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Economic Analysis of Agricultural Markets: a Manual

5

Overseas Development Administration

Economic Analysis of Agricultural Markets
A Manual

Vanessa Scarborough and Jonathan Kydd

Marketing Series Volume 5

Natural Resources Institute

The Scientific Arm of the
Overseas Development Administration

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SUMMARY

This manual is intended for the use of economists working on problems of markets and marketing policy for the agricultural and food sectors in developing countries under the circumstances encountered by consultants responsible for providing advice to governments, aid agencies and non-government organizations. Under typical conditions, data sources are scarce and of variable quality and analysts are required to formulate recommendations within a short period of time.

The manual begins with a discussion of the potential role that markets and marketing may perform in developing countries, considers common problems and imperfections in developing country markets and the implications for government action.

Concepts of economic performance in agricultural marketing, often used loosely, are clarified. For each concept of performance, indications are given of appropriate data sources and evaluation methods.

The historical development of the economic analysis of markets and marketing is reviewed, revealing two important implications for the conduct of research. First, the theoretical under-pinning of the field is under-developed and, second, in assessing performance, there is a need to combine various types of research and information.

There is extensive coverage of data collection, starting with a discussion on how to identify the research agenda and, subsequently, to define research objectives with precision. The use of secondary data is explored and suggestions made for evaluating its quality. Fieldwork methods are reviewed, including findings from the literature on rapid reconnaissance, observational surveys, interviews, key informants and case studies. Data requirements for various kinds of market sub-system are discussed and a number of sample interview guides are given and explained. It is argued that the collection of data and its analysis must be closely interactive activities because understanding of the broad picture defines the data requirements for subsequent stages of analysis.

The uses and limitations of a range of techniques for data analysis are explored, including tests for economic efficiency of markets and for the internal efficiency of enterprises. Among the problems considered in detail are application of the model of perfect competition, price analyses (including real price trends, price variation, seasonal effects and margin analysis). Because it is so frequently used in practice, emphasis is given to the collection and interpretation of data on margins and profitability for marketing and storage agents.

Presently, much marketing analysis takes place in economies in which programmes of economic policy reform are being implemented and, in recognition of this, the manual provides guidelines for the analysis of agricultural marketing policy. Agricultural marketing policy is defined, with examples. The importance of distinguishing between objectives and instruments of policy is explained, and examples given of how this may be done in practice.

The neoclassical approach to policy analysis is critically reviewed to highlight its uses and limitations. Key concepts are explained, including divergences, market failures and distortions. The idea of a policy hierarchy, i.e., of policy optimization under political constraints, is considered and practical examples of this are analysed. The use of indicators in policy analysis is covered, including the effective protection coefficient and the domestic resource cost ratio. Worked examples are given of the calculation of these indicators.

The manual concludes with an analysis of agricultural market liberalization in Africa. This serves to provide readers with an understanding of the context, issues and lessons in economic policy reform generally, and marketing policy reform in particular.

Chapter 1
Introduction

This manual attempts to provide marketing analysts with a variety of methodological and conceptual tools with which to assess the economic efficiency of markets and marketing policy in less developed countries (LDCs). It is based on both a survey of the literature, and the authors' own experiences of such exercises. It therefore offers a synthesis of ideas and techniques concerned with market analyses, rather than any new theories or methods. Such a compilation was thought timely in view of the recent liberalization of many LDC markets.

MARKET LIBERALIZATION IN LDCS

From the end of the 1970s, and throughout the 1980s, many LDC economies experienced severe macro-economic disequilibria, seen in high rates of inflation, overvalued exchange rates, and unsustainable deficits in the balance of payments and budget. Chapter 6 outlines this crisis, together with some of its causes and effects, in more detail. Here we merely note that: (a) so-called structural adjustment programmes have been adopted by most of these countries in response to the crises, particularly in Sub-Saharan Africa, and that (b) domestic market liberalization has been one of the most important, and widely implemented, of the structural adjustment policies.

Market liberalization implies a move away from existing market structures. These vary widely across LDCs, and so the term is relative, but in the majority of cases, liberalization has meant increased private sector participation, at least in domestic markets. In addition, liberalization has often meant a change in the role of marketing parastatals and co-operatives. One of the main objectives of liberalization was to increase the economic efficiency of marketing and price structures, but there has been widespread concern that private sector markets may not prove adequate to the tasks set for them.

It is this process of liberalization, and subsequent changes in the structure and organization of domestic marketing, which have been the main motivation for the production of this manual. The reforms themselves were stimulated by a recognition that: (a) pre-liberalization marketing practices may have constrained agricultural production, producer incomes and consumer welfare, and (b) there has been a bias in development economics towards production and a consequent underestimation of the role of marketing. For these, and other reasons discussed later in this chapter, market liberalization became one of the main policies of structural adjustment. In turn, the implementation of market liberalization has raised many new problems. Of particular concern is the question of how to meet some of the policy objectives previously attained through pre-liberalization market structures and, if necessary, how to enhance the economic efficiency of new marketing systems.

It is hoped that this manual will provide analysts, consultants, civil servants and others advising on policy and investments with a set of concepts and tools for addressing these problems. Whilst liberalization provides much of the current policy context to marketing, the manual can also be used in analysing marketing practice, irrespective of the status of policy in a given situation.

USE OF THE MANUAL

The methods for assessing the efficiency of markets provided here are directed at research carried out under consultancy conditions typically encountered by economists responsible for providing operational advice to governments, aid agencies and non-government organizations. In such circumstances, existing data sources are scarce and of variable quality, and analysts are expected to formulate recommendations on policy or public investments within a short period of time. Rapid reconnaissance methods used in this situation often throw up more questions than they answer, which should be addressed by longer term research. However, if used with care, such approaches

can have an important role in many LDCs, where the data bases available cannot sustain more sophisticated methods of research and policy decisions must be made fast.

It is unlikely that single projects of this type will be directed at analysing all aspects of efficiency in a single commodity market, let alone a linked set of markets. Therefore it is thought that analysts will use particular parts of the manual as the objectives of their research demand. It is hoped that the comprehensive index will ease the search for relevant sections. In addition, an attempt has been made to keep the manual as practically useful as possible. To this end much theory, and other pieces of text which may be deemed to be of lesser practical value, has been boxed, in order that users may choose to read these passages, or not, with facility.

This chapter briefly reviews the debates concerning the potential roles of markets and marketing in development and provides a list of common problems and imperfections in LDC markets. Chapter 2 of the manual attempts to clarify what is meant by the terms 'economic performance' and 'economic efficiency'. This is important, because the common use of such phrases masks ambiguity in their precise meaning. Various ways of thinking about the nature of markets are also discussed in Chapter 2 in order to provide analysts with means of imposing some order on the apparent chaos observed in the field. Data collection is the subject of the third chapter in this manual. It discusses the use of secondary sources and rapid reconnaissance fieldwork and then lists types of data that may be required in an analysis of the economics of a market. Chapter 4 describes various analytical techniques commonly used by economists in assessing the economic efficiency of markets, whilst Chapter 5 is concerned with the analysis of marketing policies. Finally, Chapter 6 reviews the process of market liberalization in Africa in some detail.

MARKETS AND DEVELOPMENT

The debate on the role markets can, or do, perform, in economic development is summarized by Harriss (1979b). With reference to the literature on India, she identifies three main ways in which markets and traders have been characterized, as follows:

- as agents of development;
- as powerless agents of stagnation, due to traders' risk aversion and hierarchies of credit-debt relationships throughout the market, and
- as powerful agents of underdevelopment, to the extent that markets are monopolized by a few, who are thus able to reap excessive profits, at the expense of producers and consumers.

These different characterizations encapsulate the emphases of different disciplinary traditions in social science studies of marketing: (a) business management and neo-classical economics, (b) anthropology, and (c) Marxist economics. Here only the neo-classical approach will be expanded upon, because it was the belief in the potential role of efficient markets to contribute to economic development that lead to liberalization becoming such an important policy in the 1980s and into the 1990s.

Markets as Potential Agents of Development

Markets can potentially contribute to the development process in two ways. Firstly, they can provide a way to allocate resources ensuring the highest value production and maximum consumer satisfaction. Secondly, and more controversially, they may stimulate growth, by promoting technological innovation and increased supply and demand.

Price transmission and specialization in production

If it is accepted that economic development requires increased resource productivity, there are two important means of achieving this: increased specialization in production (and the exploitation of absolute and comparative advantages), and technological innovation.

The corollary of specialization is the separation of producers and consumers of particular products into distinct groups. For example, farmers, specializing in the production of a certain mix of crops, may become dependent on exchange for agricultural inputs, consumer goods, and other agricultural products not produced on their farms, possibly including foodstuffs. Specialization in production therefore requires co-ordination between producers, distributors and consumers, or between supply and demand. Markets provide one means of such co-ordination. Growth in the size and spatial spread of the market allows for greater specialization in production, which can lead to further increased output from each unit of resource employed. Therefore there is a two-way relationship between increasing resource productivity and the development of adequate systems of exchange.

It is by generating and using prices that markets co-ordinate many otherwise unconnected economic decision makers. Prices summarize an enormous amount of information about the availability of resources, production possibilities and consumer preferences. In arriving at a price, the market provides a way of collecting and passing on this information and so helps future economic decision making. Prices can also either reward or punish the decision makers by determining the costs of and returns to the decision. In this way, markets co-ordinate decision makers widely separated either physically, economically or both. However, the detailed way in which prices are generated and passed on in markets is crucial in determining whether resource allocation leads to maximum production and optimum consumer satisfaction in reality.

Price formation and the efficient allocation of resources

The prices which markets generate are the means through which they determine what, and how much, is produced from finite resources, which methods are used in production, and how products are distributed. Consumers attempting to maximize their satisfaction do so in the face of fixed prices and incomes. The price they are willing to pay for different quantities of any commodity will depend on the utility of that quantity of that commodity to them. Through the market they can cast 'monetary votes', which can be passed back to producers. If the prices created and transmitted through the market are economically efficient, producers, in attempting to maximize their profits and incomes, will produce and sell those commodities which consumers most desire and can pay for, and they will do so at least cost. The effectiveness of prices as carriers of information, incentives and rewards in this process, and the resultant allocation of resources, will depend on the structure and organization, or the economic efficiency, of the market.

If markets are perfectly competitive, and prices reflect the real costs of production, and if consumption does not have any external effects (positive or negative) on society, it can be shown that, through their influence on economic decision making, markets will lead to an optimal allocation of resources. At this optimum, resource productivity and consumer satisfaction are at the maximum possible level, given available resources, technology, consumer incomes and income distribution. Such an outcome is known in welfare economics as a Pareto Optimum, the criterion for which is that it is impossible to improve anyone's welfare through changes in production or exchange, without impairing someone else's welfare. Markets must be perfectly competitive for this condition to follow, because it is only these markets which generate and transmit prices which accurately reflect the scarcity of resources relative to consumer demand.

In competitive markets, consumers can express their preferences, subject to the constraints of their incomes, by paying a certain price for particular qualities and quantities of goods. Producers can then attempt to maximize their profits by supplying the relevant quantity and quality of goods at least cost. It is the combination of the price structures created by perfectly competitive markets, and the maximizing objectives of consumers, producers and owners of resources, which ensures that such resources are deployed in their highest returning uses, that output is optimal and that resource productivity, production and consumer satisfaction are maximized.

Box 1:1 summarizes the conditions and assumptions contained within the neo-classical model of perfect competition. Various models, that take into account the inter-dependence between the economic activities in different markets, have been developed to show that perfect competition leads to efficiency in production and in exchange and to an optimal conformity between production and consumption. What is important here though is an understanding of (a) the emphasis given to competition in economic analyses of markets, and (b) the rationale behind liberalization policies.

Box 1:1 The Neo-Classical Model of Perfect Competition

Necessary conditions
The neo-classical economic model of perfect competition necessitates the following conditions:

- sufficient numbers of buyers and sellers, and/or degrees of rivalry between them, to prevent any one firm from influencing market prices. In particular the price of a product or service must not be affected if a seller withholds supplies or a buyer limits purchases. That is to say that individual buyers and sellers must be price takers and the terms of exchange must be determined impersonally by the market through the collective action of all buyers and sellers;

- all commodities or services must be homogenous, such that buyers have no reason to prefer the goods of one seller over those of another;

- market participants must be economically rational, i.e. they must attempt to maximize their profits, utility and/or incomes;

- resources and products must be perfectly mobile, i.e. there must be no barriers to capital, labour, management etc. entering any economic activity and it must be possible to move these to locations in the economy in which they will secure the highest returns;

- commodities and currencies must be perfectly divisible and fungible;

- all participants in the marketing system must have perfect and equal knowledge of the forces likely to affect supply and demand, and hence market conditions, such that no increased information would change their economic decisions.

Assumed, and facilitating, conditions
The model assumes the existence of market places, where offers to buy and sell are made; reliable communications, allowing adjustment to equilibrium, within and between markets. Conditions which can be argued to facilitate the realisation of the above include standardized weights, measures, varieties and qualities; means to enforce contracts and flexible terms of exchange.

Pareto optimum
Pareto (1906) showed that, under certain conditions, perfectly competitive markets lead to a situation in which no re-allocation of the economy's resources can make anyone better off without making at least one person worse off.

The conditions necessary for perfect competition to result in the maximization of the value of production and of consumer satisfaction in this sense include:

- the absence of economies of scale in production, which would otherwise mean that output could be increased from given resources under monopolistic, rather than competitive, conditions;

- absolute consumer sovereignty such that all economic activity is ultimately directed towards consumer satisfaction and responsive to consumers' monetary votes;

- the absence of externalities, i.e., circumstances where costs or benefits of production or consumption are imposed on, or received by, individuals or groups without payment, or receipts, for them being made;

- the absence of public goods (which can be conceived of as extreme externalities)

Utility of Pareto's theory
The analytical utility of the Pareto condition is limited by two considerations. Firstly, for the Pareto optimum to be socially optimal it is necessary to assume that the distribution of income is desirable, which may not be the case. Secondly, the condition provides no guidance as to the choice between alternatives where a re-allocation of resources in production and/or exchange makes some people better off, and others worse off. Economists have tackled these difficulties in various ways. The most commonly used of these is to determine whether the gainers from a re-allocation of resources can compensate the losers and still remain better off than before the change. Such a change is known as a Pareto improvement. The utility of this principle depends on a judgement about whether the necessary degree of redistribution should, or will, actually take place.

In advocating liberalization it was argued that, because many LDC markets had been monopolized and controlled by parastatal agencies, and because many prices had been determined administratively rather than through market forces, the allocation of resources had become highly inefficient, i.e., resources were being used in a way which inhibited the realization of their productive potentials, and therefore the absolute value of production was lower than it could have been. In addition, agricultural producer incentives had often been weakened, market structures had become inflexible and unable to respond to changing external circumstances, and government budgets had become overburdened. It was thought that by allowing the market, rather than governments, to determine prices, changes in the structure of supply would result, which would raise the aggregate value of output, and allow for a more flexible economy, better able to respond to changes in international prices, and lower budgetary costs to the government.

Markets and economic growth

The important potential role of markets in generating economic growth was recognized by Adam Smith in *The Wealth of Nations* (1776), but since Pareto formulated the theory of optimal welfare early this century, there has been an emphasis on the efficiency with which markets allocate given resources and technology to maximize output and welfare. However, the potential of markets to stimulate economic growth is crucial, especially in LDCs, because statically efficient markets can coexist with widespread poverty.

In the realm of economic growth, markets may provide the incentives to profit-maximizing participants to develop new technologies, products, sources of supply, new markets and new methods of exploiting them. Some economists (for example Schumpeter) argue that these long-run, dynamic potentials of the market for stimulating economic growth are more important for social welfare than the efficient allocation of existing resources. However, competition has not always been seen as the best mechanism for encouraging growth. Schumpeter (1942) argues monopoly markets provide greater incentives to innovate because of the larger profits and reduced risk they imply.

Markets can also provide a mechanism of surplus extraction and inter-sectoral resource transfers, most commonly from agricultural to non-agricultural sectors. For example, governments can use markets to tax trade and/or production; profits made in agricultural trade may be invested in other sectors of the economy and transfers may be engendered where land, capital and labour markets are linked. This extractive role may inhibit the development of the full potential of the agricultural sector, because it draws investment away, but it is usually seen as necessary for the diversification of economies and the development of other sectors.

The development and expansion of markets can create increased demand through various means. For example, markets provide a source of productive employment and income generation; their role in transferring resources to the non-agricultural sectors leads to the development of a home market and hence the demand for agricultural commodities by the non-agricultural sectors and vice versa, and the profit-maximization objective of entrepreneurs may lead to the development of new products. By commercializing agriculture and other sectors, and by increasing the demand for goods and therefore for money with which to purchase them, markets may also encourage increased producer price sensitivity and greater specialization into goods and services in which particular geographical zones have a comparative advantage.

Marketing has an intrinsic productive value, in that it adds time, form, place and possession utilities to products and commodities. Through the technical functions of storage, processing and transportation, and through exchange, marketing increases consumer satisfaction from any given quantity of output. The economic value of these functions, in terms of their effect on the allocation and distribution of resources, depends on how efficiently they are carried out and how the services they represent are priced. As incomes and populations grow and agricultural specialization increases and non-agricultural sectors develop, there is an increased demand for marketing services. The role of markets in encouraging increased production through price incentives will be crucial.

Markets and other development objectives

Markets also have influence on income distribution, food security and other important, and

commonly held, development objectives. The precise way in which markets affect these is controversial, as will be seen in Chapter 2. In addition to questions of the economic efficiency of markets, important factors are the pre-existing distribution of income, concurrent events, for example drought, and subjective political evaluations.

Government roles

Governments have an important role in regulating the market mechanism to ensure efficiency, equity and macro-economic stability. Markets may not be efficient as a consequence of market imperfections and the problem of public goods (see Box 1:1). Furthermore, although efficiently functioning markets will increase the value of total output, as has been noted, there is no reason why they should deliver a socially desirable distribution of income. Therefore, there may be justification for governments to intervene to produce a more socially desirable distribution of income. The challenge for policy is to find mechanisms for intervening in favour of distributional objectives which do not compromise (and, hopefully, even promote) growth objectives.

To encourage the realization of the potential contributions markets can make to the development process, governments may, for instance:

- increase economic efficiency of, and reduce the risks in, markets, for example through the provision of information;
- invest in public or collective goods like improved transport and communications networks, which could reduce the costs and widen the extent of marketing;
- provide a measure of market stability, for example through floor and ceiling price policies on basic goods like foodstuffs;
- initiate income distribution and food security programmes;
- develop the private sector, if it is in an 'infant industry' phase, through research, training, institution building etc.; and
- guarantee law and order, including adequate property rights and means of contract enforcement.

Summary

In summary then, encouraging growth in the volumetric size and spatial spread of the market can potentially increase economic welfare through possibly engendering:

- greater specialization in production and hence increased output from each unit of resource employed and more efficient allocation of resources;
- the realization of potential economies of scale in production;
- an increase in the variety of commodities from which to choose, increasing consumer satisfaction;
- increased price and supply stability; and
- increased competition between larger numbers of buyers and sellers.

Improvements in the efficiency with which marketing functions are undertaken can be argued to contribute to development through:

- providing fuller use of a given level of production, for example by reducing physical losses and managerial and labour inefficiency;

- fostering more efficient production by generating prices which more accurately reflect resource availabilities and consumer preferences;
- reducing the costs of marketing and the marketing margin, thus increasing producer and/or lowering consumer prices, which may lead to increased output (depending on demand and supply elasticities);
- allowing greater specialization in production, and possibly reducing price variability, which may lead to increased output; and
- possibly stabilizing demand and prices and providing incentives for improving product quality.

