1984 is shown in Annex Exhibit 1. Net social cost is the value of goods and services sacrificed by inefficient use of resources. Compared to a well-functioning market, rice policies in 1983 increased farmers' income by \$1,023,410 and commercial rice importers' income by \$1,618,910. Loss to consumers was \$5,195,180. Net loss to the private sector was

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Annex Exhibit I

Gains and Losses to Private Sector, Public Sector and Society
from Liberian Rice Market Interventions in 1982, 1983 and 1984

Item	1982	1983	1984
		\$1,000	
<u>Private Sector</u>			
+ Gain to producers	595.35	1,023.41	186.69
+ Gain to commercial importers	629.25	618.91	545.67
- Loss to consumers	4,481.94	5,195.18	7,658.67
= Net loss to private sector	3,257.34	3,552.87	6,922.30
 <u>Public Sector</u>			
+ Policy transfer from consumers to GOL	3,711.45	4,388.45	6,724.73
- Policy transfer to producers	882.00	1,516.16	203.13
- Excess cost of country marketing	291.04	389.27	374.71
- Value lost from country waste	529.20	1,044.29	361.62
- Spoilage and waste, Monrovia	629.25	586.65	604.50
= Net gain to public sector	1,379.96	852.09	5,180.77
 <u>Society</u>			
Net cost of public intervention to society	1,877.38	2,700.78	1,741.54
(Excess of private cost over public gain)			

\$3,552,870 because consumers sacrificed more than producers and commercial importers gained.

Gains in rice producers cost the Government of Liberia (GOL) \$1,516,160 in 1983. In addition, costs of marketing, waste and spoilage in excess of those expected in a well-functioning market totaled \$2,020,510 to the Government. Ignoring the value to the GOL of PL 480 counterpart funds, the government gained \$4,388,450 from consumers through prices held above world price levels in 1983. Public sector gains from consumers more than offset public sector losses. Hence, the GOL gained an estimated \$852,090 from rice market intervention policies in 1983 (Annex Exhibit 1).

Overall public sector gains fell short of private sector losses. The sum of private and public sector gains and losses was negative. The net social cost of rice market policies was \$2,700,780 in lost value of goods and services (national income) that could have been forthcoming in the absence of the Government rice market policy. National income loss was less in 1984 than in 1982 and 1983 mainly because country rice support activity was curtailed in 1984.

One objective of Liberian rice policy was to transfer income to producers. A "pure" income transfer would shift income to producers from consumers or others at no resource cost or lost output. In fact, scarce resources are used in transferring income. Transfer of income away from Liberian rice consumers was relatively efficient; less than 10 cents of real income was lost from consumption per dollar transferred (see row 17C, Annex Exhibit 2). This high transfer efficiency compares favorably with other well-managed income transfer programs in world perspective.

On the other hand, the efficiency of transferring income to Liberian producers was very low. National income was reduced over \$1.80 in 1982, 1983 and 1984 to add \$1.00 to producers' income. The high real cost of the transfer came from three principal sources:

- 1) Foregone output of tree crops and other high value products because producers were encouraged by price supports to use their limited resource to produce rice.
- 2) Spoilage of country paddy rice stocks accumulated by price supports but not processed because of limited milling capacity.

Annex Exhibit 2

Gains and Losses from Government Policies, Liberian Rice Economy

Producers (Farm Level) P					
Item	Notation	Units	1982	1983	1984
(1) Domestic production sold to LPMC	q'_p	1,000 mt paddy	10.00	17.19	9.25
(2) Guaranteed producer price	p_g	\$/mt (18c/lb.)	396.90	396.90	396.90
(3) Effective producer price	p_p	\$/mt	264.60	264.60	198.36
(4) Producer receipts (1)x(3)	$q'_p p_p$	\$1,000	1,646.00	4,548.47	1,834.83
(5) Normal market price, farm level	p_f	\$/mt (8c/lb.)	176.40	176.40	176.40
(6) Producer subsidy (3)-(5)	$p_p - p_f$	\$/mt	-88.20	88.20	21.90
(7) Policy transfer to producers (1)x(6)	$q'_p (p_p - p_f)$	\$1,000	882.00	1,516.16	203.11
(8) Proportional subsidy (6/5)x100	$(p_p - p_f) / p_f$	Percent	50.00	50.00	12.42
(9) Direct price elasticity of market surplus		Percent	1.30	1.30	1.30
(10) Quantity generated by production subsidy (1)x(8)x(9)/100	$q'_p - q_p$	1,000 mt	6.50	11.17	1.50
(11) Production value loss .5(6)x(10)	$.5(p_p - p_f)(q'_p - q_p)$	\$1,000	286.65	492.75	16.44

Annex Exhibit 2 (continued)

Gains and Losses from Government Policies, Liberian Rice Economy

(12) Gain to producers (addition to producers surplus) (7)-(11)	\$1,000	595.35	1,023.41	186.
(13) Production value loss per unit of gain to producers (11)/(12)	\$	.48	.48	
(14) LPMC quantity sold from local production	1,000 mc	4.00	5.35	5.
(15) LPMC marketing cost of local production sold	\$/mc	205.06	205.06	205.
(16) Normal marketing cost for competitive sector	\$/mc	132.30	132.30	132.
(17) Excess resource cost of marketing (15-16)x(14)	\$1,000	291.04	389.27	374.
(18) LPMC purchases less sales (1)-(14)	1,000 mc	6.00	11.84	4.1
(19) Value lost from waste .5(5)x(18) (assume half loss)	\$1,000	529.20	1,044.29	361.6
(20) Sum of social costs (11)+(17)+(19)	\$1,000	1,106.89	1,926.31	752.7
(21) Social cost per unit gain to producers (20)/(12)	\$	1.86	1.88	4.0

Annex Exhibit 2 (continued)

Gains and Losses from Government Policies, Liberian Rice Economy

Item	Consumption (Wholesale Level) C				
	Notation	Units	1982	1983	1984
(1) Total quantity marketed and consumed	q'_c	1,000 mc	95.40	102.40	102.40
(2) Support price, wholesale	p_c	\$/mc	465.00	440.00	474.00
(3) Consumption cost (1)x(2)	$q'_c p_c$	\$1,000	44,361.00	45,056.00	48,537.60
(4) Computed cif world wholesale price	p	\$/mc	419.50	391.10	403.00
(5) Consumption tax (2)-(4)	$p_c - p$	\$/mc	45.50	48.90	71.00
(6) Policy tax on consumers (1)x(5)	$q'_c (p_c - p)$	\$1,000	4,340.70	5,007.36	7,270.40
(7) Proportional tax (5/4)x100	$(p_c - p)/p$	Percent	10.85	12.50	17.62
(8) Commercial imports	q'_{cc}	1,000 mc	50.00	55.00	55.00
(9) Prescribed import margin .03(4)		\$/mc	12.59	11.73	12.09
(10) Planned commercial tax revenue (5-9)x(8)		\$1,000	1,645.75	2,044.18	3,240.65
(11) LPMC a) PL 480		1,000 mc	43.00	45.00	46.40
b) In-country purchases		1,000 mc	2.40	2.94	2.68
c) Total	q_{cg}	1,000 mc	45.40	47.94	49.08
(12) Policy tax transfer to GOL (5)x(11c)+(10)		\$1,000	3,711.45	4,388.45	6,724.73

Annex Exhibit 2 (continued)