COMMON PROBLEMS AND IMPERFECTIONS IN LDC MARKETS

The following list provides an indication of commonly noted market imperfections and marketing problems in LDCs:

- barriers to entry, particularly at higher levels of wholesaling and transportation;
- monopolization/cartelization of one or more market functions and/or geographical areas, sometimes as a result of the above;
- lack of realization of economies of scale, for example in the transport, storage and processing functions;
- externalities, i.e., interdependence between the costs and benefits to individuals and community that are not taken full account of through prices;
- poor information, for example of prices, supplies and demand, which may impede the physical flow of goods and lead to excessive price differences between markets because traders are unaware of profitable marketing opportunities;
- market fragmentation (often as a result of poor information) – i.e., different prices obtaining in different but equivalent transactions, because buyers and sellers are unaware of other prices being offered;
- wide price variations between markets in time and space, due to high costs and/or high returns (see Chapter 4);
- high rates of physical loss or spoilage, sometimes due to crude and technically inefficient handling and storage;
- high-cost transactions and handling due to small lots bought and sold; the dispersed and diversified nature of production; inefficient operation of transport services; poor infrastructure etc.;
- poor transport and communication networks, which increase the costs of marketing and thus impede physical flows and the extent of possible specialization in production;
- widespread risk aversion, in both the trading and production sub-sectors;
- inadequate capital markets and hence insufficient liquidity in the marketing system to match supply and demand over time and space;

- absence or non-enforcement of standardized grades, varieties, qualities, weights and measures which makes visual inspection necessary, inhibiting the flow of meaningful information through prices, and increasing costs;

- lack of legal means to enforce contracts which often results in the physical movement of traders and inhibits distance trade;

- low effective demand as a result of low incomes, thus small-scale retail transactions;

- highly uncertain and volatile supplies of many food crops due to subsistence consumption; and

- producers with weak market bargaining positions due to the small and dispersed nature of production units; indebtedness in general, and to traders in particular; poor information and rural transport facilities.

Chapter 2
Economic Performance and Conceptual Frameworks

- **Defining economic performance in agricultural marketing**
- **Economic efficiency**
- **Technical and operational efficiency**
- **Exchange efficiency**
- **Other performance objectives**
- **Innovation**
- **Inter-sectoral resource transfers**
- **Equity**
- **Employment**
- **Food security**
- **Co-ordination efficiency**
- **Describing a conceptual framework for the economic analysis of agricultural marketing systems**
- **The internal productive efficiency of the firm**
- **The structure, conduct, performance school**
- **Marketing sub-systems**

In this chapter, various facets of economic performance in agricultural marketing are defined in order to clarify key concepts. This is important because many of the terms employed to describe market performance are often used very loosely in consultancy reports, and because understanding what is meant by economic performance is essential to creating a research strategy, and in delineating policy options.

For each of the aspects of economic performance covered here, a definition is followed by a brief indication of the data and evaluation methods needed in assessing real situations.

In the second part of the chapter a conceptual framework of the form and context of agricultural marketing systems is outlined to help the organization of research. This framework is based on the historical evolution of economic analyses of agricultural markets, which itself is then briefly reviewed.

INTRODUCTION

Conceptual or analytical frameworks of market performance, and of the way in which markets are structured, are essential to guide effective and efficient data collection. Such frameworks should help indicate the most useful area(s) in which to focus limited research resources, and ensure that data collected is relevant to the objectives of the research.

The stated objectives of any particular research project must be defined as clearly as possible since they determine the broad requirements of data collection and analysis. Constructing a logical framework is one way in which to order and clarify these broad objectives. The means of meeting the latter then need to be worked out, and it is in this that conceptual frameworks, describing economic performance and markets, will be useful.

MARKET PERFORMANCE AND ECONOMIC PERFORMANCE

It is assumed here that most analyses of markets in less-developed countries will be concerned with assessing and determining ways of enhancing economic performance. However, many elements are often implied by this term. The most commonly used of these are defined below, and the means of measuring and enhancing them are briefly discussed. Market performance is then defined as the way in which markets and marketing contribute to various aspects of economic performance.

Performance criteria are here divided into two categories, those respectively related to economic efficiency and other performance objectives, as illustrated in the diagram below. These criteria are not exhaustive, and research projects may be directed at others, but it is hoped that the means of analysing markets described in this manual can be adapted for particular uses.

Figure 1 Performance Criteria

ECONOMIC EFFICIENCY OBJECTIVES	OTHER PERFORMANCE OBJECTIVES
Technical efficiency	Innovation
Operational efficiency	Inter-sectoral resource transfers
Exchange efficiency	Equity
	Employment
	Food security
	Co-ordination efficiency

Economic Efficiency Objectives

A market system, or parts of it, can be said to economically efficient if:

- all firms are productively efficient;
- the spatial distribution of firms, plant and infrastructure is organized to take advantage of scale and locational economies, and
- the operation of exchange generates prices which conform to a competitive standard (French 1977, p.95).

Economic or productive efficiency of an individual enterprise is dependent on both technical and operational efficiency as defined below. Helmberger (1968) coined the term 'O-efficiency' to describe the organization of market infrastructure in space, but means of measuring this remain to be developed and it is not covered here. Exchange efficiency, also referred to as market level allocative, pricing or economic efficiency, is defined and assessed here through reference to the neo-classical model of perfect competition (see Box 1:1).

Other Performance Objectives

Some so-called 'non-economic efficiency' performance criteria are also reviewed below in an attempt to take into account the most important caveats stemming from the assumptions of the neo-classical model of perfect competition. In less-developed countries the most important of these are:

- technological innovation;
- income distribution;
- food security;
- poverty.

The relationship between markets and each of these performance criteria is discussed below, but the means and extent of the contribution which the market makes to each criterion is very difficult to quantify or define, and often only qualitative evaluations will be possible. For example, with reference to increased economic growth, it is necessary to assess the optimal utilization of resources, and the organization of markets, over time, given uncertainty and change. However, "progress in formulating such a dynamic framework appears to have been very limited to date" (French, 1977; p.96). Despite this, the relationship between markets and economic growth can be addressed by studying the effects of the former on, for example, technological innovation; inter-sectoral resource transfers and effective supply and demand. In addition the relationship between markets and income distribution and food security need to be addressed, if only because they are major issues in the stated developmental goals of most LDCs. The data collected and analysed, as described below, in assessing the economic efficiency of markets, will be able to shed some light on these relationships.

MODELLING MARKETS

Following the definition of performance criteria, a multi-dimensional model of the form and context of agricultural markets is outlined, which can be used to organize research into economic efficiency. This model is based on the historical evolution of economic analyses of agricultural markets to date, which itself is reviewed. The model presented here can be divided into three distinct stages, as follows:

- the internal productive efficiency of the firm;
- the structure, conduct, performance school; and
- sub-systems analysis.

DEFINING PERFORMANCE CRITERIA

Economic performance is a complex, multi-dimensional concept, about which there is no agreed definition. Some important elements of it are set out below, but the list is not exhaustive, and the division of the criteria is inevitably arbitrary. Furthermore, because, in the rest of this manual, emphasis is given to economic efficiency performance criteria, other performance criteria command greater attention here.

These performance criteria are often contradictory and difficult to assess empirically. Moreover, the standards or norms against which to judge some of them are poorly developed. Therefore, performance priorities and trade-offs between criteria need to be defined, and performance indicators and operational approximations need to be used, and, in many cases, better developed.

Box 2:1 The Economic Performance Debate

In the debate surrounding economic performance, economists are divided in particular on the issue as to whether the standard neo-classical theory of economic efficiency, and the model of perfect competition, provide a sufficient definition of, and means of evaluating, economic performance.

The main arguments against using this theory, and the norms it provides for evaluation, can be divided into two groups, those which are critical of the static, informational and single market assumptions contained within the model, and those critical of the objectives defined by the model.

In response to the former set of criticisms, attempts have been made to develop the neo-classical model by reducing the simplifying assumptions, and incorporating into it uncertainty, information defects, multi-market and non-spot trading characteristics etc..

However, others argue that the performance of an economy must be evaluated with respect to non-economic, political and social objectives as well as those of the neo-classical tradition.

In this manual, the neo-classical model is used as a base for the evaluation of economic performance for two reasons. First, more dynamic models of economic efficiency, which take into account one, or more, of the neo-classical assumptions, are as yet less well-developed, and much more complex than that of perfect competition. Secondly, many LDCs are not democratic and the hybridization of neo-classical economics with theories of public choice and rent-seeking remains incomplete. Although this manual focuses on the neo-classical model of economic performance, analysts are encouraged to constantly refer back to the assumptions of the model of perfect competition and also to take into consideration various non-economic objectives in their research.

Economic Efficiency Performance Criteria

Technical Efficiency

Definition This refers to the efficiency with which resources are used in marketing, in terms of physical input and output ratios. A technically efficient firm, or market, produces the maximum possible output from the inputs used, given locational and environmental constraints, and it minimizes resource inputs for any given level of output. 'Neoclassical economic theory has traditionally assumed that firms operate with technically efficient production functions; since this is not always true in the real world, the determination of technical efficiency is quite important for applied economists' (French 1977, p.94).

Deviations from technical efficiency can stem from a variety of sources, including a lack of knowledge of available techniques or inadequate management due to lack of motivation, skills and/or personnel.

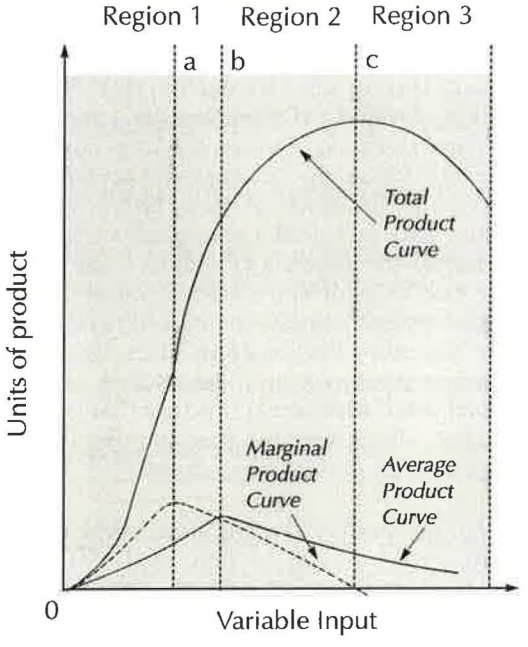
Assessment In order to assess and potentially increase the technical efficiency with which markets and marketing firms operate, inputs used and output produced must be identified and measured. It is unlikely that optimal relations between inputs and outputs will be specified, but relative levels of technical efficiency, or inefficiency, can be indicated by comparing differences between similar firms' levels of inputs and outputs. This will also help identify ways of improving technical efficiency.

To increase technical efficiency, either output must be increased relative to inputs, or inputs must be relatively decreased. Technical efficiency can be assessed both statically, with reference to existing technology, and dynamically, through predicting the effects on input/output ratios of technological, managerial or other innovations.

Examples Clear examples of measures of technical efficiency in marketing are provided by the rate at which raw materials are transformed into end- and by-products in processing, and the extent of qualitative and quantitative crop losses in handling, transport and storage. However, although some inputs and outputs related to marketing are relatively easy to identify and measure, others prove more difficult.

In general labour, capital and raw material inputs are easier to identify and value than management skills and risk taking. Indicators, or operational approximations, of the values of such inputs then have to be defined and deployed. For example, the premium of managerial over skilled labour or clerical salaries can be used to value management skills. Likewise, money lenders' subjective evaluations of the risk element in interest rates can be used to indicate the value of risk taking. Similarly, for output, volumetric and quality losses, and milling conversion rates, are easier to quantify than time, form, place and possession utilities, which are often seen as the ultimate outputs of the market system. 'The output of a supermarket, for example, consists of a service associated with assembling six thousand or so items in a convenient location where they are readily available to consumers. The measurement of this product is considerably more difficult than is suggested by the usual presentation of neo-classical production theory' (French, 1977, p.98). Usually the different prices consumers are willing to pay for various marketing services are used as indicators of the

Box 2:2 The Economics of Technical Efficiency



(a) Level of input use which maximizes the marginal product of the input; (b) point of maximum average product; (c) point of maximum total product.

The total product curve shows the level of physical output for each level of variable input.

The average product curve shows the ratio of total product to the quantity of the input used in producing it.

The marginal product curve shows the addition to the total product when one more unit of the variable input is used, assuming all other inputs are held constant.

The curves are drawn in a way that illustrates the common occurrence of diminishing marginal returns to increased application of inputs.

In Region 1, marginal product is greater than average product and each additional unit of input produces a greater than average level of input. It is therefore rational to continue to increase production at least until average product reaches its maximum.

In Region 3 marginal product is negative and total product is falling with each additional unit of input used. It is therefore not rational to produce beyond the point where marginal product equals zero, which is the point at which total product is at its maximum.

Region 2 is known as the region of rational production, since total product is increasing, albeit at a declining rate, and marginal product is still positive, although it is decreasing. Average product is also decreasing, but is greater than marginal product.

Technical efficiency can be measured through calculating the ratio of actual output to potential maximum output.

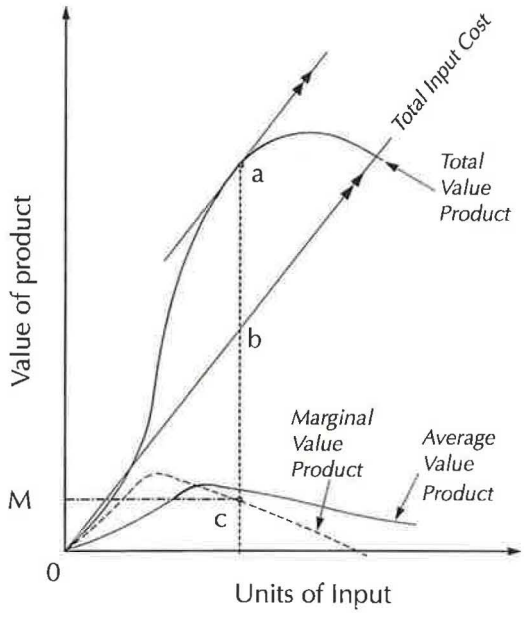
latters' values, but these may not always be easy to ascertain, and they more correctly refer to operational and economic efficiency criteria.

Data Researchers may be concerned with one or more aspects of technical efficiency and their specific objectives, together with data availability, will determine the sources of data used. For example, it is likely that many studies will be concerned with crop losses and spoilage in storage and/or transportation, information on which may be sought through government, academic and consultancy reports and/or through interviews with farmers, wholesalers, retailers, transporters and/or knowledgable observers.

Operational Efficiency

Definition This is usually defined as the provision of goods, or services, at least cost and at a level of output, or combination of inputs, which ensures that the value of marginal product equals marginal factor costs. Operational efficiency is also sometimes referred to as firm level allocative or pricing efficiency.

Box 2:3 The Economics of Operational Efficiency



(m) marginal input (or factor) cost; (ab) total profit; (c) intersection of marginal input cost and marginal value product curves

For the maximization of productivity in resource use, and of consumer satisfaction, welfare economics proposes that the price of each product should equal the marginal social cost and that the price of each input should equal the marginal social product.

Under perfect competition, the profit maximization objective achieves this condition. Profit is at a maximum where the vertical distance between the total cost and the total value product curves is greatest. At this point the slope of these two curves is equal and marginal value product (or the value of the product obtained from using the last unit of the variable input under consideration) equals the cost of producing the last unit of the output. Thus, the profit maximization condition holds that, for any given price, firms must produce that level of output which ensures that marginal costs equate with marginal revenues.

Under perfect competition, there is no difference between average, and marginal, revenue and therefore profit is maximized when price equals marginal costs.

The ratio of costs when optimal input proportions are used, to costs with actual inputs used, provides a measure of operational efficiency.

Assessment The key questions in assessing the static operational efficiency of markets, and of marketing firms, are whether, given current technology and infrastructure, the costs of marketing functions can be reduced, and whether the level of output/combinations of inputs are such that marginal revenues equate with marginal costs. There is likely to be an emphasis on the first of these since assessments of operational efficiency, like those of technical efficiency, will usually be directed at identifying means of incremental improvement.

Operational efficiency is therefore closely related to technical efficiency, since reduced physical and quality losses imply cost savings. It can be assessed by calculating the actual costs of various market functions and comparing these with:

- technologically feasible minima;
- the costs of optimal input proportions; and/or
- the costs incurred by other firms undertaking similar functions.

Again, some inputs will be obvious and easy to measure, and indicators and approximations will have to be used to value others. Similarly, there is likely to be a focus on comparing different, but similar, firms' levels of costs, and on seeking out means of reducing costs, rather than calculating optimal input proportions.

Having identified any inefficiencies, the causes behind them need to be investigated if means of understanding, or overcoming, them are to be found. The system's dynamic capacity for expansion, and further long-term cost reductions, for example, through managerial or technological innovation or infrastructural investments, can also be examined.

Examples There are many potential sources of operational inefficiency, including lack of incentives; inadequate information or managerial expertise and bottlenecks in input supply. For example, due to the seasonal nature of much agricultural production, capacity under-utilization in processing plants is a common problem. This could be reduced through increasing storage capabilities or through multi-product milling, but the costs, benefits and indirect effects of such programmes need to be examined.

Similarly, lack of competition in the market, and the cost minimizing and profit maximizing incentives associated with it, can lead to so-called 'X-inefficiency' (Leibenstein, 1966) and 'organizational slack' (Cyert and March, 1963). Thus, efforts to increase competition may simultaneously increase technical, operational and allocative efficiency.

Another common source of operational inefficiency in many LDCs is the lack of standardized weights, measures, qualities and grades which often makes visual inspection of products necessary. This not only increases the direct costs of buying and selling, but also inhibits longer distance trade, and therefore increased geographical specialization in production. Thus, both direct and indirect costs could be reduced if such standards were effectively instituted.

Box 2:4 Productive Efficiency

Productive, or firm-level economic, efficiency is the combination of technical and operational efficiency. The product of the measures of technical and operational efficiency, described respectively in Boxes 2:2 and 2:3, provides a measure of firm level productive efficiency. A technically and operationally efficient firm will have a productive efficiency index of 1.0. However, it must be noted that a firm may be productively efficient for its size but inefficient with reference to optimal scale, and the latter may vary with relative factor costs (French, 1977, p.95).

Research into productive efficiency may lead to improved marketing performance by:

- determining the relative efficiency of existing alternative production methods, scales of operation, and business practices, thereby aiding individual marketing firms to move to the most efficient production function for their environment, or to an improved position on a given production function, and
- formulating models of efficient organization within market areas or industries. The latter may serve as planning guides for industry groups, and as aids to policy formulation for public agencies and legislative bodies (French, 1977, p.96).

Exchange Efficiency

Definition This is also referred to as market-level allocative, pricing or economic efficiency and is both dependent on, and influential in, the above two efficiency criteria. Although debates on definition and measurement continue, the economic efficiency of the market usually refers to the combined effect of the productive (technical plus operational) efficiency with which marketing services are undertaken, and the degree to which the prices provide incentives to producers and consumers that are consistent with resource availabilities and demand.

Assessment To test the economic or allocative efficiency of markets, therefore, two factors must be determined: (1) the accuracy with which prices generated by the system reflect the real costs of production, and the real benefits of consumption; (2) the precision with which they are transmitted through the system.

There are no direct means of assessing the degree to which actual prices reflect social costs and benefits, and therefore methods rely on the hypothesis that perfectly competitive markets maximize the efficiency of resource allocation. High degrees of competition in the market should provide the incentives to ensure firm-level productive, as well as pricing, efficiency. Thus, analyses of market-level economic efficiency start by evaluating the degree of competition in the market.

Indicators of the state of competition in the market include the following, which are all reviewed in more detail in Chapter 4:

- Qualitative assessments of the presence of the conditions of the model of perfect competition;
- Seller-concentration ratios;
- Correlations between price movements over space, time and form;
- Cost and return elements in unitary market margins;
- Rates of profitability of marketing firms.

It is important in all analyses of economic efficiency to recall that markets may be more or less competitive in particular areas, times, commodities, functions, levels of marketing activity, scales of operation, etc.. For example, in the post-harvest period, a number of petty traders/farmers may enter the market for a short time, but constraints on storage may result in monopolization of trade in pre-harvest periods. Similarly, competition may be stiff at the retail level of food marketing, where capital requirements to entry are not prohibitive, but wholesaling may be oligopolistic.

It is also crucial in assessing economic performance to:

(a) Combine various types of analyses, since all are only indicative of competitiveness and none on their own can be held to be conclusive;

(b) Establish the sources of apparent imperfections, since the means to overcome them need to be identified and not all of them will necessarily result in efficient resource allocation; and

(c) Return therefore to the assumptions of the model of perfect competition and non-economic efficiency objectives, to weigh up the costs and benefits of apparent imperfections. For example, where natural economies of scale exist, oligopolistic markets may result in a more efficient allocation of resources than competitive ones.

Other Performance Criteria

Inducing Innovation

Technological, institutional, product, managerial and other innovations can be generated within the marketing system, and the market can also induce innovations in sectors of the economy to which it

is linked. These should reduce costs and increase resource productivity and/or production and output, and thus contribute to real economic growth and increased per capita incomes in the long term. Thus, the degree to which markets encourage or inhibit such innovations, and their subsequent adoption, should be assessed.

Box 2:5 Innovation and Competition

There has been much debate within economics on the relationship between competition, or static economic efficiency, in markets, and innovation, or dynamic efficiency.

It has been traditionally argued that competition between firms provides sufficient incentive to innovate, because innovating firms are able to capture the short-run benefits of reduced costs whilst prices remain stable. In the longer term, more firms adopt the innovation to reduce their costs, and thus prices fall back to a competitive equilibrium as output rises, or competition between firms pushes the price down.

Further, it has been argued that competitive markets induce an efficient rate and direction of innovation, such that they reflect relative factor scarcities, and the most binding constraints on increased output, or reduced costs, are lifted first (Hayami and Ruttan, 1971; Ruttan and Hayami, 1984). This theory of induced innovation is based on Hicks' (1932) argument that competitive entrepreneurs sought out specifically labour-saving technology when wages rose, rather than innovations aimed at saving all factor costs.

However, Schumpeter (1942), Galbraith (1956) and others argue that intense competition inhibits innovation, because it means greater risk and uncertainty, less capital accumulation to invest in research and development, and a limitation on the period of time over which the benefits of innovation can realized.

Similarly, Harrison *et al.* (1987, p.86) argue that, in Latin America, intense competition and the risky environment this creates leads to increasing conservatism in marketing rather than increased efficiency.

The debate continues, but Scherer (1980) in summarizing it, concludes that a "bit of monopoly power in the form of structural concentration is conducive to invention and innovation...but a very high concentration has a favourable effect only in very rare cases and more often it is apt to retard progress by restricting the number of independent sources of initiative and by dampening firms' incentive to gain market position through accelerated research and development".

Assessment Progress and innovation are very difficult to measure. In the West, various indicators like the level of firms' expenditure on, or employment in, research and development, and the number of patents received as a percentage of sales, are used as indicators. These measures have been analysed comparatively in determining the relationship between the competitiveness and 'progressiveness' of various industries. Thus, not only is there no absolute standard by which to judge optimum levels of research expenditure, but such data will certainly be unavailable for the majority of food-marketing enterpises in LDCs.

Some examples of potential innovations in LDC marketing are provided below. However, such innovations may lead to economically inefficient, oligopolistic structures and pricing; have adverse effects on income distribution and may not always be progressive (Harriss, 1981, p.100). For example, vertical integration can lead to cost savings and more stable and reliable producer prices, but the reduced costs of marketing may not be passed on to producers and/or consumers, and vertically integrated firms may be able to exert local control over the market by undercutting other traders. Alternatively, diversification may be aimed at reducing risk, rather than increasing output, or minimizing costs. This would imply a decrease in economic efficiency in the static neo-classical sense, but since the latter does not take into account the uncertainties of the real world, such innovations may prove to be economically efficient in the longer term. Therefore, it is important to assess the implications of potential innovations for, and to evaluate the trade-offs between, different objectives, including producer returns, entry into the market, consumer satisfaction and prices, and the responsiveness of the market to changing demand, technologies and relative prices.

By analysing the operation of markets in detail, and in particular the costs of the functions undertaken, potential innovations which would lead to expanded capacity and/or increased technical, operational or economic efficiency can be identified. Much 'marketing development' to date has taken the form of infrastructural investments, without prior assessments of market participants' needs. For example, if the majority of traders lack the finance to buy produce, improving the quality of market places is not likely to have substantial impact on the capacity and economic efficiency of the market.

Examples Often there will be few feasible innovations open to small marketing enterprises in LDCs, but active marketing can play an important role, in inducing the adoption of externally generated innovations in the agricultural sector, and this should be examined. For example, the market may encourage or inhibit the adoption of technologies designed to increase production and productivity in agriculture.

Inducing innovation in the agricultural sector It is often argued that, due to the price fluctuations implied by relatively free markets, governments have an important role in stabilizing producer prices to reduce the risks of adopting new technologies – hence the common existence of floor pricing policies. Conversely, one of the most important justifications of food market liberalization in many countries was that anti-agricultural state pricing policies had lead to a depression of producer prices, which inhibited both increased food production and marketing, and the adoption of high-yielding technologies.

Another example of the effect of markets on agricultural progressiveness is provided by Harriss (1978, p.13). In her review of the literature on agricultural marketing in West Africa, she argues that the market simultaneously serves to commercialize agriculture, and inhibit investment and progress in it, by forcing small farmers to sell their produce early in the season, while later in the season they work on larger farmers' land and borrow money in order, for example, to buy back food requirements.

Marketing innovations Within the marketing systems of LDCs, most innovations are likely to be of an organizational nature. In the common context of poor information and small-scale dispersed production, various institutional arrangements, or management practices, may increase operational efficiency; enable the realization of potential economies of scale and/or reduce marketing risks and costs.

For example, new vertical and horizontal linkages may be forged like vertical integration and forward buying; flexible credit relations may be instituted and co-operation between traders or producers, for example, in organizing transportation and storage are possible. Firms may diversify their businesses through adopting new commodities and functions, or they may instigate new management practices – like ordering stocks by telephone or letter and using banking facilities for payments.

Inter-Sectoral Resource Transfers

In addition to inducing various innovations, markets also play a potentially key role in the extraction of resources from agriculture. Since most LDC economies are largely based on this sector, and economic diversification is one facet of development, the role markets can play in inter-sectoral resource allocation is important in determining the direction of such development. However, there will always have to be a trade-off between the rate of extraction of resources from, and the rate of growth in, the agricultural sector, and this again needs to be defined and evaluated.

In assessing the magnitude and direction of inter-sectoral transfers engendered through the market, Harriss (1981) suggests the following are indicative:

- the domestic terms of trade;
- the taxation of marketing firms and the use to which such revenue is put; and
- the profitability of trade, the origins of trading capital and the sectoral direction of investment of profits over time.

Equity and Income Distribution

Most LDCs exhibit a highly skewed income distribution and, more importantly, levels of income which engender conditions of abject poverty for the poorest. It is doubted that markets can play a significant role in improving income distribution, but they certainly strongly influence it, and it is often argued that they exacerbate inequalities. Given that markets can substantially affect the distribution of income, and that greater equity is often claimed to be a primary developmental goal, analyses of the nature of the relationship between markets and equity are important.

Box 2:6 Equity and Economics

In neo-classical terms, economic efficiency has as its main objective the maximization of output and utility for whole economies. It is only socially optimal if income distribution is universally agreed to be acceptable, which is an impossible condition. It therefore does not address the equity problem directly, but through analysing markets using neo-classical tools, various insights into the ways in which markets influence inequality can be attained. These can then be used to predict the effects of various markets on income distribution, and to inform the design of policies and projects aimed at alleviating inequality. Such analyses can, for example provide an indication of the degrees of inequality within the marketing system itself; the origins and the means of reproduction, or exacerbation, of this inequality, and the effects of the market on income distribution outside the marketing system.

Definition The term equity is most commonly used to refer to the distribution of income between undifferentiated individuals, but it is also important to look at the distribution of income between men and women; those of different ethnic origin, between various regions within a country, and between different age groups.

Assessment Much information on the way in which markets impinge on income distribution can be obtained through an examination of:

- the differences in prices received, or paid, by various socio-economic, gender or ethnic categories of farmer, trader and consumer;
- the inter-sectoral and inter-spatial resource transfers implied by market prices;
- credit, marketing and employment relationships between large and small farmers; traders and farmers, and between different categories of trader;
- degrees of inequality in assets; annual turnover and profitability between different types of trader;
- owner-operator and employee relations, and
- the gender, ethnic and age characteristics of those involved in marketing.

Examples A number of factors should be investigated when examining the origins and reproduction of inequality within the market system itself: the rates of return to various-sized operations, the degree of upward mobility within the marketing system, the ethnic and gender distribution of marketing participants in relation to individuals' functions, and the functions and sizes of enterprises.

The way in which markets reproduce inequalities outside the system is often seen through the differential prices paid, and received, by different groups. For example, poor consumers may pay higher prices for their food, because they purchase in smaller quantities than wealthier ones. Similarly, poor farmers may receive lower prices for their output because they sell in smaller quantities; they are unable to store their produce, and/or because they are locked into debt relationships with their buyers.

With reference to inter-sectoral inequalities, available price series data often demonstrate that the internal terms of trade have turned against agriculture over time. This may be due to inelastic demand for agricultural products, monopsonistic food markets depressing producer prices, market power located in the non-agricultural sector, or government policies which act against the agricultural, or food-producing, sector. Similarly, analysing price series data may demonstrate increasing regional inequalities.

Policy and Income Distribution Various market interventions to improve income distribution may be identified through such market analyses. Market imperfections often act against poorer consumers, producers and traders disproportionately, and increasing competition in these circumstances could also improve income distribution, through its effects on prices, access to the market, and levels of profitability.

In competitive markets, the returns to economic activities should be proportional to resources invested, costs assumed, and risks and responsibilities undertaken. Similarly, where imperfect markets lead to higher and more unstable food prices, poor consumers are taxed to a greater degree than wealthier ones, because the former spend more of their income on food than the rich and their price elasticity of demand for food is higher.

Likewise, in many LDCs, smaller farmers are often net consumers of agricultural commodities, whereas larger, wealthier ones are net suppliers. Reducing the price of food, through increasing market competition and capacity, or reducing the costs of production and/or marketing, should therefore improve income distribution directly, but it can also have indirect beneficial effects. For example, lower food prices may increase demand for food products, which could lead to increased incomes and employment opportunities in the food and input production and distribution subsectors.

Alternatively, whilst recognizing the superiority of the market in terms of efficiently allocating resources, projects and programmes may have to be separately designed to counteract the inequalities markets may produce. Thus, various targeted subsidization programmes could be operated alongside the market. For example, poorer market participants' access to resources, such as storage and finance, could be enhanced through specific subsidy projects. This could empower smaller traders' market position, relative to those who already have these resources, as well as increase competition. However, there remains a great need for better measures of income distribution, and also for other indicators of equity performance.

Markets and Employment

Analysing the relationship between marketing and employment is also important, not only because stable and full employment of all productive resources is one of the conditions of perfect competition and is necessary for the maximization of productive potential, but also because creating employment is often seen as one means of improving income distribution (Timmer, 1984, p.119).

In imperfect markets, levels of employment will be partly determined by technical, operational and economic efficiency, since market power can lead, among other things, to an inflationary bias and excessive unemployment.

Once again, means of defining and measuring under-employment in the marketing system, and its effects in other areas of the economy, remain problematic. Despite this, the potential effects markets, and market interventions, may have on employment and inflation, can at least be taken into account in research.

For example, it has been argued that private trade is more labour-intensive than alternative forms of trading organization and requires much less capital for slightly less labour productivity (Harriss, 1981, p.8). Similarly, the effects markets have on foodgrain prices can have implications for employment. Mellor (1984, p.152) argues that, where increased food grain prices lead to an absolute reduction in the consumption of other goods and services by higher income groups, employment opportunities are significantly reduced as a result of the decline in real income suffered by these

classes. The presence or absence, and levels, of barriers to entry into markets may also affect the employment of resources in an economy.

Food Security

Markets, through their influence on incomes, prices and commodity flows, play a crucial role in determining national levels of production of, and consumer access to, food. There is a critical policy dilemma here between attempts to increase levels of food production nationally, and those aimed at ensuring all consumers have access to subsistence levels of food throughout the year. Not only do increased national levels of food production provide current insurance against poor harvests, natural disasters and volatile world food markets, but, in the long term, they may provide for lower food prices and improved consumer access to food. However, in the short term, providing farmers with the incentives to increase agricultural production and productivity, is likely to have a major negative impact on the consumption of the poor, especially those not engaged in agriculture. This dilemma is particularly stark in food price policies, where consumer and producer, and long- and short-run, goals are diametrically opposed.

Assessment and Data Therefore, in looking at the relationship between food markets and food security, two important research issues often have to be addressed. Firstly, the effects markets are currently having on production and consumption must be defined, and secondly potential means of reducing disincentives in production and/or nutritional inadequacies must be identified.

Consumption The degree to which marketing and production, together, meet current demand in physical terms, can be evaluated. Insights into this can be gained by examining the effective availability of food throughout the year for different groups of consumers, and defining gaps in such access, along with their causes. For example, absolute levels of supply may not meet demand; physical flows may be interrupted; or some consumers may lack access to food at certain times of year due to excessive prices relative to incomes.

Thus indicators of the effects markets have on consumption can be provided through analysing:

- the stability of volumes of food flowing through consumer markets;
- the levels and stability of consumer market prices, particularly those paid by poor consumers buying in small quantities; and
- the ratios between various consumer incomes and food prices.

Some of this data may be available from secondary sources but, where time and resources allow, surveys and interviews enquiring into volumetric flows and price ranges are often preferable. Poor consumers are often not represented in survey data and particular efforts must sometimes be made to obtain information on the nature of their access to food.

Production The market availability of inputs and the price ratios between different inputs and outputs, need to be calculated for different crops grown on various sizes of farms, in a number of representative locations. Again the following are indicative of the relationship between food markets and food security:

- the stability of volumes of food flowing through producer markets;
- the level and stability of producer prices – particularly those received by small farmers;
- the ratio between input costs and output revenues.

Other factors influencing producer responsiveness to price incentives should also be assessed. For example, evaluations of extension and credit services may be available; the availability and price of high-yielding technology and consumer goods in rural areas can be noted; and the economic efficiency of input markets questioned.

Food security policy In terms of identifying policy options in facing the food security dilemma, there now appears to be a growing consensus amongst economists that, in an environment of rapid change, an increased reliance on the market will generate better long-run economic performance in production, than reliance on the public sector, and that equity and nutritional objectives should therefore be addressed through the design of specific programmes and projects, within a competitive market context.

However, by assessing how and to what extent the market provides adequate and affordable diets for the population, and so contributes to national level food security, interventions can be designed that work with the market. These may be more effective, in terms of meeting food security objectives and minimizing budgetary burdens and production disincentives than those which take no account of the market. For example, deficiencies in consumer access to required foods can be the result of low incomes, inadequate supplies and/or high prices. Which combination can inform government policies on producer floor pricing, input supply, consumer and producer subsidization, food imports and food aid distribution.

If the market is operating to provide available supplies at minimum cost, but low levels of production or storage lead to seasonally high prices, in the short-term, food aid could be distributed through the market at lower prices, and in the long-term, programmes aimed specifically at enhancing production and/or storage can be implemented. If however, market imperfections are the cause of high prices and these cannot be overcome in the short-run, alternative distribution policies will have to be designed.

Co-ordination Efficiency

Definition This refers to the degree to which effective consumer demand is met by the production and marketing sub-sectors, and to which supply and demand are equalized at all levels of the marketing system. It is therefore closely linked with food security since consumer needs are transmitted to food producers through the marketing system. If the signals do not get transmitted, or traders are unable to respond to them, both producers and consumers will be taxed.

Harrison *et al.* (1987, p.57) define a well-co-ordinated food marketing system as one in which:

- consumers receive stable, adequate and reasonably priced supplies;
- consumer and producer prices reflect biological production patterns;
- storage, transport and processing costs equate with the differences between prices in time, form and space;
- returns to farmers encourage production which satisfies consumer demand; and
- markets clear.

The neo-classical model of economic efficiency assumes consumer sovereignty, and subsequently focuses on the utilization of resources in production. Economically efficient markets should stimulate the production and distribution of the combinations of produce, and related services, that best reflect consumer preferences and real relative costs of production. However, given imperfect markets, and the importance of markets in individuals' access to food, the degree to which consumer demand is being recognized and met by the market can justifiably be analysed separately from economic efficiency issues.

Economic and co-ordination efficiency The potential role of efficient price formation and transmission, in determining effective co-ordination, is important and should not be ignored. For example, the financial returns to farmers, in combination with other factors, influence their production decisions, and hence the relationship between the quantities and qualities produced, and those of aggregate demand. It has long been assumed that moving towards the conditions of perfect competition will improve markets' responsiveness to consumer needs. In some cases this may be sufficient for the effective physical co-ordination of the marketing system, but in LDCs other factors are also often

necessary. As Shaffer *et al.* (1985, p.310) point out, while economic efficiency is important for the static allocation of resources, it only relates to marketed surpluses and does not have a role in the effectiveness of supply and demand co-ordination and its potential contribution to increased productivity.

Physical infrastructure and co-ordination efficiency Physical infrastructure is important; in particular that which enables traders to move commodities through time and space and provides all market participants with access to market information, means of communication and regularly used market places. Jones (1970) suggests that, over time, traders' profit maximization behaviour should lead to an effective demand for such facilities, but given the 'infant industry' status of private trade in many countries, means of enhancing market capacity and co-ordination efficiency, may legitimately be analysed separately from competition and static economic performance.

Institutional organization and co-ordination efficiency Various institutional forms, like vertical integration, trader associations, farmer organizations, consumer co-operatives, and fixed contractual arrangements, may also enhance co-ordination, through the improvement of information and financial flows. For example, the vertical integration of production and marketing, within a single firm, centralizes information on consumer preferences and production possibilities, and hence improves the accuracy, and timely availability, of such information. However, it may also inhibit pricing efficiency, through diminishing the role markets play in price determination, and reducing competition. Therefore, the relative costs and benefits of each institutional form have to be evaluated in relation to objective priorities.

Assessment In order to examine co-ordination efficiency, consumer demand characteristics must be delineated and the means by which production and marketing respond must be evaluated. In food marketing, the following can be assessed, although they are often difficult to quantify and, therefore, once again, the use of indicators may be necessary:

- the stability and adequacy of supplies of nutritious and preferred foods;
- consumer access to such foods in terms of location of sales and price relative to income; and
- the returns to, and the timely availability and price of, inputs necessary for different types of food production.