Gains and Losses from Government Policies, Liberian Rice Economy

(13) Direct price elasticity of demand	Percent	-0.60	-0.60	-0.60
(14) Consumption lost by tax (1x7x13)/-100	$q_c - q'_c$ 1,000 mt	6.21	7.68	10.8
(15) Consumption value loss .5x(5)x(14)	$.5(p_c - p)(q_c - q'_c)$ \$1,000	141.24	187.82	384.2
(16) Loss to consumers (6)+(15)	\$1,000	4,481.94	5,195.18	7,654.6
(17) Consumption value lost per unit of tax (15)/(12)	\$	.04	.04	.04
(18) Spoilage and waste above normal	1,000 mt	1.50	1.50	1.50
(19) Cost of spoilage (4)x(18)	\$1,000	629.25	586.65	604.0
(20) Gain to commercial importers (6)-(12)	\$1,000	629.25	618.19	543.0

Annex Exhibit 2 (continued)

Gains and Losses from Government Policies, Liberian Rice EconomySociety Gains and Losses from Market Intervention^a

<u>Private Sector</u>	Source	Units	1982	1983	1984
Gain to producers	(12P)	\$1,000	595.35	1,023.41	186.69
Loss to consumers	(16C)	\$1,000	4,481.94	5,195.18	7,654.67
Gain to commercial importers	(20C)	\$1,000	629.25	618.91	545.67
etc		\$1,000	-3,257.34	-3,552.87	-6,922.30
<u>Public Sector</u>					
Policy transfer to producers	(7P)	\$1,000	882.00	1,516.16	203.13
Excess cost of country marketing	(17P)	\$1,000	291.04	389.27	374.71
Value lost from country waste	(19P)	\$1,000	529.20	1,044.29	361.62
Policy transfer from consumers to GOL	(12C)	\$1,000	3,711.45	4,388.45	6,724.73
poilage and waste	(19C)	\$1,000	629.25	586.65	604.50
etc		\$1,000	1,379.96	852.09	5,160.77
<u>Net cost of public intervention to society</u> (Loss to private sector less gain to public sector)					
		\$1,000	1,877.38	2,700.78	1,741.54

Omitted from analysis:

- (a) Net costs and benefits of PL 480 imports -- could be established as separate account.
 (b) The subsistence rice production-consumption sector.

- 3) Administrative and other personnel and transportation costs incurred by LPMC in excess of those required by the private market to process the same volume of rice.

Intrinsic benefits of income redistribution and of price stability are not accounted for in Annex Exhibit 1. That is, even if total real output of Liberia were unchanged, income transfers from high income to low income people and greater income stability may make people of Liberia better off on the whole. These benefits must be balanced against the costs shown. At issue is whether rice policies could be changed to reduce social costs and achieve income redistribution and stability objectives at lower cost.

Policy Changes to Increase Efficiency

We first examine policies to benefit local rice producers, then examine policies regarding imports of rice for urban consumption.

In-Country Supports

Several policy changes discussed below could substantially reduce the social cost of rice policies. One alternative to reduce the real cost of the country rice policy would be to terminate Liberian Produce Marketing Corporation (LPMC) country rice supports and allow the private market to transport, mill and market country rice. There appear to be sufficient numbers of private buyers to create market competition, restrain market costs, and promote efficiency. However, the market would function more efficiently if the government would provide timely estimates of market prices and ensure that scales of buyers are properly calibrated. Country rice prices could be supported indirectly if deemed desirable by a variable levy on foreign imports. LPMC might continue its milling activities for a fee and might hold buffer stocks to stabilize rice prices and supplies. It would buy and sell at market prices to roll over stocks so as to maintain stocks at desired levels. LPMC would use a first-in-first-out (FIFO) rather than a last-in-first-out (LIFO) inventory policy to minimize spoilage.

This market oriented overall policy would free substantial government resources to upgrade research and extension resources encouraging efficient tree crop production and marketing. The additional tree crop production would in time raise producers' incomes to more than offset any loss of income from rice.

A second general alternative is to retain country rice price supports but with modifications to reduce Government rice to a level that will allow supports

to be sustained without interruption. Addition to milling capacity at country collection points will allow LPMC to market more milled rice from in-country purchases. Milling capacity currently being installed will remove the need to store paddy for long periods with attendant spoilage.

Some producers use LPMC as a storage and milling agent by selling to LPMC at harvest and then buying back clean rice as needed during the year. The attractiveness of this option is apparent. Assuming a milling conversion rate of 55 percent for a producer, 12 cents per pound paddy rice received on average by farmers selling to LPMC is equivalent to 22 cents per pound clean rice.

By buying back clean rice as needed from LPMC stocks during the year for 24 cents per pound (2 cents over the selling price), the producers save costs of storage facilities, interest, spoilage and milling. Meanwhile, costs of transportation, storage, spoilage and milling to LPMC were at least 12 cents per pound in 1982. Producers would perform these functions at much lower cost because they have lower labor and transportation costs. Hence, net social costs would be reduced and real national income increased by reducing incentives for producers to sell to and buy back from LPMC. Lack of ability to control borders means that some LPMC procurement costs accrue as benefits to rice producers in neighboring countries. The high cost of the operation to LPMC has caused funds to support prices to run short periodically so that purchases are intermittently terminated. This adds instability to rice markets.

If producer price supports are maintained, several changes could make them more workable.

- 1) One option to reduce LPMC costs would be to lower the in-country support price by several cents per pound at the three LPMC buying stations. The lower support price could have less unfavorable impact on producers if producers are allowed to sell directly to LPMC.
- 2) Seasonally adjust support prices. If producers can store rice more cheaply than can LPMC, they should be encouraged to do so by LPMC, providing lower support prices at harvest and raising support prices according to storage costs as the season progresses beyond harvest.
- 3) Adjust support prices for quality. If the same support price is paid on all purchases by LPMC, producers have strong incentives to deliver lower quality rice to LPMC and sell commercially their higher quality rice.

- 4) Pay no premium for transportation. Transportation allowances attempting to provide the same local support price for all locations encourage production and marketing by producers so distant from markets that large transportation costs are incurred. If local prices are allowed to differ by transport costs, more rice will be produced nearer markets so that resource costs to produce and market rice will be as low as possible. Furthermore, there is evidence that transportation allowances are misused. Buyers provided transportation allowances for purchase of rice from distant points instead purchase nearer LPMC stations and pocket the allowance. It follows that the termination of transportation allowances would not necessarily reduce producers' incomes by the amount of the allowance -- much of the loss would be absorbed by lower profits to middlemen who obtain supplies from producers for delivery to LPMC.

Economic analysis suggests that local rice has the characteristics of a "non-traded good" for Liberia. The cost of clean rice imported at Monrovia plus transportation costs to rural locations is approximately 25 cents per pound. Locally produced rice is available at a much lower cost, hence it does not pay to import rice into producing areas except in some localities from bordering countries. The opportunity cost (foregone earnings from tree crops) of producing and marketing locally produced rice in major urban areas of Liberia is well above the cost of importing rice, hence it does not pay to produce rice in Liberia for coastal urban markets. Thus, the most efficient, low cost policy for Liberia is to continue to import rice for urban consumption.

Based on studies of comparative advantage in production, it is more profitable and efficient to produce tree crops for export rather than to produce rice for commercial urban markets. But for food security and other valid reasons, Liberian farmers will continue to produce rice for subsistence home consumption. Rice will continue to be produced in large quantities in Liberia, and the GOL should continue strong policies of research and extension to improve rice production and marketing through agricultural extension and research. Rice storage and a rice security reserve fund financed from levies on commercial imports can be used to ensure stable rice supplies and prices. But as indicated earlier, government costs of market interventions to support producer prices are now very large relative to benefits received. A lower rice support price and reduction of marketing cost and taxes on tree crop exports could substantially increase incomes to producers. Because tree crops damage the soil less and provide more income per acre (including fallow) than cultivated crops, greater

emphasis on tree crops is also consistent with an environmentally sound and sustainable agriculture.