On the consumption side, Harrison *et al.* (1987, p.41) suggest that locational convenience, product assortment, regularity of supplies and relative prices in upper, middle and lower income neighbourhoods, can indicate the degree to which the system provides a relevant price and quality mix for each consumer group. If poor consumers are paying more for their food than wealthier ones (including the costs of travel to the point of purchase) some inefficiency is implied, whether couched in co-ordination, pricing and/or equity terms.

Similarly, indicators of the effectiveness of co-ordination can be provided by questioning farmers about their cropping decisions, and the reliability of, and prices on, their input and output markets, and ascertaining whether traders actively promote products, and/or relay information to producers about consumer demand.

It is often alleged that traders in LDCs are passive co-ordinators, that they tend to accept a surplus and do their best to sell it profitably, but do not identify and promote new markets or potential means of improving supply to meet existing demand. If this is substantiated, then means of encouraging more active co-ordination on their part should be sought. For example, Harper and Kavura (1982) suggest that training and assisting traders to become active co-ordinators may be important in promoting producer and consumer satisfaction, and thus increased productivity.

Again, both static and dynamic aspects of co-ordination efficiency can be addressed. For example, the ability of production and marketing to respond to qualitative and quantitative changes in effective consumer demand is important, since both these are expected with rising population and incomes.

Contradictions and Trade-offs

There will always be some contradiction between these performance criteria and thus trade-offs will have to be accepted, and objectives prioritized. For example, there has been a long debate on the extent to which the means of enhancing equity and economic efficiency conflict, at least in the short-run. Likewise, maximizing technical efficiency may be deleterious to employment levels, or to economic efficiency if scale economies exist, and it engenders monopoly power. Stiff competition in the market place may inhibit technical innovation due to the risks and low profit margins implied. We have already seen that the high transaction costs of buying from small and dispersed producers, together with the lack of good market information, has often led to various institutional arrangements, like forward buying and vertical integration, in order to reduce risks and costs. However, these may also lead to inefficient pricing, depressed producer prices, and greater inequality in income distribution through monopoly controls. Therefore, the reduced costs of marketing implied have to be assessed alongside these disbenefits.

The emphasis of particular criteria over others will necessarily entail subjective judgement and political decision making. However, the costs and benefits of trade-offs can be evaluated, and the rationale behind choices or policy recommendations made explicit. A systematic framework of objectives is therefore crucial in policy research, since although it is impossible to trace all effects comprehensively, policies designed to achieve one goal will influence other dimensions of performance. By constructing a trade-off matrix the most important relationships between objective criteria can be identified and characterized, as illustrated in Box 5:3.

A CONCEPTUAL FRAMEWORK FOR MARKETS

The specific focus of any study will be dependent on project objectives. Here, the primary emphasis is on economic efficiency, but even then the terms of reference may require analysts to focus on the efficiency of a particular market function like storage; the operations of one type of participant like retailers; or the marketing of one commodity or group of commodities. Whatever the scope of the study, a conceptual framework of markets aids the organization of research and allows the incorporation of systemic connections.

Reviewing the historical evolution of the economic analysis of markets and marketing reveals two important implications for current research into the performance of marketing systems. The first is that the field remains theoretically underdeveloped and that therefore (a) much research is necessarily of an inductive nature, and (b) there is a need to combine various types of research and information in assessing performance criteria. The second is the need to combine analyses of the following since they all have a major impact on performance, however defined:

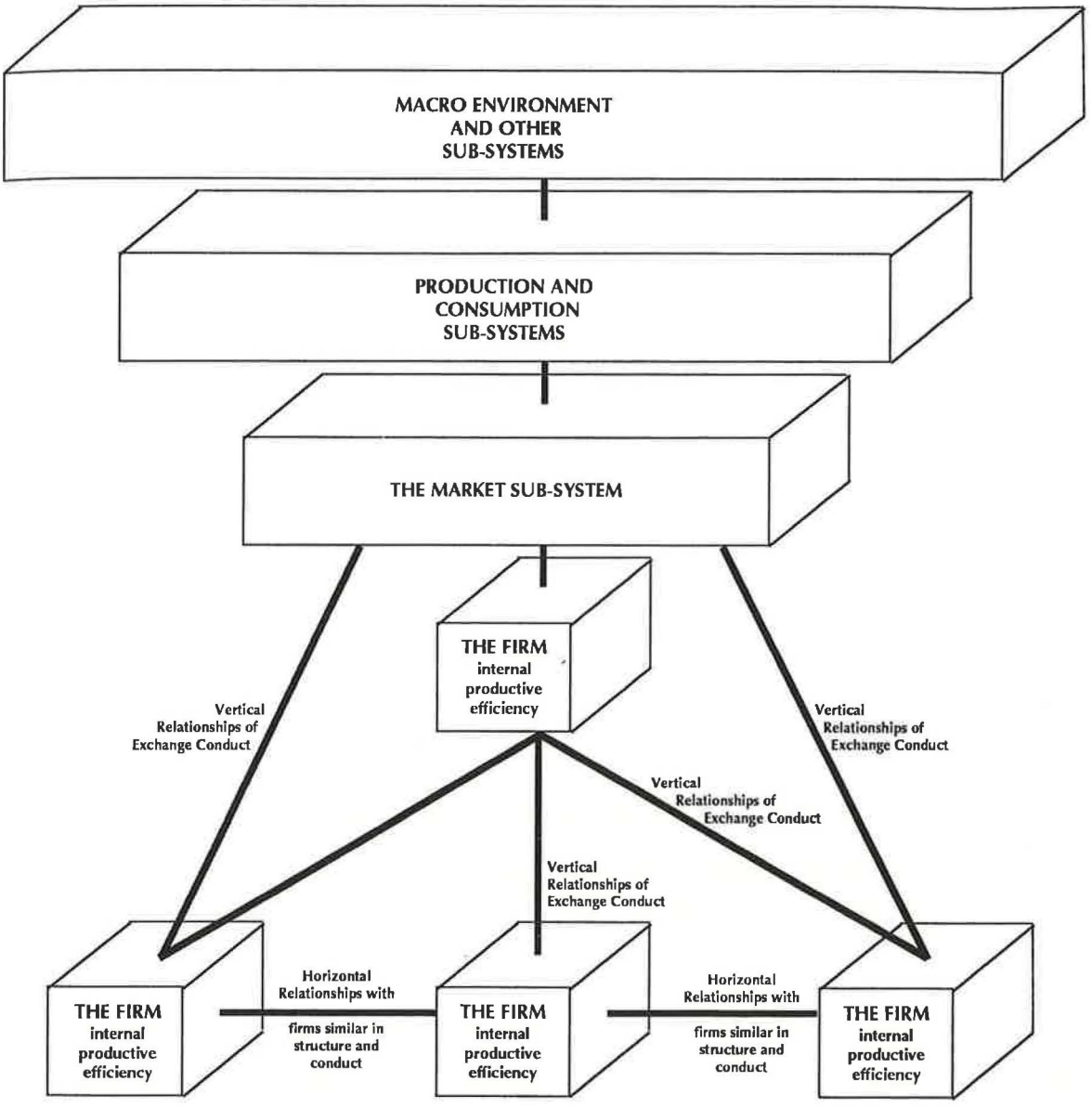
- the internal technical and operational efficiency of the activities of enterprises;
- the degrees of competition between functionally similar firms, i.e. 'horizontal' relations;
- the nature of the relationships between different categories of firm within the marketing system, particularly those of exchange, i.e. vertical market relations; and
- the relationship between the marketing, production and consumption systems and various environmental characteristics, i.e. systemic and environmental relations.

Figure 2 depicts this conceptual approach to studying the economic efficiency markets and will provide a basis on which to discuss methodological means of analysis.

The Historical Evolution of Economic Analyses of Markets

Reviewing the historical evolution of economic market analyses helps organize research. In the 1940s and 1950s the main emphasis in marketing economics was on the internal technical and operational

Figure 2 A Conceptual Framework of Markets



efficiency of marketing firms. In this intra-firm organization, management structures, motivation and incentive arrangements, and decision-making rules and processes, were seen as important influences on the efficiency of operations.

However, by their very nature, markets are systemic and all elements within them are linked. Since the 1960s, this characteristic of markets has increasingly been emphasized in defining means of analysing their efficiency. For example, the so-called structure, conduct, performance, or industrial organization, school focuses on the behaviour of groups of similar, rather than individual, firms, and the influence the horizontal relationships between these firms has on market performance.

Similarly, the 'food systems framework' developed by Michigan State University, stresses vertical and horizontal relationships between the participants, institutions and functions related to a commodity, or group of commodities. All three of these main schools of marketing economics will be reviewed here, in order to provide a basis for a methodological framework.

The Internal Productive Efficiency of Marketing Enterprises

French (1977, p.160), in his thorough review of the literature on the analysis of productive efficiency in marketing, argues that we now have a good static theoretical framework for measuring costs, and analysing the efficiency, of individual firms. He divides approaches to estimating firm-level economic efficiency and cost relationships into three groups as follows:

- descriptive analyses of accounting data;
- statistical analyses of the same data, using econometric methods to estimate production function relationships; and
- analyses which combine physical production and cost relationships, using engineering, biological and other types of data on inputs and outputs of the production fucntion.

All are aimed at the objective of improving technical and/or operational efficiency, but to this end, they have different sub-objectives. Only the first method will be reviewed here, because it is the least demanding in terms of time and data, and because it is more easily accessible to market participants. The other techniques are unlikely to be possible under the constraints of the type of research envisaged.

Descriptive analyses based on accounts data are used to calculate average costs, and provide standards and data for cost comparisons between different types or sizes of firm. Various hypotheses can then be formulated to explain any differences in costs, by qualitatively assessing organizational characteristics of the firms. However, there is a danger in attempting to make generalizations about, and postulating causality between, the relationships between costs and firm characteristics because there are so many factors which can, and do, affect costs. For example, amongst other factors, economies of scale, different production techniques and organizational structures, location and environmental conditions, vertical or horizontal integration, managerial and other employee efficiency, remuneration and motivation, capital intensity, capacity utilization, rates of physical crop losses, and input prices all affect the costs of producing marketing services. These may or may not be easy to evaluate. For instance, ways of assessing managerial performance remain poorly developed. Aside from this problem of inference, assessing the internal productive efficiency of firms may also prove difficult due to non-availability of reliable data, and the need to standardize costs across various types of firm, using different accounting methods. However, this method is the simplest, and least data-hungry, available, and will therefore be returned to in Chapter 4.

The Structure, Conduct, Performance School

This provides a broadly descriptive model of the nature of various sets of market attributes, and the relationship between them and performance. The emphasis is not on the internal organization of firms, but on the relationships between functionally similar firms, and their market behaviour as a group. Its basic tenet is that, given certain 'basic conditions', the performance of particular industries depends on the conduct of its sellers and buyers, which in turn is strongly influenced by the structure of the relevant market.

The school is not unified and there is much on-going debate within it. Despite being imprecise and controversial, a simplified outline of the approach is provided below, because it "provides the only well developed framework for examining behaviour of imperfectly competitive markets" (Marion and Mueller, 1983, p.17).

Performance is, as always, defined variously and much debated. Commonly the following characteristics of an industry, and its markets, are referred to, although the focus is usually only upon the first two:

- productive and allocative efficiency;
- 'progressiveness',
- equity, and

- employment.

Conduct refers to firm behaviour, for example pricing and selling policies and tactics; overt and tacit inter-firm co-operation, or rivalry, and research and development activities.

The structure of the industry, or market, is defined as 'those characteristics of the organization of the market that seem to exercise strategic influence on the nature of competition and pricing within the market' (Bain, 1968, p.7). Three characteristics are usually stressed, namely the number and size distribution of firms in relation to the size of the market; the presence or absence of barriers to entry facing new firms, and physical, or subjective, product differentiation. In addition, the ratio of fixed to total costs, and degrees of vertical integration, are sometimes examined.

Basic conditions refer to environmental, and supply and demand, characteristics which are exogenous to the market. They include for example legal and infrastructural frameworks, government policies and cultural evaluations of co-operation or aggressive individualism, the location and ownership of essential raw materials, the nature of available technology, the durability of the product, temporal patterns of production, commodity weight:value ratios, the adequacy of grade descriptions, the degree of workforce organization, the price elasticity of demand at various price levels; the availability of, and cross-elasticity of demand for, substitutes, the rate of growth and variability of demand over time.

Although the primary direction of determination is from basic conditions and structure, to conduct to performance, feedback effects are permitted. For example, sellers co-ordinating their prices, a behavioral characteristic, may affect the structure of the market by raising barriers to entry. However, these are rarely assessed, and usually analyses begin with a definition of structural characteristics, which are then used to classify industries, or their markets, somewhere on a continuum between pure competition and absolute monopoly. These classifications then form a basis for predicting firm behaviour and economic performance.

The most important hypothesis generated by this school holds that, as market or industry structure moves away from that depicted by the model of perfect competition, the degree of competitive conduct will decline and there will be a consequent decrease in output and allocative efficiency, and an increase in prices. But all classification systems have limitations in providing a base from which to make predictions, and many industries and markets cannot be adequately defined by these structural categories. For example, markets may be fragmented, in the sense that at different levels, or times of year, they have different structures and this model is unable to cope with such fluctuations.

Problems faced by the school The school has been subject to much, and varied, criticism, but probably the two most important weaknesses are the degree of inference concerning behavioral and performance characteristics, and the types of indicator used to assess the latter.

The structure of a market may provide the conditions for potential types of firm behaviour, but there is no necessary fulfilment of these, and therefore structure cannot be held to be absolutely deterministic of conduct and performance. For example, aggressive rivalry between a few firms may ensure that structurally oligopolistic markets exhibit characteristics of conduct and performance akin to those of the perfectly competitive model. Similarly, where significant scale economies exist, oligopolistic market structures may provide for better economic performance than atomistic and competitive ones. However, within this paradigm, there has been a tendency for inference to be accepted as proof – i.e. to leap from structural categorizations to performance characteristics.

Industrial organization studies have largely concentrated on structure and performance, and, in particular, the relationship between industry concentration and firm profitability as indicators of these, whilst conduct has been relatively neglected. This is probably due to data and measurement difficulties and the underdeveloped nature of the theory. As Helmberger *et al.* (1981, p.553) point out 'in the absence of total independence and explicit collusive agreement,...it is difficult to observe and record the nature of competitive processes'. Thus, the determinants and effects of types of market conduct remain poorly understood. For this reason many continue to support the focus on structure,

and the inferential approach towards conduct. However, it can be argued that, through qualitative interviews and alternative research techniques, behavioral characteristics can be researched further. Similarly, the emphasis on the relationships between firms has lead to the neglect of the internal organization of firms and basic conditions as potentially major influences on the nature of competition in a market.

Empirically defining the structure of markets in LDCs can be very difficult. However, the conceptual categories of structure, conduct and performance are useful organizational tools in research, and analysing structure enables the formulation of hypotheses about conduct and performance, which can then be tested through other means. Therefore means of analysing structural characteristics of markets are reviewed in Chapter 4, but it is stressed that these types of analyses should be combined with others, and that they should be used solely to generate hypotheses, not conclusions, about the competitive nature of markets.

The Food Systems Framework

In the late 1960s, Shaffer (1968, 1973) argued that there was a need to examine the nature of vertical, as well as horizontal, relationships between firms in assessing market performance, and to identify binding constraints on, or in, the system, and opportunities for enhancing its productivity and performance. This lead to the development of the food systems, or sub-sector, framework.

It is based on the concepts of structure, conduct and performance, but attempts to broaden, and inject a more dynamic aspect into, the model. To this end, it goes beyond industry boundaries and assesses structure and conduct vertically and horizontally over the entire commodity flow from input supplier to ultimate consumer. The rationale behind this extension is that structure and behaviour at one level in the system, influences those in others. By analysing the structure of the whole sub-sector, hypotheses concerning the effects of the nature of vertical co-ordination between different, but related, industries, on market and economic performance, can be developed. (The French concept of *filière* also takes the importance of vertical integration and vertical linkages into account. Broadly *filière* means a commodity production and marketing chain.)

The food systems framework also advances the structure, conduct, performance model, in addressing the potentials for change in the structures of supply and demand, and in particular the role markets can play in bringing these about. It therefore examines the problems of economic development and the static nature of the neo-classical model of perfect competition more directly. Thus, the economic, infrastructural and institutional environments in which markets are operating are not taken as given, but are studied in terms of (a) their impact on market performance, and (b) the constraints on and opportunities for markets to contribute to improved economic performance.

Such constraints and opportunities are defined through interviews with market participants and local political leaders concerning their subjective evaluations, as well as through classical market analysis tools. The identification of managerial, institutional, technological and other innovations which would then lift constraints, and aid the realization of opportunities, is then stressed.

There are two further aspects of the commodity systems approach. Firstly, it explicitly recognizes the importance of joint products (e.g., at the farm level – cotton and cotton seed; at the marketing level – channels which handle a number of commodities). Using a commodity systems perspective, it is possible to compare a number of distinct multi-commodity, marketing systems handling a related series of products. For example, the following could be compared: small-scale informal traders, large-scale private traders, co-operative systems and parastatal traders. Secondly, it allows for the fact that enterprises may use the same facilities for producing/handling a number of commodities. For example, where a farmer produces and markets sorghum, millet, sunflower and cotton, an analysis which assumed that there was a such a thing as a sorghum marketing system would run the danger of obscuring important complementary and substitutional activities.

In practice, in specifying the boundaries of sub-systems, the policy analyst has to make pragmatic judgements to:

- define a set of activities which have sufficiently strong inter-linkages to be sensibly described as a system or sub-system; and

- arrive at a definition of a system which makes sense for the policy problem under examination.

A comprehensive, standardized analytical and methodological approach has yet to be developed within this framework, but the emphasis on identifying constraints and opportunities, and on the interdependence between various markets and marketing functions, is important.

Chapter 3
Data Collection

- **narrowing the research agenda**
- **the availability and use of secondary data in LDCs**
- **rapid reconnaissance techniques of primary data collection**
- **data requirements for analysing the performance of agricultural markets**

This chapter discusses how and why to collect the basic data needed for any economic research in terms of primary data, secondary data, rapid-appraisal techniques.

In order to know what data to collect, one first has to know the aims and objectives of the research. Sometimes this has already been clearly defined by very specific project terms of reference. More usually, these terms of reference are vague and the analyst will need to take some basic decisions on how to narrow the research agenda to fit the budget and the time available.

Secondly, the chapter discusses secondary data in LDCs, in terms of sources, availability, use and evaluation.

Thirdly, the chapter describes rapid appraisal techniques of primary data collection and their use in analyses of the market. These techniques have become important for two reasons.

1. In a time of rapid change, policy decisions have to be taken very quickly.
2. Long-term research is very expensive.

Their limitations should be remembered, however, and they should be used in addition to, rather than instead of, more formal methods.

Lastly, the chapter gives many examples of the types of data needed for market analyses, together with their sources and uses. The examples are presented on the basis of the model in Figure 2.

DEFINING THE RESEARCH PROBLEM

Narrowing the Research Agenda

Attempting to analyse entire national food systems with reference to various performance criteria is very rarely possible, given limited resources. Thus, most studies of LDC markets narrow the research agenda by concentrating on:

- one or more major urban areas and their food sheds – i.e., the areas which supply their food;
- one or more of the major food items in consumer diets;
- one or more aspects of market performance, and/or
- particular market functions, channels, institutions or participants.