Greater reliance on the private sector to market locally produced rice, coupled with a smaller marketing role for the public sector, can reduce marketing cost and save scarce Government resources for much needed investments will have less spillover to benefit bordering countries than does the current local rice support policy.

Import Policies

Private commercial importers have profited from current government rice import policies as noted in the calculations in Annex Exhibit 1. Commercial imports at prices below Government support levels for sale in competition with LPMC frequently erode LPMC sales from PL 480 imports and build LPMC stocks to levels causing spoilage.

Several options need to be considered to control commercial rice imports.

- 1) Tighter import licensing regulations to restrict commercial imports at levels that do not erode LPMC sales. Such licenses could be auctioned to the highest bidder.
- 2) Strict enforcement of procedures to collect variable levies on imported rice. A \$1 per hundredweight duty seems to be currently enforced but the variable levy is not. A study of how the European Economic community and how other developing countries have successfully collected the variable levy would be instructive. Lessons learned could be implemented in Liberia. One option would be to charge commercial importers a variable levy not based on commercial import invoices, as is done currently, but on the basis of the lowest quoted price at U.S. or Thailand ports adjusted to Liberian grade imports and accounting for shipping and handling costs.
- 3) Another option would be to turn over all importing to commercial firms. LPMC would only be responsible for holding and managing rice storage stocks, which would be released if rice prices rise to prescribed levels. A levy might be imposed on all imports to support prices to producers and earn foreign exchange. The levy could be variable, rising when world prices fall and falling when world prices rise to maintain a more stable price to Liberian consumers. The work market would provide the major buffer stock, but local stocks might be held by LPMC to provide additional security. The GOL would need to work out arrangements for private firms to import and market PL 480 supplies. Proceeds above negotiated marketing costs would be turned over to the Government.

- 4) Another option would be for LPMC to import all rice. Sale by LPMC of imported stocks to commercial distributors would in essence collect the variable levy. This option would strain LPMC managerial capacity, potentially creating problems of mismanagement.

Enforcing a variable levy on rice imports would help to keep Liberian rice prices relatively stable, provide modest price incentives to producers and transfer some income from higher income consumers to lower income producers. The currently high value of the dollars institutes an import subsidy which can justify an offsetting import tax to achieve an appropriate balance between imports and domestic production. The support price must not be held substantially above world prices, however, or high costs will be imposed on Liberian consumers. Also, rice prices held well above world price levels would require a costly targeted food assistance program for the needy if the well-being of low income consumers is of concern.

Approximately half the marketed rice consumption in 1983 was from PL 480 imports, which provided counterpart funds used to support essential and productive Government services such as agricultural research and extension. Because rice imports from neighboring countries cannot be controlled at the border, a high support price would invite sufficient commercial imports to undermine PL 480 rice marketing and cut off an important and low cost source of funding for public services to agriculture. PL 480 imports may be jeopardized if stocks are allowed to spoil or if sales are used to finance country rice supports.

In summary, the variable levy should be designed to:

- 1) stabilize domestic rice prices,
- 2) provide an insurance stabilization fund (to be set aside for imports if world rice supplies are short and import prices rise),
- 3) provide modest economic incentives for domestic producers, and
- 4) transfer some income from higher urban consumers to lower income producers.

If inflation drives world prices above locally established market prices for extended periods, it would be unwise for the GOL to persistently subsidize rice consumption. Transitory world rice increases due to temporarily short world supplies of rice need not be passed to Liberia consumers because one goal of price policy is to assure adequate supplies at reasonably stable prices. But a more

permanent price increase due to inflation or other sources should be passed to consumers because the GOL cannot afford the large Treasury drain of permanently subsidizing consumers. Under such circumstances, an appropriate policy may be to raise the Government-established wholesale rice price, say, 1 cent per pound per month, until domestic prices are raised to the level of world rice prices. This policy would avoid sharp price changes disliked by consumers, and would avoid depleting either LPMC rice stocks or the Treasury. Rice prices set too low to consumers or too high to producers may actually contribute to instability because they cannot be sustained by the Government's limited revenues. When revenues are stretched too far, sharp policy changes must occur which are unsettling to producers and consumers alike.

Conclusions

Liberian agricultural and food policies are under stress. Troublesome issues include high social costs (inefficiency) from policies to increase rice output and raise farm income. A second major problem is the disarray in rice import policies. A number of options were presented to improve these policies.

The goal of self-sufficiency in rice production shows a commendable commitment of the GOL to serve the needs of farmers and consumers. However, self-sufficiency is unattainable with current policies and Government resources in the foreseeable future. The goal of self-sufficiency should not deter the Government from immediate attention to a policy that increases producers' efficiency and income, reduces Government treasury outlays and maintains food security.

The highest form of food self-sufficiency is food security. This issue is discussed in another paper by Trapp and Rogers; only a few points are mentioned here. Liberia will increase food security by helping producers to increase income by shifting to crops offering highest returns and in other ways using resources most efficiently. This can best be accomplished by modifying policies to permit tree crops to be marketed as efficiently as possible without export taxes. A modest variable levy on rice imports could be maintained to encourage local production and to provide an insurance fund for purchasing rice in an emergency from accumulated variable levies. Some buffer rice stocks could be maintained by LPMC for food security.

Current country rice price support policies reduce national income. Instead, Liberia's very limited funds to improve agriculture could be used where

investment benefits exceed costs and thereby add to national income. Producers will continue to produce rice for local needs. But several high payoff activities can produce benefits in excess of costs, can target benefits to Liberians and avoid spillout to neighboring countries. Potential productive investments to improve agriculture include:

- 1) General and vocational schooling of youth in agriculture.
- 2) Research to develop or adapt from other countries improved farming practices and inputs such as seed varieties. Efforts need to be directed not only at rice but also at tree crops, fruits, vegetables and livestock.
- 3) Modest subsidies to speed early adoption of improved farm inputs such as higher yielding seed varieties. (The Smallholder Rice Seed Development Project is an example.)
- 4) Roads and bridges.
- 5) Sanitary water systems, health and family clinics.
- 6) Local credit unions or clubs mobilizing savings and encouraging investment in high payoff activities in rural communities.
- 7) Extension activities, including upgrading of capabilities and transportation for extension personnel. Extension personnel can assist farmers not only in improving efficiency of rice production but also in expanding output of tree crops such as coffee, cocoa, palm oil and rubber which have higher payoffs for commercial markets.

Technical Appendix to Annex 1

Annex Exhibits 2 and 3 show estimated gains and losses from Government market interventions in the Liberian rice economy in 1982, 1983 and 1984. Analysis is at the product level (P) expressed in paddy rice and at the consumer level (C) in milled clean rice. Although much effort went into obtaining data, some of the estimates are not highly reliable.

First consider impacts on producers as estimated in the first panel (P) in Annex Exhibit 2 and the lower panel of Annex Exhibit 3. The official support price at the country receiving stations was 17 cents per pound paddy but at the farm level was approximately 12 cents per pound p_p . The effective support price was lower in 1984 because the official support price could not be sustained for lack of funds. In the absence of supports, farm price was estimated to be $p_f = 8$ cents per pound, hence the effective proportional subsidy was 50 percent in 1982 and 1983 as shown in row (8P). The support price generated a market surplus quantity $q'_p - q_p$. The subsidy of $(p_p - p_f)(q'_p - q_p)$ to producers was partially offset by additional production costs as shown in row (11P).

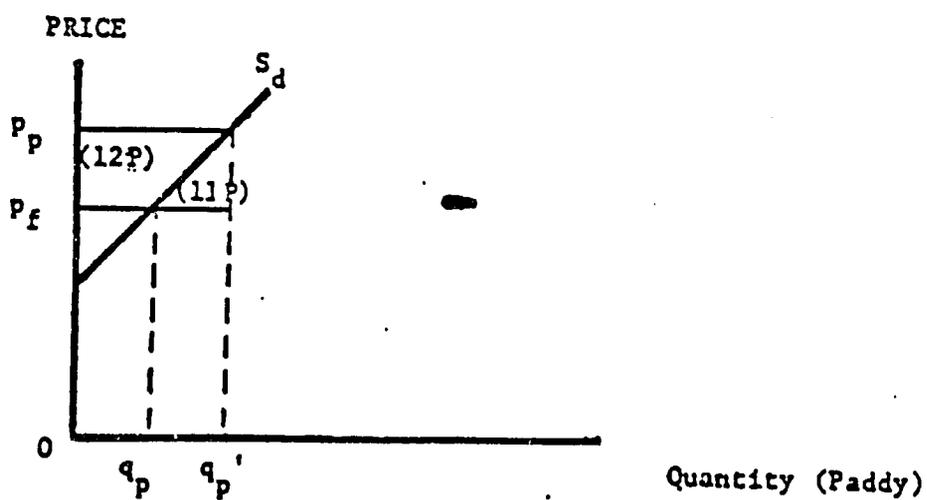
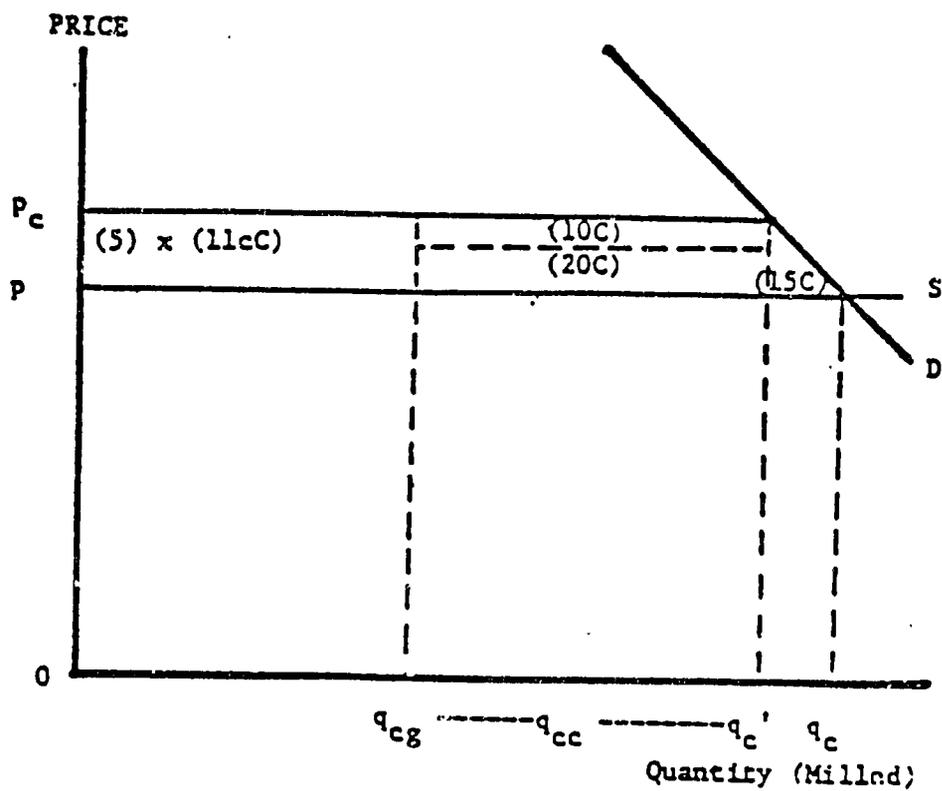
Only the market surplus is assumed to be affected by rice price support in the above calculations. Approximately the same additional quantity is produced in row (10P) if it is assumed that total rice supply elasticity is .1 and all Liberian rice production, even in remote areas for subsistence use, is effectively raised in price by 25 percent.

Mainly because of limited milling capacity, the Liberian Produce Marketing Corporation (LPMC) was only able to market a portion of paddy acquisition as noted in row (14P). An estimated half of the unmarketed quantity was lost as waste at a value shown in row (19P). In addition, marketing costs were estimated to exceed competitive marketing costs. The excess resource cost for marketing is shown in row (17P). The sum of the lost value from three sources (production value lost, excess marketing cost, and spoilage) is shown in row (20P). The loss of well over \$1 in goods and services to transfer \$1 of income to producers as shown in row (21P) indicates very low efficiency in transferring income to producers.

Effects of Government rice policy on market consumers (C) are shown in the second panel in Annex Exhibit 2 and the upper panel of Annex Exhibit 3. The Liberian price p_c was supported above the cif world price level p as shown in row

Annex Exhibit 3

Graphic Illustration of Liberian Rice Policy Intervention



(5C), reducing consumption from q_c to q'_c as shown in Annex Exhibit 3. Of this consumption, $q_{cc}=q'_{cg}$ was imported commercially and q_{cg} was from LPMC in-country and PL 480 acquisitions as shown in row (11C) of Annex Exhibit 2. The loss to consumers from the consumption tax was (16C). The Government received part of the tax directly and (10C) of the tax indirectly from a duty on commercial imports. Commercial imports gained (20C) of the tax as economic rent, hence consumers lost (15C) not gained by Government or commercial imports. In addition, social costs roughly estimated in (19C) were incurred due to above normal spoilage of LPMC stocks.

The distribution of gains and losses from market interventions is summarized in the final panel of Annex Exhibit 2. Gains to producers and commercial importers were offset by losses to consumers so that the private sector incurred a net loss of over \$3 million each year. The public sector gained because transfers from consumers more than offset losses from price supports to producers, excessive marketing costs, and spoilage and waste. The net loss to society was over \$2 million in 1983 because losses to the private sector exceeded gains to the public sector. The social cost must be balanced against unaccounted for benefits of rice policies such as stability of rice prices, public employment and political support. Net costs and benefits of PL 480 counterpart funds are not included in the calculations.

ANNEX 2

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This useful volume reviews the literature surrounding use of time-lagged (Nerlovian) models to measure short- and long-run production responses to price (price elasticities) and presents a concise summary of country-by-country and crop-by-crop results available from research completed as of the late 1970s. Still useful, although individual country data is increasingly dated. (An updated review of econometric estimates of supply and demand elasticities is available from APAP: Shida Henneberry, *A Review of Agricultural Supply Responses for International Policy Models*, April, 1986).

Beneke, R., and E. Winterboer, Linear Programming Applications to Agriculture, Iowa State University Press (Ames, Iowa), 1973.

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Chiang, Alpha, Fundamental Methods of Mathematical Economics, Second Edition, McGraw-Hill (New York), 1974.

A basic text on mathematical methods for microeconomic analysis, with thorough treatment of both calculus and matrix techniques on an introductory level. Techniques covered include static and comparative static analysis, dynamic analysis using differential equations, linear programming, and game theory.

Distortions of Agricultural Incentives, Theodore Schultz (ed.), Indiana University Press (Bloomington, Ind.), 1978.

A collection of articles on policy-based disincentives to increased production in developing country agriculture. Individual articles treat price policy, international prices and trade, barriers to efficient capital investment, and related topics of high interest to agricultural policy analysts.

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Gittinger, J. Price, Economic Analysis of Agricultural Projects, Second Edition, Johns Hopkins University Press (Baltimore), 1982.