The extent to which the research agenda is narrowed down will depend on the resources and secondary data available, and the depth and breadth of coverage, required. The choices made in this

narrowing-down process will usually be determined by the terms of reference, but they should always be explicitly justified, and should not lead the researcher to ignore systemic connections.

Box 3:1 Criteria for Narrowing the Agenda

For example, the choice of particular urban areas may be justified by their importance in terms of population numbers; their specific marketing problems or through reference to previous marketing studies. Similarly, areas in the food shed covered should be chosen to ensure some degree of representativeness. Regions with very different production, or infrastructural, characteristics and/or those which are the most important suppliers to towns, may be included.

The commodities chosen for study will often be those which are most important in the national diet, but there may also be other reasons for coverage. For example, the commodities focused on should be those with the greatest possible potential in production, consumption and/or food security, or those believed to suffer particular marketing problems.

Concentrating on specific market functions, or participants, is likely to be based on perceived weaknesses in a certain level of the market, or on coverage in other marketing studies. For example, it might be suspected that storage is inefficient in technical terms, or that wholesaling is being monopolized, and thus research will be directed at the relevant elements within the market.

Defining Research Objectives

It will be assumed here that the focus of research is specific to a commodity and region and aimed at assessing economic efficiency within the system itself, using the model of perfect competition as an initial standard for comparison. Despite this economic focus, much of the data collected in attempting to understand the operation of markets, and to assess their economic efficiency, can also be used to shed light on other performance criteria.

Moreover, due to the dearth of information available about private markets and marketing in many LDCs, analyses will often have to begin by defining the existence of markets in space, time and commodity terms, and by describing how markets actually function and operate on the ground, before an evaluation of any performance attributes can begin.

Having delineated the marketing sub-system research, a more detailed appraisal can identify where, when and for which commodities markets are working. In cases where they are, an attempt should be made to understand the causes, and to specify interventions to improve performance and the distribution of the gains from market efficiency (Timmer *et al.*, 1983, p.164).

In addition, the systemic linkages between the marketing, production and consumption subsystems, and the context in which they operate, will be taken into account. It is important to characterize these because of the two-way relationship between this overall context and the marketing sub-system. For example, the macro-economic, physical, legal, demographic and institutional environments within which markets operate, are likely to impinge on the nature and efficiency of the marketing system, and in some instances they will in turn be affected by the marketing system.

THE AVAILABILITY AND USE OF SECONDARY DATA IN LDCS

In many LDCs a lot of little-used secondary data has been collected, but establishing both its existence and location is often very time-consuming, and it is very varied in quality. In attempting to evaluate such data, as much information on its collection should be obtained as is possible. For example, documentation of the rationale and objectives and means of collection may be available, and interviewing individuals involved in the process may provide insights into its quality. In

particular, it is useful to establish why and by whom, or what institution, the collection was initiated, and how and by whom it was implemented. Given the objectives and institutional background, researchers can speculate about likely biases within the data.

For example, it may be possible to establish the fieldwork techniques used – the types, and means, of sampling undertaken, the questionnaires, interviews and case studies used, the observations made. How quantitative data were measured may also be revealing. In the latter case, for instance, reported monthly prices might be averages of prices obtaining through the month, or spot random samples. Weights and measures may not have been very accurate, and measures and grades used may not have been those used by traders, in which case the way in which conversions were calculated is interesting. It is also important when dealing with price data to attempt to establish whether prices refer to the same qualities and varieties of commodities, because, for example, products may change in nature and quality over a price series. If enumerators were used, finding out what incentives they faced and how they were supervised may also be instructive.

Secondary data can also be subject to initial isolated analyses, in order to determine their internal consistency. For example, Goetz and Weber (1987, p.6) recommend graphically plotting quantitative data to provide a quick insight into trends and relationships, and their intuitive plausibility. They suggest that these exercises can be used to identify inaccurate recordings and to approximate missing values. Such data can also be cross-checked with different sources of related data; through interviews with market participants and knowledgable observers and, if the data are still being collected, current reportings can be compared against the researcher's own field observations.

Major Sources of Secondary Data

- Ministries of Agriculture, Commerce, Finance, Industry and Planning
- National Development and Commercial Banks
- Regional and Local Development Agencies
- Local and International research agencies and consultancies
- International funding agencies
- Development project managers, personnel and reports
- Local and foreign universities; local student theses
- Parastatal or other governmental agency annual reports
- Private market research agencies
- Producer organizations, for example co-operatives
- Trader organizations, for example, trader associations
- Licensing, taxation and foreign exchange allocation offices

FIELDWORK AND PRIMARY DATA COLLECTION

The focus of primary data collection will depend on the terms of reference and the secondary data available. Following the compilation and analysis of secondary data, information requirements need to be prioritized to ensure efficient primary data collection. Similarly, the objectives of, and resources available for, fieldwork, and the quality of secondary data, will influence the timing and length of field visits. For example, if the research is concerned primarily with the costs and productive

efficiency of storage, it may be preferable to undertake fieldwork when crops are being placed in, or released from, stores. Alternatively, where the research agenda is more diffuse, it is often the case that traders have more time to participate in interviews during the off-, or pre-harvest, season.

Where time and resources allow, formal sample surveys of market participants may be undertaken. There is a large literature on these (e.g., Casley and Lury, 1987) and they will not be covered here. Conversely, in many instances rapid appraisal, or reconnaissance, techniques will be necessary. It is they, rather than formal techniques, which we concentrate on here since much less has been written about these in respect to marketing analyses, and they are likely to be increasingly used.

Fieldwork Techniques – Rapid Reconnaissance

Holtzman (1986) provides the most comprehensive formulation to date of rapid appraisal techniques applied to marketing systems, and much of what follows is derived from his work. He defines a rapid reconnaissance survey as 'a broad and preliminary overview of the organization, operation and performance of a food system, or components thereof, designed to identify system constraints and opportunities'.

Distinguishing characteristics of rapid appraisal research, include the following (Agricultural Administration, 1981; Chambers, 1983; IDS Bulletin, 1981):

- narrowing the content, and temporal and spatial dimensions, of the agenda (as described above);
- a reliance on secondary data where possible;
- informal fieldwork techniques;
- an emphasis on indicators, including the direction and order of magnitude of quantitative data, rather than detailed measurements; and
- the use of simple forms of data analysis.

This approach to research has become increasingly necessary and accepted over the last decade. The necessity arises from the prohibitive costs of long-term research, and the greater emphasis being placed on policy, as opposed to projects, in the development agenda. Long-term, data-intensive, analyses are often unable to meet the temporal demands of policy decision making. Rapid appraisal techniques, in spite of their limitations in certain dimensions, have also been shown to provide valuable and accurate data. Rapid appraisal fieldwork techniques can be classified into three forms, each of which will be reviewed below, namely:

- direct observation, and observational surveys;
- market participant, and knowledgable observer, interviews and case studies; and
- analyses of marketing enterprise records.

Direct Observation and Observational Surveys

Direct observation 'By directly observing marketing processes and functions, investigators are able to identify marketing problems and evaluate what key informants say about the organization and operation of the system against what is actually observed' (Holtzman, 1986, p.47). Direct observation can lead to subjective judgements on, for example, the qualities and adequacy of infrastructure and facilities, and of the characteristics of some marketing functions, participants and transactions. Thus, the following types of phenomenon can be initially assessed through observation:

- the general state of roads, vehicles used for transporting foodstuffs, stores, mills and market places;

- demand relative to supply seen in queue formations, for example;
- haggling and bidding in price formation;
- quantities involved in cash and commodity exchanges;
- the quality of physical handling and packaging; and
- the availability of market information through mass media, etc.

Direct observation can also be made more systematic; for example, through following a specific unit of produce along the marketing chain from farmer to consumer, or following the whole range of a particular wholesaler's activities. However, direct observation will not enable judgements concerning the hierarchy of binding constraints on market capacity or efficiency.

Observational surveys These can be used on a localized scale to various ends. For example, if sample population characteristics cannot be determined through secondary sources, an informal survey may be sufficient to provide the basis of a sample frame. If the project is confined to a single urban area or market place, observational surveys will often be able to furnish investigators with rough indications of numbers of different types of participant active in the market in the current period. This is particularly the case where market participants are spatially grouped according to commodity and function, as is common in many LDC market places. These characteristics of the population can then be used to construct categories of participant from which to subsequently select representative interviewees.

Similarly, observational surveys can be used to count the numbers of different-sized vehicles entering and leaving, various market places, and bags of a particular commodity or group of commodities loaded and unloaded, through one or more days.

The data obtained from observational surveys can then be cross-checked for their accuracy and representativeness, through interviews with market officials and participants, or other knowledgeable observers.

Interviews and Case Studies

Because of the dearth of information on private marketing available through secondary sources in many countries, market participant and knowledgeable observer interviews will often be the source of the bulk of data concerned with the marketing sub-system. In addition, such interviews are necessary to ascertain subjective perceptions concerning marketing constraints and opportunities, and detailed information about the nature of marketing, and the costs and prices obtaining.

Informal interviews Under the conditions of rapid appraisal, using formal questionnaires will probably not be possible, unless the research is highly specific and localized. Similarly, where there is a dearth of information about private marketing the use of questionnaires is inadvisable in the first instance. However, some idea of the questions to be addressed, and the best way in which to do so, should be decided in relation to research objectives. 'Informal interviews will be structured in the sense that the intention is to cover important topics in a preferred sequence. Yet they will be unstructured in the sense that interviewers will be able to vary the length and format of an interview, probing promising lines of inquiry in depth, where feasible, or adhering to non-controversial or less sensitive topics where necessary... Allowing informants enough flexibility to discuss issues and topics which interest them or problems which they find especially bothersome can have high pay-offs. Investigators can often uncover unexpected in-sights in this way' (Holtzman, 1986, p.55). Harrison *et al.* (1987, p.124) similarly recommend the use of 'detailed interview guides' rather than structured questionnaires.

Case studies These are defined by Casley and Lury (1987, p.64) as involving 'the detailed examination of a relatively few persons or items'. The techniques entailed in case studies are wide-ranging and flexible, including for example, close observation, analyses of records, detailed dialogue with respondents and possibly participation by researchers in the relevant activity. Case studies are

often concerned with the same types of information as interviews, but are much more detailed. They are particularly useful where attitudinal, historical and/or sensitive data are required. Because they are time-intensive, and produce results less amenable to generalization, they are usually best combined with informal surveys. Surveys are often used as a basis on which to choose particular case studies, and the latter may influence the issues to be addressed in the survey.

Numbers of interviews The types and numbers of interviews and case-studies undertaken will depend on project objectives and resources available, the quality and quantity of information obtainable from secondary sources, and the numbers and heterogeneity of enterprises in the population. Some trade-off between breadth and depth of coverage will usually have to be made, and the resultant mix of direct observation, observational and interview-based surveys, and in-depth case studies decided upon. However, an attempt should always be made to actively counter-balance common biases in rapid appraisal studies against disadvantaged groups, like the very poor and women, and to ensure representative coverage as far as is possible.

Where to start If information concerning the total population cannot be obtained from secondary sources, observational surveys or knowledgable observers, Holtzman (1986, p.50) suggests that strategically placed market participants, such as large-scale wholesalers or processors should be interviewed before others. 'They are typically more knowledgeable about the organization and operation of the entire marketing system than other participants and...will have more of a systems perspective about the inter-relationships among parts of the system and resulting system performance'. The information obtained from such interviews can further direct the fieldwork effort. For example, subsequent interviews can be carried out with those participants with whom wholesalers and/or processors deal.

Historical data and group interviews Interviewing participants who have been trading over many years may provide information on various historical aspects of, and changes in, marketing practices and policies. As Harriss notes (1981, p.23) 'to some extent...the problem of the absolute brevity of fieldwork is eased by drawing wherever possible from merchants' life histories'.

Group interviews, with a number of relatively similar traders, whether formally organized or the result of spontaneous voluntary participation, can generate a lot of information in a short space of time; encourage reticent informants to contribute and serve as a forum for debate, for example, concerning trader perceptions of binding constraints and major opportunities. However, where one or two individuals appear to dominate such a group, emergent findings should not be generalized, and the utility of the exercise may be greatly diminished.

Anonymity and consistency If possible, all interviews should be conducted anonymously and confidentially. This may overcome the tendency towards misrepresentation due to fears of taxation or the sensitive nature of phenomenon like credit relations and rates of profitability. Consistency checks can be built into informal interviews in a number of ways:

(a) questioning interviewees about internal inconsistencies in their responses;

(b) questioning inconsistencies between their responses and those of other interviewees;

(c) using different sets of questions to obtain the same information;

(d) asking the same questions of a variety of participants performing similar functions along a particular market route;

(e) asking the same questions of people working at adjacent stages in the marketing chain; and involved in transactions with one another;

(f) cross-checking information from group interviews with that from individuals.

Recording the information Data gathered from interviews should be recorded in a way which as uninhibiting, and as temporally efficient, as possible. Tape recording interviews can be highly

Box 3:2 Key Informants (adapted from Holtzman, 1986, p.53,54)

INFORMANT	ADVANTAGES	DISADVANTAGES
Small Consumers	Detailed knowledge of consumer market; the seasonality and levels of consumer prices; preferred products, qualities and varieties and other consumption characteristics. Can provide information on consumer preferences regarding different types of retailing operation.	Knowledge of consumption matters likely to be highly specific to socio-economic group and local area, therefore important to identify and interview range of consumers. May over-state price levels; be subject to common image of exploitative traders, and have no knowledge how markets work or are organized.
Farmers	Detailed knowledge of local input and output markets, and of the advantages and disadvantages of different buyers and sellers in these; of producer prices and levels of marketed surplus and stocks in local area; of costs of, and crop losses in, storage; of marketing and production practices, and the rationale for these.	As with consumers, knowledge of production and marketing may be highly localized and socio-economically specific. May adopt uncritically view of exploitative traders; lack knowledge of marketing system beyond first handling stage, and understate prices received.
Market Officials	Easily located and usually willing to be interviewed. Can often provide much information on numbers, and sizes of different categories of trading firms and on market supply, demand and price trends manifest in market places under their jurisdiction. Detailed knowledge of market regulations; costs of paying for taxes; licences and renting stalls in local market places. May have detailed knowledge of organization of marketing, and of constraints and opportunities facing traders.	May be unwilling to discuss how stalls, licences etc. are allocated. May desire to protect traders', or local governments', interests. Unlikely to know much about rural marketing practices if located in urban areas, and vice versa, or about other areas of the marketing chain.
Civil Servants	Easily located. Knowledge of national and local government policies and regulations concerning marketing, and official rationale for these; of secondary sources on regional, and national, demand and supply situations and trends; of numbers of different types of trader registered and licensed; of levels of turnover reported, and of taxes imposed and recuperated.	May lack details of how markets operate on the ground and be subject to common image of exploitative traders and popular, but unsubstantiated, views of production and consumption patterns and problems.
Bank Loan Officers	Easily located and stationary. Can provide information on conditions of lending; bank interest rates and demand for official credit from marketing sector, and on the patterns of use to which such loans are put. May have knowledge of larger firms' operations, assets, turnover and gross returns.	May lack knowledge of how markets operate. Only likely to have information on largest trading concerns. May make judgements on basis of narrow rate of return criteria, and may be unwilling to provide information about borrowers' operations.
Informal Money lenders	Detailed information on terms and conditions of informal lending including interest rates; rates of demand for informal credit and of defaulting on loans; on use of loans and characteristics of traders like asset ownership, turnover, profitability.	Usually extremely difficult to identify and locate and unwilling to be interviewed concerning money lending activities. May provide misleading information.
Extension Agents	May have detailed information on farmers' production and marketing practices; local producer price, and demand and supply, patterns for inputs and outputs; and farm characteristics like size distribution, technology utilization and cropping patterns.	May have no knowledge of how markets operate beyond first handling stage. May be biased towards larger farmers in production information. May have too few resources to carry out many field trips and therefore primary knowledge of production systems may be limited.
NGOs	Knowledge of secondary sources available and their reliability. Often involved in localized projects with detailed knowledge of production and/or consumption problems faced by poorest deciles; may be willing to provide information on sensitive issues, like government policies and their effects on, or corruption in, the marketing system.	May lack information on how markets operate and are organized on the ground.
Development Agencies	Knowledge of secondary sources available and their reliability and of unpublished or on-going research. Detailed knowledge of international lending institutions and governmental policies and aims; of national level market characteristics and imports and exports.	May lack detailed information of how markets operate and are organized on the ground.
Missionaries/ Volunteers	May be able to describe difficult to observe phenomena; have detailed knowledge of local production, consumption and marketing, and may be willing to discuss sensitive issues.	Knowledge of production, consumption and/or marketing may be highly localized. May not have detailed information on how markets operate or are organized on the ground.