The standard text on cost benefit analysis techniques as applied to projects in the agricultural sector. Thorough, step-by-step discussion of all aspects of project analysis, with extensive use of examples and illustrations. Methods used are field-tested for applicability under LDC conditions. Discussions of shadow-pricing methodology and partial budget analysis are particularly applicable to agricultural policy analysis.

Norton, Roger, Agricultural Policy Analysis: Methods and Case Studies, forthcoming.

This volume uses case studies of price and nonprice policy issues in developing countries to illustrate the application of analytic techniques for both policy analysis and project design. Specific topics include structural adjustment in the agricultural sector, credit and agrarian structure in Colombia, evaluation of food aid impact, employment criteria in project evaluation, fertilizer distribution in Turkey, microcomputer applications, and evaluation of sectoral investment programs.

Rao, Potluri, and Roger Miller, Applied Econometrics, Wadsworth Publishing (Belmont, Calif.), 1971.

A thorough and practical textbook on econometric methods, with particular emphasis on the use of linear regression and related techniques. Discusses practical approaches to identifying and overcoming analytic problems, including dummy variables, analysis of residuals, and the use of lags.

Scandizzo, Pasquale, and Colin Bruce, Methodologies for Measuring Agricultural Price Intervention Effects, World Bank Staff Paper No. 394, World Bank (Washington, D.C.), 1980.

Discusses methods of calculating and interpreting accounting prices (shadow prices) for tradeables and non-tradeables in the agricultural sector, including land, labor and capital. Detailed discussion of how to calculate nominal and effective protection coefficients, domestic resource cost, and equivalent subsidies, and their use in evaluating agricultural policies that directly or indirectly affect prices in the sector. Well-illustrated with examples from developing country experience.

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Timmer, C. Peter, Walter Falcon, and Scott Pearson, Food Policy Analysis, Johns Hopkins University Press (Baltimore), 1983.

An excellent overview of economic policy issues from both the consumer and producer perspective, with an emphasis on neoclassical economic approaches to analysis of food markets. Also briefly reviews interactions with the macro-economy. Technical issues are presented in non-mathematical form, but treatment of analytic techniques tends to be overly theoretical. Good bibliographic notes are included.

Tolley, George, Vinod Thomas, and Chung Ming Wong, Agricultural Price Policies and the Developing Countries, Johns Hopkins University Press (Baltimore, Md.), 1982.

Uses examples drawn from analysis of price policy issues in selected developing country to present analytic tools relevant to these issues and demonstrate their application. Each example is discussed extensively in non-technical terms, with the analysis itself presented separately, so that the volume is equally useful for the analyst and for those interested only in the results of the analytic process. Specific topics discussed include: rice price stabilization in Korea, price supports and inputs subsidies in Bangladesh, integration of world and domestic grain markets in Thailand, and price management for related products (grain, meat, and milk) in Columbia.

World Bank Staff Papers on Agricultural Prices:

Although now somewhat dated, this series of papers remains one of the best sources for indepth analysis of agricultural price issues from a policy standpoint. Individual papers include:

Agricultural Price Management in Egypt, by William Cuddihy (staff paper No. 388, 1980).

Thailand: Case Study of Agricultural Input and Output Pricing, by Trent Bertrand (staff paper No. 385).

Argentina: Country Case Study of Agricultural Prices, Taxes, and Subsidies, by Lucio Reca (staff paper No. 387).

Prices, Taxes and Subsidies in Pakistan Agriculture. 1960-1976, by Gilbert Brown and Carl Gotsch (staff paper No. 387).

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Yotopoulos, Pan, and Jeffrey Nugent, Economics of Development: Empirical Investigations, Harper and Row (New York), 1976.

A good general review of economic theory as it applies to economic development issues, this source is particularly strong in its review of comparative static methods and its discussion of alternative structural forms for the production and consumption functions. Other major topics covered include development equilibrium, intersectoral relationships and resource flows, international trade and growth, and the role of planning.

ANNEX 3

SOURCES FOR ASSISTANCE FOR POLICY ANALYSIS AND REFORM

INSTITUTIONAL SOURCES OF TECHNICAL EXPERTISE

Center for Research on Economic Development (CRED): A specialized institute for research and teaching on economic development issues at the University of Michigan (address: Ann Arbor, Michigan), CRED specializes particularly in issues affecting sub-Saharan Africa.

Food and Agricultural Organization (FAO): A United Nations agency, the FAO provides technical assistance to member governments, publishes reports and other documents on analytic methods, and conducts training courses for LDC personnel. Contact: UN resident representative or FAO, Via Della Terme di Caracalla, 00100 Rome, Italy.

Food Research Institute (FRI): A specialized institute for research and teaching located at Stanford University, FRI offers degree and some non-degree training in agricultural policy.

International Agricultural Research Centers (IARCs): Most of the IARCs (international centers associated with the Consultative Group for International Agricultural Research or CGIAR) have agricultural economics units capable of providing short-term assistance in analysis of agricultural policy issues, particularly as related to their crops of specialization. In most cases, assistance must be financed from outside resources. Among the largest centers are the following:

Centro Interamericano de Agricultural Tropical (CIAT),
Cali, Colombia.

International Center for Agricultural Research in Dry Areas (ICARDA), Aleppo, Syria.

International Center for Research in the Semi-Arid Tropics (ICRISAT), Hyderabad, India.

International Rice Research Institute (IRRI), Los Banos,
The Philippines.

International Bank for Reconstruction and Development (IBRD),
(see World Bank).

International Fertilizer Development Center (IFDC): Conducts research on issues related to the production, marketing, and application of fertilizer. Address: Muscle Shoals, Alabama.

SOURCES OF ASSISTANCE FOR POLICY ANALYSIS AND REFORM (cont.)

International Food Policy Research Institute (IFPRI): An IARC specializing in food policy issues, IFPRI conducts and publishes research on agricultural policy issues, particularly those relating to consumption issues. Address: 1775 Massachusetts Ave., Washington, D.C. 20036.

Land Tenure Center (LTC): A specialized institute at the University of Wisconsin (Madison, Wis.), the LTC carries out research, training, and technical assistance related to issues of land ownership, tenure, and agrarian reform, particularly with reference to Latin America.

U.S. Agency for International Development (AID): Provides support to government and private sector analytic capacity. Assistance available only through government-to-government agreements. Contact: U.S. Embassy or AID, Washington, D.C. 20523. For copies of reports and publications available to the public, contact the Development Information Unit, AID, Washington, D.C. 20523.

U.S. Department of Agriculture, Economic Research Service (ERS): Conducts economic research and does policy analysis on U.S. agricultural policy issues both domestic and international. Maintains public access data bases on world supply, utilization and prices for internationally traded commodities. For reports, etc. contact ERS, Office of Information, U.S. Department of Agriculture, Washington, D.C. 20250.

World Bank: In addition to its ongoing lending operations, the IBRD offers support to policy analysis through publication of staff papers on analytic techniques and other reports (contact Publications Office) and through training programs for LDC personnel (contact Economic Development Institute). Address: 1818 H Street, N.W., Washington, D.C. 20433.

ANNEX 4

GLOSSARY OF POLICY ANALYSIS AND AGRICULTURAL POLICY TERMS

- ad valorem tax (subsidy):** a tax fixed as a percentage of the total monetary value of the commodity (e.g., a 5 percent tariff).
- balance of payments:** the net value of a country's trade (exports less imports).
- barrier to entry:** a policy, pre-existing situation (such as lack of sufficient transport), or condition (such as presence of a cartel) that tends to prevent new firms from entering into a particular market.
- black market:** a market on which goods are sold illegally or under illegal conditions (e.g., at prices above the official price); see **parallel market**.
- border price (world price):** the price, usually expressed in foreign exchange, at which a good can be imported (c.i.f.) or exported (f.o.b.) from a given country, net of any duties or other charges imposed by the government; usually regarded as the **opportunity cost** or **shadow price** for a **tradeable** (see appropriate entries).
- budget constraint:** 1) for an individual consumer or producer, the total budget available for a given class of expenditure (e.g., food in the case of a consumer), which sets the limits within which tradeoffs must be made between goods within that class; 2) for a government, the total availability of financial resources for capital and operating expenses, within which all individual expenditures must fit.
- budget line:** the budget constraint expressed in the form of a straight line connecting the maximum amount of good A that can be purchased within the budget, the maximum amount of good B, and all feasible combinations in between.
- buffer stock:** a physical stock (usually of grain) held by a government or individual for consumption during periods of scarcity or to reduce variation in the price of the commodity over time.
- capital:** one of the three basic factors of production; the stock of equipment used to produce a good; financial resources available for investment.
- capital intensive:** a production technology that makes heavy use of equipment and other non-labor inputs, either absolutely or in comparison to competing technologies.
- cartel:** an association, sometimes secret, of producers or consumers for the purpose of controlling the market (e.g., raising prices).
- c.i.f. price:** the price of an import at the port, including the base cost in the country of origin, insurance charges, and freight.

GLOSSARY OF POLICY ANALYSIS AND AGRICULTURAL POLICY TERMS (cont.)

- comparative advantage:** the ability of a country to produce a given good at a lower cost than another country relative to other goods that both produce or (loosely) the ability to produce and export a given good at a price below the border price.
- competition:** the presence of several firms in a given market, such that prices are determined by supply and demand, with no single firm or group of firms having sufficient control over the market to affect the price, a single price faced by all firms and consumers, and reasonably complete knowledge available to both consumers and producers regarding market conditions.
- competitive equilibrium:** a situation wherein the price for a given good and the quantity sold (consumed) are determined by a market operating under competitive conditions, such that, at the prevailing price, suppliers are unwilling to supply more of the good and consumers do not wish to purchase more than the amount supplied.
- complementary good:** a good that is usually consumed (or produced) along with a given good (e.g., butter is a complementary good for bread), so that, as more of the second good is consumed (produced), more of the first good will also be consumed (produced).
- concentration (degree of):** the extent to which a given market (e.g., tomatoes in Madrid) is dominated by a single firm or group of firms, usually expressed as the total market share (percent) held by the top x firms.
- concessional imports:** imports of food or other commodities that are financed in whole or in part by bilateral or multilateral donors.
- consumer surplus:** the sum of the amounts that each consumer would be willing to pay for a given good above the price of that good, usually regarded as equal to the roughly triangular area under and to the left of the demand curve and above the price line.
- cost benefit analysis:** a technique for analysis of specific policy interventions or investments wherein the costs and benefits are quantified for each time period, discounted and compared to determine whether total discounted benefits exceed total discounted costs.
- cross-price elasticity:** the elasticity (usually of demand or supply) for a given good with respect to the change in the price of another good (e.g., the percentage change in rice output that would be expected to result from a one percent decrease in the price of fertilizer).
- deadweight loss:** the loss to the economy as a whole resulting from the reduction in economic efficiency that is caused by policy or non-policy factors, such that prices differ from the equilibrium level, usually expressed as the sum of consumer and producer surplus.

GLOSSARY OF POLICY ANALYSIS AND AGRICULTURAL POLICY TERMS (cont.)

- decision maker:** an individual who makes a policy decision or is directly involved in making a policy decision along with others (usually but not necessarily a high government official or group of high officials).
- demand curve:** a line (usually represented as concave) that shows the total quantity of a given good demanded at each price.
- depreciation (appreciation) of the exchange rate:** a drop (increase) in the amount of foreign exchange that can be purchased with a given unit of local currency, whether caused by a formal devaluation or other factor (such as movements of relative currency prices on the open market).
- devaluation:** a formal reduction in the amount of foreign exchange that can be purchased with a unit of local currency at the official rate.
- discount rate:** a measure of the value of money (or anything of value) in a future time period (usually the next year) compared to another time period (usually the present), generally expressed as a percentage and regarded as a measure of the minimum acceptable real return on investment.
- distortion:** a policy or other factor that causes the market price and quantity for a given good or service to differ from the equilibrium levels.
- domestic resource cost:** a measure of comparative advantage in the production of a particular tradeable, expressed as the total value of domestic factors of production needed to produce an amount of that good sufficient to earn one unit of foreign exchange (e.g., one dollar).
- duty:** (see tariff).
- economies of scale:** a situation whereby the level of additional inputs needed to produce an additional level of output is less than proportional to the existing level of output (e.g, a doubling of production requires less than a doubling of inputs).
- econometrics:** generally, the measure of economic levels, but often as a synonym for regression.
- effective rate of protection:** a measure of the total rate of tax or subsidy on a traded good, taking into consideration direct taxes and subsidies, overvaluation or undervaluation of the currency, and taxes and subsidies applied to factors of production and intermediate inputs used in its production.
- efficiency (economic):** the degree to which a given economic situation results in the maximum level of production and consumption possible within the existing resource constraints, so that it is not possible to increase the value of production by reallocating inputs from one production process to another, or to increase social welfare by reallocating goods from one person to another.

GLOSSARY OF POLICY ANALYSIS AND AGRICULTURAL POLICY TERMS (cont.)

- elasticity** (see also **income elasticity**, **substitution**): a measure of the relationship between changes in two factors, expressed as the percent change in one factor that would result from a one percent change in the other factor; especially the price elasticity of demand (the percent drop in the amount of a good demanded by consumers in response to a one percent rise in its price) or the price elasticity of supply (the percent rise in supply in response to a one percent increase in price).
- endogenous**: in modeling, a parameter that is determined by factors within the model.
- equilibrium**: in economics, a point where two more more opposing forces (particularly supply and demand) are in balance.
- exchange rate**: the price of a foreign exchange expressed in the **local currency**.
- exogenous**: in modeling, a parameter that is determined by factors outside the model (usually set by the analysts on the basis of information available to them).
- externality**: a cost (negative externality) or benefit (positive externality) associated with a particular good or service that is not captured by the market such that it is reflected in the price, such as the value to farmers of organic manure left by sheep grazing a harvested field (note: if the farmers pay the herdsmen -- directly or indirectly, formally or informally, this value is said to be **internalized** in the market and is not an externality).
- factor of production**: a basic economic input, usually defined to include land, labor, and capital.
- fair price shop**: (see **ration shop**).
- farmgate price**: the price received by the farmer, net of any charges for transport to the marketplace or preliminary processing before sale at the **wholesale** level, usually used to refer to the price for a good in unprocessed form (e.g., paddy rice, not milled rice).
- fixed price**: a price set by government decree or regulation, but usually not backed by a government commitment to buy and or/sell at a level needed to maintain the market price at this level.
- fixed quantity intervention**: a subsidy implemented in such a way that the quantity available at the subsidized price is limited (and is usually less than the amount demanded at this price) or a tax that applies only to a given quantity of the amount produced (e.g., a mandatory delivery quota for rice at a below-market price).

GLOSSARY OF POLICY ANALYSIS AND AGRICULTURAL POLICY TERMS (cont.)