Box 3:2 *Continued*

INFORMANT	ADVANTAGES	DISADVANTAGES
Wholesalers	Located at system node, thus systems perspective. Knowledge of production, stocks, flows, prices and demand in different rural and urban areas. Often the major storers, and therefore may provide information on costs of, returns to, magnitudes, temporal dimensions and rationales of, storage.	Often very busy and mobile and thus difficult to interview at length, hence advantages of travelling with them on business. May over-estimate costs, and under-estimate returns and turnover.
Assemblers	Knowledge of exchange arrangements with farmers and wholesalers; and of supplies, stocks and prices in particular rural areas.	Knowledge of market conditions and activities may not extend beyond rural area of operation, and buying from farmers and selling to wholesalers. May over-estimate costs and under-estimate returns.
Processors	Systems perspective; knowledge of demand for processing services and for by- and end-products; costs and prices of processing; different technologies available and transformation rates etc.	May under-report throughput and size of operation depending on tax laws. Smaller millers are unlikely to keep records.
Transporters	Knowledge of spatial and temporal commodity flows – magnitudes, directions and seasonality; and of costs of transport services.	Unlikely to know about detailed operations of market, and marketing activities, as often not involved in buying and selling commodities themselves. High degree of mobility and may be difficult to interview. May over- and under-report costs and returns respectively.
Retailers	Stationary and therefore more easily located and often with time to undertake interviews. Knowledge of consumer desires, and needs, and of retailing operations, costs and price movements.	Often will not have knowledge of markets and marketing beyond urban/rural location.
Importers/ Exporters	Knowledge of magnitude, timing and prices of imports and exports; and of organization, costs and prices, regulations and requirements of importing and exporting. Will often have accounting records if operating legally, as these may be required by government.	Unlikely to have detailed knowledge about domestic marketing. Likely to be unwilling to be interviewed if illegal, or to provide information on all the costs of their activities if these involve bribery etc. May over-estimate costs and under-estimate returns.
Commission Agents	Systems perspective; knowledge of supply and demand situation, wholesaling activities and prices in urban area.	Unlikely to keep records; may be unwilling to discuss contractual arrangements; may under-estimate returns and over-estimate costs; may under-report turnover depending on tax laws.
Producer Co-ops	Knowledge on roles, rationale and magnitude of public sector marketing interventions; detailed records on buying, storing and selling timings, areas, quantities and prices, and on costs of public sector marketing.	May be elite-dominated and not accurately represent all producers. May be government appointees and not represent membership. Unlikely to have detailed knowledge of private sector marketing.
Trade Associations	Knowledge of services in demand, and therefore of constraints in trade; and of numbers, sizes and characteristics of member firms.	May be elite-dominated and unrepresentative of diverse interests; may be unwilling to be interviewed, or be misleading, in an attempt to protect traders' interests.
Parastatal Managers	Same as for producer co-ops. In addition may be involved in implementing food aid policies, storage and imports/exports, and may provide information on these.	May be unwilling to divulge records, or be interviewed, depending on sensitivity of operations; may know little about private sector.
Institutional/ Large consumers	Likely to have records of activities, and accounts. Knowledge of seasonality of supply and wholesaler transactions and possibly of importing. Stationary and therefore easy to locate and interview.	Unlikely to have knowledge of marketing system, or of other consumers' relationships with the market.
Researchers	Detailed knowledge of secondary sources available and their quality and reliability, and of unpublished and on-going surveys, research projects etc..	Information may be highly specific and related to particular research projects undertaken; it may not include details on marketing practices, problems, organization, costs and returns of different participants.

inhibiting, and full transcription is very time-consuming. Conversely, attempting to avoid any recording during the interview may lead to much important data being lost. Therefore, some written record will usually have to be taken during interview. However, there are various ways of minimizing the effects this has on the length of interview time. For example, the sequence of common

Box 3:3 Example Interview Guides

INTERVIEW GUIDE USED BY AUTHORS IN CAMEROON, MALAWI, TANZANIA, 1990

Trader Classification: interview number, functional category, gender, ethnic/religious identity, age group, place, location – i.e., market place, home etc., status in firm

Nature of Business: number of commodities and functions dealt in, temporal dimensions of involvement in specific marketing activities, other businesses/employment engaged in, assets owned/rented, ownership arrangements, e.g., individual owner operator, partnership, family, other

Size of Business: turnover, assets, stocks, credits/loans, total value

Organization of Operations: marketing activities engaged in, buying and selling locations, to/from whom and where goods/services are bought/sold, reasons for these, seasonality of these; sources of market information, contact and price agreement mechanisms, means of transport, storage, processing used, availability, and organization of use, age of facilities, capacity, and rates of utilization, rates of transformation in milling, and commodity losses in other functions

Unitary Costs, Prices Returns: current examples, maximum and minimum over last year, break down of costs, including prices of commodities and inputs and physical commodity losses

Other Costs: overheads like general maintenance and permanent labour, licences, taxes, stall/store rentals, depreciation on buildings and machinery, family monetary needs

Labour: types and numbers of labourers employed, remuneration, availability of labour/work

Credit and finance: borrowing and/or lending activities, occupational identity of lenders/borrowers, motivations for lending and borrowing, quantities involved, eligibility/securities, terms and conditions of repayment, use of larger loans if available

Profitability: value of assets, stocks, labour bill, annual turnover, income, costs and profits for last year, comparison with previous years

Use of Profits: expansion of current trading operations or other businesses, family subsistence, new ventures

Trading History: number of years in business, level of entry, reasons for entering trade, reasons for dealing in particular functions and commodities, initial capital requirements, source of initial capital, estimates of current entry requirements, means of training, learning, building up contacts, membership of trader, worker, farmer organizations

Previous, and Other, Economic Activities: size and type of farming, formal employment, reasons for leaving, other businesses, how concurrent activities are managed, divisions of labour, time etc.

questions can be memorized, and answers coded accordingly; quantitative data may be recorded during the interview whilst qualitative data may be written up immediately after each one and a shorthand can be developed. If there is more than one interviewer, standardizing the format of interviews is obviously essential for comparative purposes.

Box 3:3 *Continued*

THE STANDARD MARKETING SCHEDULE, CAMBRIDGE UNIVERSITY PROJECT ON AGRARIAN CHANGE included the following types of data (see Appendix 1, Harriss, 1981):

SAMPLE INFORMATION: interview number, type, place, date, time taken, interviews, individuals present, rapport

PERSONAL INFORMATION: job, place of birth, age education, caste, religion

FAMILY: relatives, their ages, education, work, location

OCCUPATIONAL HISTORY: type of occupation, employed/self employed, time periods, places. Other current occupations/businesses, part time/voluntary work, land owned, irrigation, means of cultivation, land rental relations, crops grown, means of marketing, other property

BUSINESS INFORMATION:

Assets: ownership (co-operative/family/partnership/own/employee) date of starting trade, commodities traded, premises and equipment

Initial capital: date, purpose, value, source, loan details

Business Size: total value of share, number of shareholders, value of deposits, number of depositors, cash value of stock, cash on hand, credit loaned or borrowed, buildings/equipment, current value, value of survey commodity, capital turnover period

Money Borrowed: purpose, value, frequency, source, security, interest rate, repayment

Use of profits: ploughed back, dividends, land, education, property, jewellery, family consumption, lent out/paid back

Annual Running Costs: rental on land, buildings and machinery, replacing equipment, general maintenance, depreciation, permanent labour, telephone, storage, fuel, transport, stationery, postage, travel, taxes, licences, repayment and interest on loans, entertainment, contingencies, other

Employment: family, non-family, jobs, type of labour, caste, years, days per year, pay, average per week, annual bill, time off for agriculture, changes in numbers of waged employees, increase in turnover necessary to increase labour force by one, length of training, mobility, organization, relationship with employer, other types of labour or work

Commissions: net profit/unit (range and losses)

Annual Turnover/Income: sales and rental, item, unit, quantity, value

Storage and Transport Facilities: type, number, overheads, age, capacity, location, value

Storage Practices over year: commodity, month, maximum, minimum, average, buffer

Milling: commodity, type, engineering capacity, location, number of days working, average number of hours per day, average quantity milled/day, total actually milled/year, desirable throughput, conversion ratios, different types of commodity, costs/charge per unit for different varieties, profits, range and average, quantities, use, prices, income and destinations of by-products

Sources of Goods Bought: item, types and numbers of seller, quantity bought, purchase price, payment, marketing costs, transport costs, place of origin of sellers

Major Destinations of Goods Sold: item, major buyers, numbers, quantity bought, minimum and maximum, selling price, payment and quantity of cash, place of origin/destination of buyers

Services Rendered: lending to buyers and sellers, quantity currently lent, maximum and minimum lent, interest rate, security, repayment, defaulters, changes in last 5 years, numbers, quantities and purposes of loans, effect of not lending, information on prices and news, moisture and dirt testing, transport, costs, destinations, frequency and purposes, storage for client, extension

BUSINESS HISTORY: trade expansion, old technology replacements, change in organization of marketing/varieties, new and collapsed businesses

MANAGEMENT: ordering goods, months, items, methods, sizes, waiting times, payment methods, etc.

Analyses of Enterprise Records

Examining the records of marketing participants of each category, over a number of years, can provide much information on the following types of data. However, often such records are not available, or they are inaccurate and partial, and surveys, interviews and case studies are therefore likely to remain important.

- Geographical and temporal commodity flows;
- The volumes of particular commodities bought, stored, processed, transported and sold, and hence the technical efficiency of operations;
- Purchase and sale prices, and the costs of, and returns to, various operations, at different times of year, i.e., indicators of operational and pricing efficiency;
- Degrees of commodity or functional specialization, diversification, seasonal shifts and vertical integration;
- Types and values of asset ownership;
- Credit and employment relations, and remuneration to different types of employees;
- Involvement in other economic activities etc.

TYPES OF DATA REQUIRED FOR VARIOUS MARKET ANALYSES

Specific data requirements will depend on the project objectives, as well as on the secondary sources available. Some examples of the types of data necessary for understanding the organization and operation of food markets, and assessing their technical, operational and economic efficiency, are provided below. If the terms of reference are highly focused, it is unlikely that data from each of the categories set out below will be required. Conversely, the examples provided are not exhaustive, and other types of information may be necessary.

There are many possible ways of conceptually organizing the data requirements for market analyses. Here, they are broadly categorized, as shown below, along the lines of the conceptual framework depicted in Chapter 2 p.25, although there is much overlap between categories and sources are often shared. For example, because the internal workings of firms, and their horizontal and vertical relationships, are all closely related, much of the data required to analyse the nature of any one of these aspects of the market will also provide insights into one, or both, of the others. Thus, data on costs, prices, profitability, credit and information are likely to provide analysts with the means to form hypotheses about all three of these phenomena, and their inclusion in one or another of the following sub-sections is an arbitrary matter.

The Macro-Environment

As described above, the macro-environment refers to the demographic, ecological, legal, institutional and other contexts within which markets, production and consumption take place. Through assessing the nature of these environments, the degree to which inefficiencies in, and constraints on improvements of marketing are rooted within the system itself, or in external factors, can be determined, and policy aimed in the relevant direction. Government policies and transport infrastructure are focused on below, because they are thought to be particularly important in their effects on market performance.

Government Policies and Laws

Government policies and objectives set down the rules and regulations of marketing; determine the nature of public participation in, and/or regulation of, marketing, and they influence markets and

Box 3:4 Categories of Data Requirements

THE MACRO-ENVIRONMENT

Government policies and laws

Infrastructure

Linked markets

THE PRODUCTION AND CONSUMPTION SUB-SYSTEMS

Population and consumption data

Agriculture and/or food production

THE MARKETING SUB-SYSTEM

Innate and market-related commodity characteristics

Spatial and temporal commodity flows

Institutional commodity flows and marketing chains
- Identifying market channels
- Categorizing market participants

Market functions
- Market activities
- Buying and Selling
- Storage
- Transport
- Processing

Intra-firm organization
- Resource utilization and allocation
- Technical and operational efficiency
- Profitability

Horizontal relationships between firms
- Number, and size and spatial distributions, of firms
- Barriers to entry
- Trader, producer and consumer organizations

Vertical relationships between firms
- Costs and prices
- The organization of exchange
- Information
- Credit

marketing through their effects on macro-economic variables. Conversely, markets may also have an effect on both macro-economic variables and government policies, for example through trader organizations and their political demands.

Most of the data on government policies and interventions affecting marketing can be obtained through secondary sources, in particular, development agency and ministerial reports. However, interviews with civil servants, bank managers, market participants and public-sector marketing institution managers, can provide further insights into the nature of government policies; the effectiveness of their implementation and their implications for the marketing system. In some cases,

the effectiveness and influence of such policies may be observed in the market place – for instance the degree to which standard weights and measures are used.

The following government policies are examples of those likely to be important in most market analyses, although again the list is not comprehensive:

- The existence, and nature, of direct intervention policies, public marketing institutions, their mandates and functions, their buying and selling practices and prices;
- The existence and levels of governmentally determined floor and ceiling prices; the means, and effectiveness, of defending these;
- Policies leading to the implicit or explicit subsidization and taxation of agricultural, or marketing, inputs or outputs;
- Commercial/trading licensing laws and procedures, and other regulatory laws;
- Taxation policies pertaining to traders, and their incomes, and the imposition of other market charges;
- Laws concerning storage practices, for example ceilings on volumes;
- Legal, or other, restrictions on the directions and volumes of commodity flows;
- The institution of standardized weights; measures; varieties and quality grades;
- Restrictions on, and direct intervention in, food imports and exports, together with food aid policies;
- Governmental provision of market information, trader training, and trader access to commercial credit;
- Macro-economic policies, particularly exchange, interest and wage rate policies.

Infrastructure

Physical infrastructure plays an important role in constraining the feasibility of transactions, and in determining the costs and influencing the economic efficiency of marketing. For example, poor transport and communication networks may lead to remote producers facing low prices and a very limited number of buyers, and to high transport costs and thus higher consumer, and/or lower producer, prices. In some LDCs, transport infrastructure is one of the most binding constraints on increasing the extent, capacity and economic efficiency of domestic markets.

Again, most of the data required here can be obtained from secondary sources, particularly from government offices and previous infrastructural studies. This information can then be supplemented with direct observation of the nature and quality of facilities available in local areas, and with market participants' subjective perceptions of their adequacy. The location and quality of infrastructural facilities can then be recorded and illustrated through mapping. For example:

- Transport networks – types, spatial coverage, quality and passibility;
- Vehicle numbers, repair and maintenance services, rail capacity and costs, fuel and spare parts' availability and prices;
- Telecommunications – numbers and distribution of phones, costs, effective operation, costs and reliability of postal system;
- Market places – location relative to centres of production and consumption, size, number, types and quality of infrastructural facilities provided. Different types of market place can be

distinguished on institutional, infrastructural, temporal and functional grounds: for example, parastatal or co-operative buying and selling points and rural, village and urban market places or assembly, redistributive and terminal market places;

- Numbers, types, capacities and spatial distribution of processing plants and storage facilities.

The Production and Consumption Sub-Systems

The relationships between marketing and production or consumption are dialectical. The structure of production and consumption, supply and demand, determine the essential nature of the domestic marketing problem. Similarly, the effects markets have on the levels and nature of production and consumption are of crucial importance in economic development, income distribution and food security. Analysts may be concerned with the effects of the market system on production and/or consumption, and/or the implications of the latter for marketing.

Population and Consumption Data

Population, income and consumption parameters are important in providing indicators of the demand characteristics of markets, and the implications of these for the production and marketing sub-systems, and for assessing the degree to which production and marketing meet effective demand. The way in which the marketing system influences the relationship between consumer incomes and the availability and price of staple foods is likely to be an important research issue in analyses of markets and consumption. Similarly, understanding current demand characteristics, and the ways in which markets respond to these, may indicate ways in which markets can potentially influence demand.

Secondary data In many LDCs, much data concerned with consumption will be available at a national level from secondary sources. This is particularly the case where consumer price indices are calculated, and household budget surveys and population censuses are undertaken. In addition, food balance sheets, specific consumption studies, and estimates of demand elasticities and projections, may be available.

If both household budget and food balance data are available, different categories of consumer can be defined, which allows detailed investigation of particular groups, for example, the poorest and most vulnerable which are often the target of specific government policies.

The following types of data are often available at a national level, and provide insights into current and future demand.

- Size and distribution of the population;
- Population density and urban concentration;
- Numbers of households/families in urban centres;
- Numbers of net consuming rural households;
- Rate of population growth;
- Per capita incomes and food expenditure;
- Rate of growth in per capita income;
- Income distribution;
- Per capita average daily calorie consumption;
- Seasonal and secular trends in consumption over time;

- Daily calorie consumption of the poorest deciles;
- The homogeneity or heterogeneity of diets;
- Commodities in different income groups' food baskets;
- The mono- or multi-staple nature of diets (as this affects income and price elasticities of demand);
- Ethnic and language diversity – where many languages are spoken, commission agents may assume important roles in finding buyers and sellers in markets.

Primary data Data from secondary sources can then be cross-checked against, and supplemented with, localized primary data collection through interviews with selected urban and rural consumers, and with knowledgeable observers, such as nutritionists, health officers, market officials and others who have worked on consumption. Primary data collection will usually be necessary in attempting to assess the nature and adequacy of consumers' access to food, and the prices they face, in particular places and times of year. In this it is important to ensure that the consumption patterns of different socio-economic and ethnic groups are covered, because poor people often consume different commodities; are likely to be more responsive to changes in prices and incomes; and more susceptible to hunger, malnutrition and disease.

Box 3:5 Markets and Consumption

Where the relationship between markets and consumption is the main focus of research, a more systematic and quantitative approach to them is likely to be necessary. However, this is an enormously complex task. As Timmer *et al.*, (1983, p.48) note 'the quantitative impact on food prices (and on the food energy intake of various population groups) of changes occurring in production, marketing, macro or international arenas can be specified with confidence only if empirical food consumption parameters for the society are available' – i.e. income, own-price and cross-price elasticities. Calculating these demand parameters is not easy, especially where own production contributes much to consumption, since time series data are often short and of dubious accuracy.

Disaggregating consumption data, in order to assess the nature of the relationship between markets and consumption by different socio-economic groups, or in different regions or seasons, is also often difficult given available secondary data. 'Skill and intuition, acquired through experience with statistical estimation on a variety of data sources and through wide spread discussion with knowledgeable people in the food marketing arena, are essential for achieving sensible results' (Timmer *et al.*, 1983, p.50).

Timmer *et al.* suggest that the starting point in analysing food consumption patterns is usually food balance sheets, which most countries now publish annually. From these, average levels of consumption of various foods can be obtained, but figures may be biased in either direction, and should therefore be cross-checked against sample survey data and/or knowledgeable observer interviews.

Disaggregating food balance sheets by income class can be undertaken using household budget surveys. All countries which publish a cost of living index have these, but they vary in content and quality. Some only provide expenditure data which cannot be used for this purpose, unless price data for relevant regions, seasons and qualities are also available, thus enabling quantities consumed to be calculated. Other budget surveys will provide more information, for example quantities of different products consumed by various households, along with certain social, economic and nutritional characteristics of those households.

Combining data on household food consumption and budgets should allow researchers to construct food balance sheets for three or four income groups, and these can be cross-checked on a local scale against interviews with a few (ten to fifteen) representative consumers in each group.

Agriculture and Food Production

Production characteristics have an important impact on the nature and costs of marketing, the returns to farmers, and the availability and price of food. For example, the nature of production can determine whether long- or short-distance trading is dominant, and the importance of storage and processing as marketing functions.

Conversely, the market crucially affects production through its influence on the prices of outputs and inputs, and the availability of the latter. Increased agricultural production and productivity require, among other factors, reliable and remunerative outlets and input supplies. To evaluate the responsiveness of production and marketed supply to price signals, data on levels of production; volumes marketed and prices over time, as well as information on other factors which affect farmers' production and marketing decisions, like the availability and cost of inputs; credit and consumer goods, is required.

Secondary data The following production data can usually be obtained for the national level from secondary sources:

- Agriculture's contribution to GDP.
- Percentage of population involved in agriculture;
- Climate – how many growing seasons a year, is agricultural production risky, when are commodities under study sown and harvested?
- Important crops and cropping patterns; areal/volumetric importance, and trends in production of different crops, the relationship between crop production for internal consumption and export;
- National and regional deficits and surpluses, imports and exports, concentrations of production;
- Land tenure and distribution, average sizes and distribution of farm sizes, implications for marketed surpluses/deficits, trends in land ownership, tenancy arrangements, the 'price' of land. Harriss (1981, p.29), for example, found a positive correlation between inequality in landholding and in the size distribution of trading firms;
- Production and yield estimates, and their variability and trends. Sometimes annual production estimates, divided by crops and regions, and sometimes by farm size and technological inputs used, can be found in project reports, extension offices etc.;
- Marketed surpluses, rates of on-farm retention for consumption, animal feed, seeds, in-kind payments, numbers of food-deficit farmers;
- Inputs used, and the extent and distribution of utilization, the state of agricultural technology, extension services and messages, the availability and costs of inputs;
- The returns to different types of crops grown, and the variability in those returns.

Primary data Where the above data are not available from secondary sources, interviews with farmers, extension officers, crop production researchers and traders can provide insights into these production characteristics. In addition, analysing the production side of the market at a local level will usually require interviews with a representative range of farmers in the area under study. Classifications of the types and number of farmers concerned, in terms of crops grown, the size of landholding, location relative to market places and towns, and technologies and market channels used, can often be compiled at a regional level through secondary sources. This is necessary to ensure coverage of different production systems, which is important because their relationship with the market is likely to vary.

The following types of question may then be asked through interviews with purposively selected informants.

- Why do they grow particular crops and combinations of crops?
- How, where and to whom do various farmers sell most of their produce?
- Is there a wide range of choice of sales outlets?
- Why do they choose particular outlets; do these vary for different crops; is the availability of credit important?
- Do farmers have difficulty in finding buyers when they want to sell?
- How easy is it for farmers to take produce to urban/rural market places?
- How far away is the nearest market place?
- Is most produce sold through rural, urban or parastatal market places or directly from the farm?
- Does this affect the prices received? For example, farmers who rely on visiting traders may be in a relatively weaker bargaining position than those selling in organized rural, or urban, market places, with many buyers and sellers.
- What are the prices different types of farmers receive; why do prices differ?
- Does the market discriminate by variety and quality of produce, by quantities sold, are credit or debt relations, or other factors, important in the determination of producer prices?
- Where do farmers obtain their information on prices?
- Do they bargain with traders concerning price?
- What marketing functions do farmers perform themselves – storage, transport, bulking, milling?
- When and why do various farmers sell the quantities they do?
- Do they buy food, when and why?
- Do they buy agricultural inputs on the market?
- How easy are these to obtain and what prices are paid for them?

The Marketing Sub-System

The data requirements for examining the internal workings of the market sub-system are divided here into those related to (a) the analyses of commodity characteristics and flows; (b) enterprise or firm level organization and decision making, and (c) the nature of horizontal and vertical relationships between marketing enterprises.

Innate and Market-Related Commodity Characteristics

Innate commodity characteristics influence the nature of marketing and price formation. As Jones (1972, p.74) points out, the inherent characteristics of a commodity will affect the extent of market integration, the speed with which changes in demand are transmitted to, and responded to by, producers, and the magnitude of seasonal price rises. Box 3.7 provides some examples of this relationship. The following types of information may be sought either from secondary sources, like commodity manuals and previous studies, direct observation of the marketing processes attached to specific commodities, or through interviews with agriculturalists or other knowledgeable observers.

- The geographical and meterological determinants of production, the effects of these on trading networks.
- The temporal distribution of harvests.
- Perishability and bulkiness; the costs and ease of transportation and storage relative to price and calorific value.
- Supply responsiveness, gestation between planting and harvesting.
- Physical handling required.
- Processing necessary or possible.
- Extent of consumer differentiation viz quality and relative prices.
- Marketed surplus as a proportion of production and in terms of absolute national level volumes, trends and variability.
- Standards of measurement and grades of quality and variety used.
- Different marketing stages and functions through which commodities can and do actually pass.

Box 3:6 Markets and Production

As with consumption, where research is particularly concerned with the nature, and implications, of the relationship between markets and production, a more systematic approach than that outlined above will be necessary. Timmer *et al.*, (1983, p.122) suggest that, without resorting to econometric modelling, aspects of farming systems research and linear programming can be used to assess the structure of production, and to analyse the effects of markets and marketing on farmers' decision making.

For example, homogenous agro-climatic zones can be identified, along with representative farming systems within each. Then input/output matrices, which take into account the relationships between various farm enterprises, can be used to construct 'farming system tableaux' for each type of farm, in each agro-climatic zone.

These tableaux, recording inputs, activities and constraints, represent and quantify the economic activities undertaken on various farm types, the relationship between such activities and the inputs and outputs entailed in each. They are a means of mapping and comprehending farmer decision making and they form a basis for predicting the effects on this, of technological, market and price changes.

The data required to construct representative farming systems tableaux for each agro-climatic zone, include the following: combinations and sequences of crops grown, farm size distributions, localized price and yield data and information on non-farming economic activities (see Timmer *et al.*, 1983 for details).

The complexities of the relationships between markets and production cannot be overstated. For example, Southworth *et al.* (1979) and Jones (1972) found that, in West Africa, the timing of farmers' sales and their storage practices were influenced by a set of forces which included the timing of harvests of different crops, own consumption needs, expectations about future prices and supplies, the timing of producers' cash needs, transport availability, levels of trader demand, access to storage facilities, fears of theft, and the timing and size of monetary income from other sources. In addition, proximity to market places, land size, the nature of tenancies and family sizes are likely to be influential in this single decision.

Box 3:7 Innate Commodity Characteristics and Marketing

It is argued that, in general, longer production periods make supply adjustment more difficult and the magnitude of seasonal price rises should be greater the longer the time periods between harvest and the larger the storage costs or losses. The geographical extent to which markets are integrated will be smaller for high bulk, low value commodities, because transport costs and returns will inhibit movement between markets, and storage at point of production becomes optimal. If commodities require processing before consumption, the costs of processing will reduce the elasticity of primary demand and the time lag implied by processing may lead to delayed supply responses to changing demand.

Spatial and Temporal Commodity Flows

Due to the dearth of information available about private markets and marketing in many LDCs, analyses concerned with market performance will often have to begin by defining the existence of markets spatially, temporally and in commodity terms, and by describing how markets actually function and operate on the ground, before an evaluation of any performance attributes can begin. Understanding the spatial and temporal dimensions of particular commodity flows is a first step towards achieving this. In addition, establishing the direction and timing of such flows is crucial to assessments of economic efficiency based on analyses of price and cost data.

Secondary data Gross national spatial and temporal dimensions of physical flows may be available from secondary sources. At the local level, previous surveys on patterns and quantities of farm production, and on marketing and household consumption, may have been undertaken and may be indicative of possible or likely flows in time and space. Additionally, indications of current flows may be sought through parastatal, or producer organization, records. More often, however, primary data collection will be necessary at the local level.

Primary data These can be collected in various ways depending on the availability of secondary sources and fieldwork resources. For example, surveys can be undertaken of farm level marketing and household consumption patterns and/or of the numbers of sellers and stockers of foodstuffs in market places, together with estimates of their turnover and inventories to indicate quantities being handled. Rough estimates of physical flows can also be calculated from check-points at market place entrances, or on roads leading to urban centres, where commodity types, and quantities, origins and destinations of produce, may be recorded.

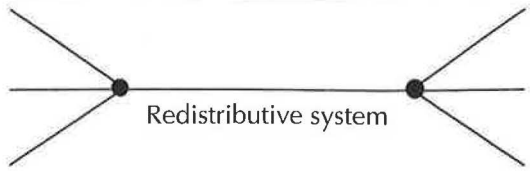
In all these instances, the problem of representativeness, in particular in terms of the temporal and spatial limitations on the coverage of surveys, and the possibilities of foodstuffs being traded outside market places, must be taken into account. One way of doing this is through interviewing traders and knowledgeable observers, for example market officials, about seasonal, annual and spatial or institutional variations, and their importance in terms of physical flows. Where possible the following types of question need to be asked of market participants and observers.

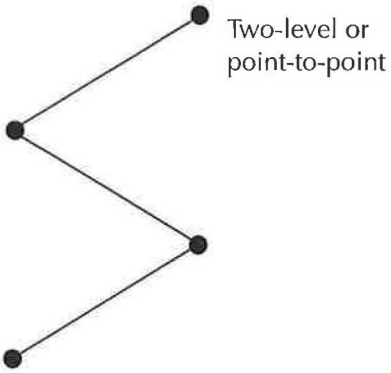
- How many market places within the area of study export and/or import the relevant commodities?
- Over what distance do imports come/exports go?
- At what periods during the year are these imports/exports undertaken?
- Which are the most important sources and destinations in terms of volume?
- What proportion of produce received/supplied by the area under study comes from/goes to each?

Box 3:8 Hypotheses from Spatial and Temporal Flows

The scale, timing and direction of commodity flows can be illustrated through mapping and can be used, alone, or together with other types of data, to form hypotheses concerning competitive conditions. For example, the diversity and complexity of spatial flows is an important indication of the responsiveness of traders to shifting price stimuli, and hence of the degree of competition in the market. Where markets are linked with a large number of others, it can be hypothesized that under competitive conditions there will be a continual flow of goods between many markets which will even out price differences (Harriss, 1981, p.136). This hypothesis can then be tested with reference to price data from different market places, and through establishing whether traders actually have the operational flexibility and necessary information and resources to move commodities in a way that does even out the prices.

Jones (1972, p.109), also using data on the spatial pattern of commodity flows in Nigeria, identifies two main types of marketing system, with important implications for economic and co-ordination efficiency. Where the commodity in question is produced in a few specialized areas, trade is long-distance and operates through a 'redistributive' market system. Conversely, short-distance trade, resulting from dispersed production, is associated with 'two level', or 'point-to-point', market systems.





Jones argues that information about supplies in the redistributive system is of higher quality, and is more speedily transmitted through the market, because most supplies move through a few centralized points. In turn, this provides for superior market performance in terms of the allocation of supplies relative to demand, the speed of responsiveness to changes in demand and supply, and the degree of market integration exhibited in close correlation between prices in consuming centres. Where possible however, data on physical commodity flows should be combined with price and cost data to further the assessment of economic efficiency.

- Are there urban to rural flows in the off-season; are there periods of marketing connection and disconnection?

- To what degree do these flows correlate with changing patterns of supply and demand?

Institutional Commodity Flows

In addition to the spatial and temporal patterns of commodity flows, the institutional means through which the former are achieved need to be established. This serves several purposes.

- Building up marketing chains furthers the understanding of the operation of the market on the ground.

- The exercise requires and leads to the identification and classification of market participants, which is necessary for subsequent purposive sampling.

- Marketing chains are important in understanding which firms/dealers are engaged in vertical relationships of exchange. They can be used to illustrate and clarify not only the movement of commodities, but also financial, credit and information flows, and the location of storage and processing facilities, in the system. The patterns revealed through such illustration may shed light on opportunities and constraints faced by traders, consumers and/or producers.

- Defining marketing chains for different commodities, regions and seasons indicates the links connecting one price series with another. 'Knowing when and where crops are sold, their transport and storage destinations, and who the ultimate consumer is, permits the analyst to specify the likely causal direction of market connections' (Timmer *et al.*, 1983, p.167). This is crucial for subsequent price, cost and margin analyses if they are to provide meaningful assessments of economic efficiency.

- Estimating the shares of marketed surplus handled by different marketing institutions and the volumes traded through each link, in various marketing channels, provides an initial overview of market structure (Timmer *et al.*, 1983, p.167).

Box 3:9 Market Channels or Chains

It is especially important to carefully identify institutional channels where markets are believed to be fragmented. For example, in many LDCs pre-liberalization, at least two almost completely separate marketing chains co-existed, in the form of parastatal and parallel, or private, markets. Analyses of market margins and prices in different market places, aimed at assessing degrees of competition, or the effects of the market on production and consumption, which fail to take into account this institutional separation, can be highly misleading.

The relationship between parastatal and private marketing sub-sectors post-liberalization may indicate other facets of integration and fragmentation. For example, in Tanzania, the authors found that although, in general, private traders avoided buying from or selling to the public sector institutions, due to price and quality considerations, large wholesalers, dealing in very large quantities and over longer distances, had a preference for trading with the public sector. This suggested that the private market lacked an efficient information system, and widespread means to store large quantities of grain, which lead to its being integrated on a regional, rather than national, level.

Identifying marketing channels can also lead to hypotheses concerning exchange efficiency. For example, similar fieldwork in Malawi post-liberalization, revealed that in some rural market places, a group of traders were buying from farmers who delivered their produce to the market, and immediately selling these commodities to urban traders within the same market place, on the same day, for a profit. Their ability to do this was dependent on farmers' distrust of weighing scales used by the urban wholesalers. They therefore preferred to sell to those buying by the plateful, but received a lower price in doing so.

Similarly, in both Malawi and Tanzania, the division between wholesaling and retailing was not always clear, as there existed a class of traders, referred to as wholesaler-retailers, which bought and sold commodities in a range of different-sized units from both farmers and wholesalers, and to both retailers and consumers (Scarborough, 1990). They constituted an extra link in conventional market channels, and therefore may be seen as increasing costs and margins. However, they may also ease entry into the retail level, by offering to sell in smaller quantities than other wholesalers, and hence they may allow for increased competition at this level.

Identifying market channels In order to define the institutional flow of commodities, the different types of marketing channel have to be identified, and all the participants in the market categorized. Information on parastatal and co-operative market channels will usually be obtainable from secondary sources and through interviews with managers or other employees. There may also be secondary data on private sector channels, but often the movement of crops through these will have to be established through observation and interviews with market participants and knowledgeable observers.

Categorizing market participants The criteria used to establish meaningful classes of participant will be specific to the objectives of individual projects. Functional categories, like rural/urban assemblers, wholesalers, wholesaler-retailers, retailers, processors, transporters, farmer-traders, commission agents, and money lenders are likely to be universally used.

Functional categories will often not be mutually exclusive though, because individuals or firms may combine several market roles, but through identifying the various functions undertaken, and the exchange relations between the institutions responsible for them, marketing chains can be built up and the means by which commodities move from producers to consumers more clearly understood. Cross-cutting, additional categorization may also be necessary depending on the objectives of the research. These may be related to gender, commodity types, public/private sector or other divisions. For example, in addition to functional categories, Harriss (1981, p.22) also distinguishes between, respectively, traders dealing in traditional agricultural commodities and modern technologies, those undertaking single and multiple marketing functions, those handling single and multiple commodities, and those based rurally and in urban centres.

It may be possible to pursue this categorization exercise through secondary sources, but in most cases trader surveys and participant, and knowledgeable observer, interviews will be necessary.

It is unlikely under rapid appraisal conditions that accurate estimates of annual/seasonal quantities of commodities passing through the links in different chains will be possible. However, in very localized studies market participant interviews which probe into the quantities handled by individuals annually or seasonally, combined with observational surveys identifying numbers of traders in particular categories may provide rough indications. For example, if the market chains through which commodities flow have been established, and the number of participants in each category estimated, rough indications of the quantities passing through each link in various chains can be calculated by multiplying the average quantity handled annually by a representative number of traders in each category, by the estimated numbers of participant of that category in the chain.

Market Functions

Having identified the main market channels and functions undertaken, it is necessary to understand the organization of those functions and the exchange of commodities along the chains. This ensures that, in subsequent performance analyses, comparisons between inputs and outputs, and costs and prices, are meaningful and accurately reflect those obtaining in individual operations. As Harriss (1979a) points out, the absence of such qualitative assessments has often lead to nonsensical or misleading analyses of performance. In addition, understanding how marketing is undertaken should lead to more fully informed attempts to explain apparent inefficiencies. Therefore, before analysing the efficiency with which market functions are undertaken and priced, analysts need to know how, where, when and by whom they are carried out.

Marketing activities Noting the various activities involved in each function, and the means by which they are carried out, helps this overall analysis. This exercise is also useful in identifying and quantifying all the inputs and outputs, and costs of, and returns to, undertaking market functions, which is necessary for subsequent technical, operational and economic efficiency analyses.

For example, buying directly from farmers may entail the following activities:

- gathering information on supplies, demand and prices;
- locating and forging contacts with sellers;
- raising finance;
- arranging means, and negotiating the price, of transport;
- hiring casual labour;
- travelling to the point of purchase;
- grading the commodities according to variety and quality;
- negotiating the terms of sale, including the price, and possibly credit and future buying arrangements, and exchanging commodities and payment;

- assembling, bulking, weighing/measuring and bagging the commodity;
- loading the commodity onto a vehicle; and
- travelling to point of sale, storage or processing, unloading, stacking and selling.

Ascertaining how marketing functions are carried out may be possible through reference to secondary sources where previous research has been undertaken, but, in most cases, it will be necessary to interview knowledgeable observers and traders representing each market channel and function, and to make further close observations. The following checklists indicate the types of question that may be asked in such interviews. The data thus collected will also provide insights into the internal organization of firms, and the nature of the vertical and horizontal relations between them.

Buying and selling With reference to buying and selling the following types of question need to be addressed:

- Where are they carried out, and at what times of year? This may have important influences on the participants' relative bargaining positions, and will almost certainly affect the costs of marketing, and hence prices paid or received.
- Do farmers sell to rural assemblers in rural areas, or to rural or urban wholesalers directly.
- Do urban wholesalers buy directly from farmers, at their houses or in rural or urban market places, or do they buy from assemblers/commission agents, co-operatives, parastatals.
- If wholesalers travel to the rural areas to buy, how often do they travel, is it a seasonal activity, to how many different rural locations, how much do they attempt to buy in a single journey? For example, urban traders may have regular suppliers which reduces risk and time in seeking out supplies, or they may travel to many places seeking out the lowest possible prices.
- If farmers travel; why and how often do they do so, in how many locations do they attempt to sell, why do they choose particular ones, what forms of transport do they use?
- If wholesalers rely on urban deliveries, who undertakes such delivery and how, are there cost savings in assembly and bulking, as well as transport, for the wholesalers, is this reflected in the prices they pay and at which they subsequently resell?
- Is information less lagged and/or more comprehensive when farmers deliver their produce to the towns?
- How is exchange between wholesalers and retailers organized, do they operate from the same market places, or does one party have to travel, how are prices agreed?
- Do wholesalers and retailers sell only in the market places or from stores, door-to-door and/or from their homes?
- How are contacts between buyers and sellers forged, and how are terms of sale agreed?
- What weights and measures and classes of variety and quality are used; are they standardized?

Storage Similar types of data are also required on storage, processing and transport. Thus the following need to be addressed before assessing the technical, operational and economic efficiency of storage by establishing the costs of, and returns to, the function:

- Where, in the market chain, is storage located; how widely dispersed is it; what are the implications of the latter for judgements concerning future supplies, and for trader access?

- What types of stores are used; what is their capacity and what are the rates, and time dimensions, of utilization; how weather- and pest-proof are they?
- Are stores owned or rented?
- How is produce bulked, packed and stacked inside the store?
- What pesticides and other chemicals are necessary or used?
- What are the primary motivations for storage, are they related more to security of supplies or to increasing income?
- What are the determinants of the volumes and length of storage?

Transport Similarly, for example, for transport the following need to be understood before realistic estimates of crop losses, costs and returns can be embarked upon:

- What types of transport are used?
- Who owns or rents vehicles, what are the rental arrangements and how are they agreed?
- How is transport is organized and what are the implications of this for time and capacity utilization rates?
- What is the availability of vehicles and other means of transport, fuel, spare parts and maintenance services?
- How are loading and unloading organized and remunerated?
- Are there formal transport tariffs related to types of produce, and to what extent are they applied?

Processing Initial surveys of processing are likely to be aimed at gathering similar types of information. For example, the following questions need to be answered:

- What processing functions are necessary or actually rendered?
- Who undertakes these and where?
- What technologies are used?
- How many mills/plants are there per town or village?
- Does this concentration and variety offer consumers and traders real alternatives?
- How much processing is done domestically by hand?
- What are the different rates of transformation?

Intra-Enterprise Organization

Having understood how these marketing functions are organized, analyses concerned with economic performance then need to examine the internal operation of enterprises, the horizontal relationships between similar enterprises and the vertical relationships between those engaged in exchange with each other.

With reference to the allocation of resources and means of organizing marketing activities within the enterprise, the precise focus of enquiries will again depend on research objectives. Continuing the

assumption that economic efficiency is the prime object of study, the following will have to be addressed:

- the allocation and utilization of labour, and of recurrent and fixed capital, within various enterprises;
- the technical and operational efficiency with which market functions are carried out; and
- enterprise level profitability.

Resource utilization and allocation It is necessary to understand how resources, primarily labour and capital, are used and allocated within enterprises in order to (a) identify, quantify and value inputs and outputs; (b) explain differences in technical and operational efficiency and profitability between enterprises and (c) make suggestions for improvement of intra-enterprise productive efficiency. In addition, data on the organization of resources within enterprises will shed light on the nature of phenomena like credit and labour relations, inequality, degrees of vertical and horizontal integration and the implications of these for competition in the market place, and inter-sectoral resource transfers.