- f.o.b. price:** the price of an export received by an exporter at the port ("free on board"), i.e., without netting out any port charges, loading charges, or taxes.
- food balance sheet:** a table showing the sources and uses of food produced, imported, exported, and consumed by a given country, and the importance of each commodity in meeting the caloric and protein needs of the population.
- food security:** the degree to which a given country is able to ensure its population access to adequate food supplies through domestic production and commercial importation (i.e., excluding concessional imports).
- food self-sufficiency:** the degree to which a country is able to meet the food consumption requirements of its population from domestic production, net of any exports.
- food stamps:** a food subsidy system in which consumers are issued coupons redeemable at any shop to purchase food (or supplement the consumer's own purchases), with the shopkeeper reimbursed by the government.
- function (production or consumption):** an equation expressing the relationship between the level of production (consumption) and the levels of other factors, such as the price of the good and competing goods, the price of inputs, the amount of each input used to produce the product, etc.
- guaranteed price:** see support price.
- household budget survey:** a sample survey designed to measure expenditures, savings, and consumption at the household level.
- income effect:** the increase in consumption of a given good as its price falls that is due to the resultant increase in the consumer's effective income (i.e., his ability to buy more with a given monetary income), rather than to the substitution effect.
- income elasticity:** the percentage change in expenditures on a given good in response to a one percent change in the consumer's income.
- indifference curve:** for any two goods, the set of points measuring possible levels for the consumption of each good (e.g., three apples, two bananas) by a given consumer, such that he values all pairs in the set equally.
- indirect tax (subsidy):** a tax that is imposed at a later or earlier stage in the production process, such that it indirectly affects a particular good (e.g., a tax on jute bags that indirectly acts as a tax on rice sold in such bags).
- inferior good:** a good that is consumed in reduced quantities as consumer income rises (i.e., has a negative income elasticity).

GLOSSARY OF POLICY ANALYSIS AND AGRICULTURAL POLICY TERMS (cont.)

- intercept:** in mathematics, the point on the vertical axis where a given function crosses it (if any); the value that the dependent variable takes when the independent variable is set at zero.
- intermediate inputs:** inputs used in the production of a given good that are themselves the product of earlier production processes and cannot be re-used (e.g., seed, fertilizer) and are not factors of production (e.g., land, labor) or capital goods.
- intervention:** (see policy intervention).
- isoquant:** a curve on a two-variable plot, such that all points on the curve correspond to a single level for a third variable; e.g., combinations of labor and capital corresponding to a given level of production form an **iso-product** curve; see also **indifference curve**.
- labor-intensive:** a production process that uses relatively high levels of labor relative to alternatives (see **capital intensive**).
- leakage:** a situation in which the impact of a given subsidy is not restricted to the intended group (e.g., non-poor consumers receive subsidized food) or a given tax does not reach all of the intended group (e.g., some of the good is exported without payment of duty).
- license (import, export, etc.):** a permit required by the government as a precondition for operating in a given market; may be issued on a one-time basis or required for each transaction.
- linear programming:** a modeling technique that can be used to predict the mix of goods that will be produced (consumed) given the need to choose among competing alternatives that use the same set of resources, assumed to be available in fixed amounts (e.g., tomatoes and wheat compete for family labor and land in July).
- local currency:** the official unit of currency in a given country.
- lump sum transfer:** a subsidy (tax) structured in such a way that the recipient (payer) receives (pays) a fixed amount of money, which he may use as he pleases; generally regarded by economists as the least distorting forms of subsidy or tax (see also **transfer payment**).
- macro-economics:** the branch of economic theory concerned with the general price level (inflation), overall economic performance (growth), fiscal and monetary policy, and international trade balances.
- margin controls:** a government system whereby the marketing margin (and therefore the price at which a given agent can sell a given good) is fixed as a set percentage of the price paid by that agent.

GLOSSARY OF POLICY ANALYSIS AND AGRICULTURAL POLICY TERMS
(cont.)

- marginal unit:** the last or additional unit of a given good produced or consumed.
- marginal value product:** the additional income gained by producing an additional unit of a given good, equal to the price in a competitive equilibrium situation.
- market clearing price:** the equilibrium price, i.e., that price at which the amount supplied is identical to the amount demanded, or the price at which the total quantity of a good available on the market (e.g., the annual crop of maize) will be sold.
- market failure:** a situation such that the unregulated operation of the market does not lead to a competitive equilibrium, because of monopoly, oligopoly, lack of information, barriers of entry, or the existence of conditions such as externalities or public goods that cause the competitive equilibrium not to be Pareto optimal.
- market intervention:** a policy or other action of a government that causes the price and quantity in a given market to differ from the competitive equilibrium.
- market price:** the price observed in the market, which may or may not be the equilibrium price, depending on the presence or absence of distortions, such as quotas and taxes.
- market share:** the percentage of the total market for a given good or service (e.g., apples in the United States) that is met through sales by a given firm (individual, country, etc.).
- marketable surplus:** the portion of the crop that producers have available for sale after meeting their family consumption needs.
- marketing margin:** the difference between the price paid for a given good (e.g., to producers) and the price received by a given marketing agent, expressed either as an absolute amount (5 pesos) or a percentage of the purchase price.
- means test:** a procedure that restricts access to a particular program or benefit (e.g., subsidized food) to individuals (families, etc.) with income below a certain level.
- micro-economics:** the branch of economics theory concerned with the behavior of consumers and producers and the operation of markets.
- milling ratio:** the ratio between the weight of the milled product (rice, wheat flour, etc.) and the weight of the grain.

GLOSSARY OF POLICY ANALYSIS AND AGRICULTURAL POLICY TERMS (cont.)

- model:** a simplified version of the real world that is intended to capture certain key relationships and permit them to be analyzed, observed, or understood more fully or easily; usually a system of equations that simulates economic interactions, used, for example, to predict the outcome of changes in the economic environment.
- monopoly (monopsony):** a situation in which a single producer (consumer) has a one-hundred percent market share.
- nominal rate of protection:** a measure of the tariff or subsidy on a given good, including the effect of overvaluation (undervaluation) of the exchange rate.
- non-tradeable:** a good or service that, by its nature, is not generally exported or imported, e.g., electricity; **factors of production** have traditionally been viewed as non-tradeables (see also **tradeables**).
- objective function:** an equation that measures the total net value derived by a firm (individual, society, etc.) from a given situation (e.g., a given level of sales for each good produced).
- oligopoly (oligopsony):** domination of a market by a small number of firms who are able to set prices and market shares through formal collusion or informal cooperation (see **cartel**).
- opportunity cost:** the benefit that must be given up in order to obtain a competing benefit (e.g., foregoing the pleasure of eating one's cake now in order to enjoy it later).
- overvalued exchange rate:** a condition under which the official exchange rate is higher than the **equilibrium** level (i.e., a unit of local currency can officially buy more foreign exchange than would be the case at a **market clearing** exchange rate), causing imported goods to be artificially cheap for domestic consumers and exported goods to receive an artificially low price in local currency.
- parallel market:** a market for a given good or service that operates outside of official channels, but is not necessarily illegal (e.g., sale of foreign exchange by banks at a rate above the official rate of exchange).
- parameter:** a measurement of the relationship between two variables that is assumed to be fixed **exogenously** and not to vary during the analysis.
- parastatal:** an enterprise owned by the state, or loosely, any enterprise or other organization that sells goods and services and over which the state exercises management control (e.g., state-sponsored cooperatives).

GLOSSARY OF POLICY ANALYSIS AND AGRICULTURAL POLICY TERMS (cont.)

- Pareto optimality:** a condition wherein there is no possibility of shifting goods among consumers in such a way that no consumers are worse off than before the shift and some are better off.
- performance indicator:** a measure of the performance of the economy relative to the government's goals (e.g., an increase in grain yield, an increase in total production, a decline in unemployment).
- policy intervention:** an action by the government that, intentionally or unintentionally, affects the operation of the market, such as a tax, subsidy, or quota.
- policy inventory:** a technique used to obtain a rapid overview of government policy interventions in a given country at a given time, and their impact on important variables in the economy (production, income, etc.) in order to set priorities for policy analysis and possible reform.
- post-harvest losses:** the percentage of a crop that is lost to pests for mishandling between harvest and final consumption or export.
- price ceiling:** an official upper limit on the price of a given good, usually a **trigger price** at which the government will begin selling the commodity to prevent further price rises, but also used to refer to a **fixed price** that is not enforced by government purchase and sale.
- price floor:** an official lower limit on the price of a given good, usually a **trigger price** at which the government will begin buying the commodity to prevent further price drops, but occasionally also used to refer to an unprotected **fixed price**.
- price line:** on a price-quantity diagram, a horizontal line indicating a particular price level.
- price-quantity diagram:** the basic micro-economic diagram, with price on the vertical axis and quantity on the horizontal axis, used to represent the **supply and demand curves** in **comparative static** analysis to show market operation under various assumptions.
- producer surplus:** the total amount that producers receive at a given price over and above their total cost of production, generally interpreted as the roughly triangular area between the price line and the supply curve.
- productivity:** the level of production of a given output that is obtained per unit of a given input, usually a **factor of production** (e.g., tomato output per hectares, rice harvested per labor day).
- projection:** a forecast of future levels for given economic variables of interests (e.g., grain production) based on current levels and assumptions regarding their relationship to future economic activity.

GLOSSARY OF POLICY ANALYSIS AND AGRICULTURAL POLICY TERMS (cont.)

- public good:** a commodity, such as air or national defense, to which access cannot practicably be denied to any individual without denying it to everyone, which continues to be available regardless of how much a given individual consumes, and that therefore must be produced and/or regulated by government action, rather than left to the marketplace, in order to ensure socially-optimal availability.
- quota:** a government-set limit on the maximum amount of a given good that can be imported or exported (or, more generally, on the maximum or minimum quantity that can be purchased or sold on a given market, domestic or international).
- rate of return:** the profitability of a given investment, expressed as an interest rate producing a return on investment equivalent to the investment's net benefit (cash flow) over its life.
- ration shop:** a government-operated store at which consumers may buy goods at subsidized prices, either in fixed quantities or in unlimited amount.
- regression:** a statistical technique used to measure the effect of one variable on another (or, in **multiple regression**, of several variables on a given variable), while holding the effect of other factors constant.
- rent (economic):** the return earned by a factor of production or by sale of a given good over and above the marginal costs of its production or importation (often a result of artificial scarcity due to policy-induced distortions).
- rent-seeking behavior:** actions on the part of individual producers, importers, consumers, etc. to take advantage of opportunities to earn economic rents (e.g., by bribing officials to obtain import licenses so that the goods can be sold at inflated prices on the domestic market).
- reserve stock:** (see **buffer stock**).
- resource constraint:** the total availability of a given resource, such as land (see also **budget constraint**).
- resource transfer:** an economic transaction in which resources (e.g., money) are transferred from one individual (or group) to another without changing the total availability of the resource to society as a whole.
- response (e.g., yield response, acreage response):** the change in a particular variable of interest that is made by economic actors (e.g., farmers) in reaction to a change in the economic conditions under which they operate, for example, the increase in acreage planted to carrots that results from an increase in the price of carrots.

GLOSSARY OF POLICY ANALYSIS AND AGRICULTURAL POLICY TERMS (cont.)

- retail:** in a marketing system, the level that deals directly with the final consumer (e.g., grocery stores).
- scarcity value:** (see shadow price).
- self-targetting commodity:** a good (such as low-quality sorghum) that is not preferred by consumers, so that relatively well-off consumers will not purchase it in preference to another good (such as rice), even if the commodity is sold at a lower price.
- shadow price:** a price, generally different from the market price, that represents the society's opportunity cost for the good in question; often taken as equivalent to the equilibrium price in the absence of policy distortions, monopoly, or other market failure.
- side payment:** a payment from one party in a transaction to another or to a third party that is not included in the price of the good or service sold (e.g., a bribe).
- social accounting price:** (see shadow price).
- stabilization fund:** a pool of funds maintained by a government for the purpose of stabilizing the price of a commodity over time, financed either by direct allocation of government resources or by government trading in the commodity on world markets.
- substitute goods:** a good that consumers tend to use instead of another good when there is a change in their relative prices (e.g., butter and margarine, maize and wheat); see also complementary goods.
- substitution (technical):** the process of shifting the technology of production (or more rarely consumption) so that more of one input (e.g., leather) and less of another (e.g., plastic) is used to produce a given type and level of output (e.g., 10 pairs of shoes).
- substitution effect:** consumer response to the change in price for a given good that is due to the change in the good's price relative to the price of competing goods, not to the consumer's increased ability to buy the good (see income effect).
- supply curve:** a line showing the quantity of a given good that will be produced for sale at each price level (by a single firm or in total).
- supply-utilization identity:** in trade analysis, the formula expressing the concept that the amount of a given good sold (exports plus domestic consumption) must equal the amount available for sale (domestic production net of losses plus imports).

GLOSSARY OF POLICY ANALYSIS AND AGRICULTURAL POLICY TERMS (cont.)

- support price:** a producer price guaranteed by the government, i.e., at which the government is willing and able to purchase as much as necessary to keep the price from falling below that level (compare fixed price).
- surplus:** (see consumer surplus, marketable surplus and producer surplus).
- targetting efficiency:** a measure of the degree to which the benefits of a particular program (e.g., subsidized food sales) are restricted to the government's intended beneficiary or target group (e.g., poor consumers); see also self-targetting commodity).
- tariff:** a tax levied on an import or export (also referred to as a duty).
- tradeable:** a good or service that by its nature can be imported and/or exported by a given country (see non-tradeable), whether or not it is currently traded.
- traded good (non-traded):** a good that is currently imported or exported into a particular country.
- tradeoff:** the necessity for an individual or society to give up some of a certain good (service, benefit, etc.) in order to increase the availability of another good (service, benefit, etc.), while staying within a given resource constraint.
- transfer payment:** a transfer of funds from one economic entity (individual, government or firm) to another that is not made in direct exchange for goods or services and therefore neither increases nor decreases the total availability of resources for other uses (e.g., a tax payment, a charitable contribution).
- trigger price:** a price at which the government is committed to enter the market to buy (sell) a given commodity to prevent its price from falling below (rising above) the official level; see price floor, price ceiling and fixed price).
- unit tax (subsidy):** a tax or subsidy in which the amount is fixed per unit of measure (e.g., 5 pesos per kilogram).
- utility function:** in economic theory, a formula that relates the level consumed of each good and service to the total utility or benefit derived by an individual consumer (or, more rarely, by society as a whole).
- value-added:** the difference between the value of the final good and the value of the intermediate inputs used to produce it, which is added during the production process and usually interpreted as the return to the factors of production, land, labor, and capital.

GLOSSARY OF POLICY ANALYSIS AND AGRICULTURAL POLICY TERMS
(cont.)

welfare: a measure of the total benefit to society as a whole, or to a particular group, such as consumers, usually not quantified.

welfare function: (see objective function).

wholesale function: in a marketing system, the level or the function of buying from the farmer or other producers for sale to firms at the retail level.

world price: (see border price).

yield: in agriculture, the rate of output of a crop, usually expressed as units of output per unit of land (kilograms per hectare, camel-loads per acre, bushels per feddan, etc.).