Where enterprise bookkeeping records are available to analysts, and are believed to be representative of their economic activities, they should provide the information necessary to build up a picture of how resources are used within the enterprise. This is more likely to be possible amongst public, co-operative or very large enterprises. Often, however, market participant interviews will be necessary, and the following types of question can be addressed:

- Are marketing functions the only economic activities engaged in by the enterprises operating in the market, what combinations of economic activities are engaged in, and how are labour and capital divided between them?
- Do traders at various levels in the market specialize in dealing in one or a few commodities, or are enterprises diversified?
- Do traders specialize in one or several functions?
- Is commodity or functional diversification manifest concurrently or sequentially; does it lead to vertical or horizontal integration?
- What are the pros and cons of specialization and diversification; is the primary motivation behind diversification related to the maximization of profits or the minimization of risk?
- What are the predominant patterns of ownership of marketing enterprises?
- Where partnerships are common, what is the rationale behind forming a partnership, are they based on kinship relations, how is the division of labour, capital inputs and profits distributed?
- What capital assets are owned and what is their current value?
- What types of labour are employed; how much is employed and how is it deployed and remunerated?

Technical and operational efficiency Whether judged relatively, or against absolute standards, assessing enterprises productive efficiency requires the identification, and physical and monetary quantification, of inputs and outputs entailed in the market function under observation. As noted in Chapter 2, some inputs and outputs will easier to identify, quantify and value than others, and the use of rough indicators and approximations is likely to be necessary in many instances, particularly under the conditions of rapid appraisal. Similarly, it is unlikely that accurate valuations of marginal factor costs, and value products, will be possible. Rather, operational efficiency can be approached through comparing the unitary, and total, costs and returns, exhibited by a variety of enterprises, with those of similar enterprises and with technologically feasible minima.

Thus the types of data required for assessing productive efficiency will be:

- Rates of spillage, or qualitative crop loss, incurred in buying and selling, transporting, loading, unloading and stacking, storage and processing.
- Rates of transformation of commodities into end- and by-products in processing.
- Rates of utilization of labour, vehicles, stores and processing plants.
- Unitary and total values of the inputs and outputs of various functions, for different types of enterprise, in terms of size, location, capital intensity and degrees of vertical and horizontal integration and specialization or diversification.

Some of this data may be available from secondary sources, like government, parastatal, consultancy or academic reports, but in many cases it will have to be obtained through market participant, or knowledgeable observer, interviews and direct observation. For example, in addressing operational efficiency, government estimates or actual parastatal costs of buying, selling, transport, processing and storage can be, and have been, used as indicators of the private costs of these functions, and together with secondary data on prices, to calculate returns. But given the paucity of this data in many countries, and taking into account differences between private and public costs and prices, together with the fact that there are unlikely to be any secondary data on the qualitative aspects of these phenomena, primary data collection will almost always be preferable. Because so little is known about private marketing in many countries, and the data required is wide-ranging, a combination of techniques is suggested, including examination of available firm records, interviews with traders, in-depth case studies and, in some instances, direct observation.

Profitability Rates of profitability at the enterprise level provide insights into productive and exchange efficiency, as well as into the nature of horizontal and vertical relationships between enterprises. For example, markets can be characterized as being competitive and economically efficient if profit levels are found to be 'normal'. Calculating enterprise-level profits, usually expressed annually, requires data on total costs and output. Such analyses therefore necessitate in-depth case studies and/or analyses of detailed enterprise records, rather than data relating to single transactions. The data needed to calculate rates of profit then depends on how absolute levels of profit are to be represented. This in turn will partly depend on the objectives of the research. Most commonly, rates of return to capital are used, and therefore data on the values of working and fixed capital within the enterprise are needed. Alternative ways of representing profitability are considered in the next chapter.

Horizontal Relationships Between Enterprises

Examining the nature of horizontal relationships between similar enterprises is analogous to analysing the structure of the market as defined by the industrial organization school. As noted above, although not deterministic, the structure of a market can significantly influence prices, supply and the economic efficiency of marketing.

The nature of competition between similar enterprises is the focus of structural studies and therefore the main aim here will be to collect data to aid the formulation of initial hypotheses concerning conditions of competition at different levels of the market. Since a high number of active buyers and sellers all along the marketing chain, ease of entry into all functions and widely available market information, together carry a strong presumption of competitive conditions and behaviour (Timmer *et al.*, 1983, p.166), market structure is most commonly evaluated by assessing the following:

- the relative numbers, and size and spatial distributions, of various types of enterprise;
- the presence, absence or level of barriers to entry faced by new or potential entrants into the market.

The data required to analyse these characteristics can also be used to identify the potentials for exploitation, discrimination and uncompetitive behaviour, and therefore to characterize the levels of inequality, and the means of its reproduction, within the system. The availability of credit and market

information are also important in horizontal relationships, especially for example as a means of procuring entry into the market, but they are considered in more detail in the next section.

Lele (1971) suggests that per capita income of the working population associated with trade, or various parts of it, can also provide an indication of the structure of the market. Similarly, Harriss (1985, p.282) proposes that the income and wealth of traders is a good indicator of the economic power facing farmers, consumers and/or other traders with which they deal.

Numbers, and size and spatial distributions of firms Estimating the numbers, size and spatial distributions of each category of intermediary provides an indication of both the local structure of the market, and the range of alternatives faced by participants in the marketing chain in their buying, selling and hiring functions. Subjective perceptions of the latter can also be obtained through interviews.

The numbers and sizes of each type of trader are necessary because conditions of competition can vary between different levels of the market and, because, although absolute numbers may appear to be large, the ratio between buyers and sellers may suggest potential opportunities for discrimination. Numbers and size distributions of enterprises are likely to fluctuate through time and so trends also need to be established.

Size is usually defined by the volume, or value, of annual sales turnover, or the value of current assets. There is unlikely to be any systematic information on trader numbers and, as noted above, they are likely to be highly variable through time, both intra- and inter-annually. However, census data, tax and licence records where available, and previous research reports or area samples may provide some estimates, which should then be verified by fieldwork at the local level.

The primary research undertaken to define these characteristics will again depend on the availability of secondary data and the scale of the study. If the research is localized, for example restricted to a single town, and time and resources permit, formal or informal surveys may be possible. These can be supplemented by trader and knowledgable observer interviews.

Market officials will often be able to furnish researchers with the numbers of various categories of traders under their jurisdiction, and traders will usually be able to provide indications of changes in numbers, annually and seasonally. Market officials, or licensing and taxation offices, may also be able to provide estimates of trends in the numbers of intermediaries and of the levels of volumes stored and processed annually, although the latter are likely to be understated if reliant on traders' reports.

Researching the effects that increased numbers of traders have on different sizes, or types, of firms can also provide indications of market structure. For example, fieldwork carried out by the authors among traders in Tanzania, following the liberalization of domestic food markets, revealed that all market participants perceived a significant increase in numbers post-liberalization, but that only small-scale retailers thought it made business more difficult. This suggested that entry into lower levels of trade was easy, relative to that into higher levels. Further probing suggested that capital requirements, rather than collusive activity, was the main constraint on entry into wholesaling.

Barriers to entry In addition, the ease with which potential participants can enter various functions is commonly used as a means of assessing the degree of competition in an industry. To assess the nature and levels of any barriers to entry it is important to collect data at different levels of the market. For example, highly competitive, small-scale retailing commonly co-exists with oligopolistic, larger-scale wholesaling and the degree of competition will thus vary with level.

Four types of barriers to entry are common: product differentiation; economies of scale; absolute cost advantages of established firms; and heavy capital requirements (Semmler, 1984, p.108). However, the first of these is unlikely to be important in LDC food markets and usually the focus is on the last.

Information on the barriers to entry can be obtained from interviews with market participants which inquire into the following:

- Modes of entry into trade, including the means of building up capital, acquiring marketing skills and contacts, periods of apprenticeship, whether such apprenticeships are based on kinship, tribal or caste connections.

- Traders' subjective perceptions of barriers.

- The origins, and levels, of initial capital required for traders of different sizes, and/or dealing in different functions and commodities. A comparison of minimum capital entry requirements for different functions, and their changes over time, with those necessary to enter other economic activities, will indicate the relative ease or difficulty of entering the market. For example, Harriss (1981, p.65) suggests that initial capital requirements necessary to enter the trade can be compared to those which would enable the purchase of a small farm.

- The degree of mobility between functions and commodities.

As noted above, it is important to characterize barriers to entry at different levels of the market since monopoly and intense competition can co-exist. This can, to some extent, be indicated by comparing the sizes and ages of enterprises, which may reveal that large enterprises start large or that there is much expansion and upward mobility in the system.

It is difficult to assess barriers to entry through interviewing traders, since all have entered the market. Further information might therefore be gained by questioning potential entrants, for example farmers, about their perceptions of market entry. Additional insights into the nature of barriers to entry can be obtained by observing:

- The age, gender and ethnic distributions of owners, operators and employees for different types of enterprise; and

- The extent to which fluctuations in the number of active traders follow rises and falls in profitability.

For example, Scarborough (1990) found a high concentration of female participants in retailing, and male domination of wholesaling in Malawi, which suggested barriers other than those directly related to capital requirements. Similarly, in both Malawi and Tanzania, there was a universal perception that numbers of traders at various levels had increased significantly post-liberalization, when the costs associated with illegal operations were reduced.

Trader, producer and consumer organizations The existence and forms of trader, producer and consumer organizations may significantly affect both the structure of the market and the barriers to entry, and need to be analysed.

For example, if trader organizations exist, their role, and the conditions, and size, of membership will be instructive since they may inhibit entrance or increase competition and efficiency. Membership may be limited by function, ethnic group, gender, or through high entrance fees. Roles may include the regulation of disputes; the representation of traders to legal authorities; the provision of storage facilities or credit; centralizing and organizing utilization of transport; and payment of joint licence or taxation fees. If credit, storage and transport facilities are widely provided, economies of scale could be realized and entry requirements lowered. Alternatively, if membership necessitates financial resources, and the association facilitates collusive behaviour, competition and economic efficiency could be adversely affected.

Vertical Relationships Between Enterprises

If horizontal relationships between similar marketing enterprises are the basis for examining the structure of the market, the nature of vertical relationships of exchange sheds light on the conduct of market participants. Having shown, in Chapter 2, that structure cannot be accepted as an absolute determinant of conduct, and argued that market analyses need to go beyond the marketing subsystem itself, the necessity to examine vertical relationships between enterprises should be clear.

The institutional organization of exchange; the quantities and types of commodity passing through each link in various marketing channels; the prices obtaining at each of these; and the nature of monetary, credit and information flows are all manifestations of the nature of vertical market relations. Often there will be a causal relationship between horizontal and vertical relations, and therefore the following types of data may provide insights into horizontal relationships as well as vertical ones.

Costs and Prices Prices of inputs and commodities can reveal a lot of varied information about marketing systems, production and consumption, but secondary data on prices is often inadequate in terms of quantity and accuracy, and can thus be very misleading. Usually, time series are short and incomplete and only wholesale and/or retail prices for agricultural commodities bought and sold in towns are available. Farm-gate and other rural prices are often not collected. Moreover, in many countries, only official or parastatal price information is available for periods preceding liberalization, and it cannot be assumed that these were the only prices faced by producers and consumers.

It is important therefore to subject any available price data to preliminary evaluations, as described in Chapter 2, and to supplement such data where possible with that obtained through observation, interviews and case-studies. Where price and/or cost data is only obtained through interviews, however, the scope of analyses will necessarily be limited in time and space.

Various forms of price and cost analyses are discussed in detail in Chapter 4, and are therefore not expanded on here. They include:

- price correlations to assess market integration and co-ordination efficiency;
- gross market margin analyses;
- deconstructed market margin analyses, to obtain insights into productive and economic efficiency; and
- enterprise level profitability, to assess economic efficiency.

The organization of exchange In addition to prices, various qualitative aspects of exchange need to be determined, since they will affect prices, as well as other aspects of market performance, including economic and co-ordination efficiency; income distribution; market responsiveness to changes in demand and supply; shocks and policy shifts generated outside the market itself. Different forms of exchange also have implications for the costs and pricing of marketing services; the quality and dissemination of market information; and the levels and incidence of risk in the market.

Analysing these qualitative aspects of vertical relations will usually only be possible through market participant interviews and case studies, unless previous relevant research has been undertaken. Interviews should be carried out with purposively sampled representatives of all the key stages in the market channels under consideration. A 'purposive' selection is recommended, to ensure a few representatives of each type of enterprise are interviewed.

The following types of question need to be addressed, unless the nature of vertical relations has already been clarified through the construction of market chains:

- To and from whom do different trading enterprises sell and buy commodities and/or services; when, where and why?
- What are the physical and institutional arrangements for organizing exchange?
- How are contacts made and contracts forged, and how are they enforced in long-distance trade?
- Do traders tend to buy from, and sell to, regular customers, or do they seek to maximize profits through responding to the most recent price information available?

- What is the range of choice producers, consumers and various market participants face, in whom to buy from, and sell to?

- How are prices arrived at – on the spot through individual negotiation, bidding between buyers, or by reference to administratively determined levels. Or are they pre-arranged through communication; forward buying contracts; or credit relations.

- Is there much individual haggling or are prices across a market place relatively uniform?

- Is the latter the result of competitive or monopolistic conditions?

- Do prices discriminate between varieties and qualities; different scales of buyers and sellers?

- What role do commission agents or brokers serve in vertical co-ordination. For example, they may be used to locate supplies or large demand orders; to establish initial contact with sellers; to complete initial purchase terms and conditions of payment. They may also guarantee sales on credit and buy and sell, store and process goods themselves. They can take many different forms, for example urban firms organizing long-distance contracts, or individuals actively promoting sellers' produce.

A wide range of exchange mechanisms are possible, and often operative in LDC food markets. They include, for example, forward contracting; reciprocal regular customage; tied credit and debt relations; co-operative bargaining, and vertical integration. These exchange relationships can influence prices; returns; market structure and performance in multiple ways. For example, the advantages and disadvantages of vertical integration in terms of various performance criteria have already been discussed in Chapter 2. Forward buying contracts between producers and assemblers, wholesalers or processors, may reduce the costs of seeking out supplies, and of the risks associated with fluctuating supplies and prices. However, they may also result in reduced returns to farmers, and flows of market information, and/or increased buyer profits; barriers to entry to potential buyers; and a lack of responsiveness to changing supply and demand. Similarly, wholesalers and producers may reduce the risks and costs of marketing through abiding by formal, or informal, reciprocal contracts of exclusive exchange, but this may also lead to unresponsive pricing and reduced competition.

Information The importance of the role of market information in terms of economic efficiency and performance, as well as equity, is widely accepted as the following quotes show. 'The view is widely held that accurate, timely market information enhances market performance by improving the knowledge of buyers and sellers concerning supply, demand and other factors affecting price. High quality market information also is said to foster competition which tends to eliminate high cost operations and inefficient firms' (Helmberger *et al.*, 1981, p.562). 'One of the most important steps a government can take to improve the fairness of market price formation so that it discriminates less against the small farmers at one end and the consumer at the other is to provide these individuals with timely and accurate information about actual market conditions...More equal balance of knowledge provides a more equal distribution of the gains from efficient market price formation' (Timmer *et al.*, 1983, p.154).

The availability and quality of market information affects the nature of both horizontal and vertical market relations. Exclusive access to market information, or the control of information and/or capital, are important sources of monopoly, and the nature of horizontal and vertical relations strongly influences the spread of information.

Because information plays such a crucial role in the market performance, analysts must attempt to determine how traders judge likely levels of supply, demand and prices obtaining in different places and times. The sources, and quality, of such information for different categories of participant should be checked and evaluated. Traders may obtain such information in a variety of ways, ranging from mass media available to all, to exclusive collection on an individual basis. The following types of question therefore need to be asked:

- How, and from what sources, is market information gathered; how is it disseminated?
- What types of market information are considered necessary?
- Do traders actively seek it out?
- Is there any public provision of market information?
- How accurate is the information obtained from various sources?
- Does its quality vary between different crops, areas or marketing chains? For example, is information harder to obtain in rural than urban areas?
- How quickly, and how discriminately, is it distributed?
- To what degree do different traders and farmers share the same information?

Harriss (1981, p.203) found that traders in South India used a variety of means to obtain information, including telephones; word of mouth; letters and telegrams, depending on the distances and price fluctuations involved. 'Telephones and telegrams are used when pricing relations change fast at the time of harvest and at post-harvest gluts. Telegrams are used for long-distance price information, while personal contacts, gossip and letters tend to be used for shorter distances and for times when not much change is expected in the pricing relationships.'

Credit The nature of credit relations within the marketing system provides insights into traders' relative market bargaining powers; conditions of supply and demand, and of competition; and into key opportunities and constraints on trade. Similarly, credit has a critical influence on conditions of entry into the market, and on price levels. Therefore the following types of question should be addressed:

- Who extends credit to whom within the market sub-system and what does this imply? For example, in Malawi, within the private marketing sector, credit was found to flow from farmers to small-scale wholesalers and wholesaler-retailers, to retailers and thence to salaried consumers in the form of delayed payments. Conversely, large-scale wholesalers always paid farmers with cash. This difference in solvency between these two levels of the market, suggested a divergence in terms of rates of accumulation, and therefore in degrees of competition (Scarborough, 1990).
- What forms does this credit take?
- What are the primary motivations for lending? Guaranteed steady supplies may be more important in money lending between traders and farmers, than profits earned from interest. If the primary objective of lending to farmers is to secure supplies, the profitability of trading is likely to exceed that of money lending. If credit is extended to farmers to secure supplies, or reduce the costs of obtaining such supplies, is this because of the vagaries of agricultural production, or those of marketed surpluses, or because buying from farmers is highly competitive? Where large traders lend to smaller ones, it is possible that this is an attempt to ensure forward sales, or high levels of competition at lower levels of marketing, thus preventing upward mobility, and increased competition amongst larger traders. Is it used as a means of reducing costs, for example of transport, and minimizing commodity losses during marketing?
- What are the likely effects of credit relations on price levels? For example, apparently low producer prices may conceal credit and interest repayments.
- What other sources of credit are available, formal and informal?
- What are the values of various types of loan?

- What are the terms and conditions of different sorts of borrowing, lending and repayment?
- How is eligibility established?
- Are loans secured against produce and/or assets?
- What are the means of, time limits, and interest rates, on repayments?
- How do interest rates in different credit markets compare, and what are the implications of any differences? For example, competition between wholesalers or assemblers for farmers' surplus may take the form of low interest rates on credit, which may be indicative of particular conditions of supply and demand and competition within that level of the market.
- How is credit used by different groups of borrowers?

Chapter 4
Data Analysis

- **Testing for economic efficiency**
- **The internal productive efficiency of the marketing enterprise**
- **The conditions of perfect competition**
- **Seller concentration ratios**
- **Price correlation coefficients**
- **Gross market margins**
- **Deconstructed market margins**
- **Enterprise level profitability**

This chapter discusses various techniques of data analysis commonly used to assess productive efficiency within the enterprise, and conditions of competition and economic efficiency within marketing systems. For each type of analysis, an attempt is made to specify the data and computational requirements, and to discuss the interpretation, use and implications of results. In addition, possible reasons for undertaking these analyses are described, and their practical and theoretical strengths and weaknesses are evaluated.

The internal productive efficiency of enterprises is approached through calculating and comparing levels and monetary values of inputs and outputs, for a sample of enterprises.

The economic efficiency of the marketing sub-system is addressed with reference to the neo-classical model of perfect competition. The main types of analyses covered are those concerned with seller concentration ratios; inter-spatial, -temporal and -form price correlation coefficients; gross and deconstructed market margins, and firm level profitability. However, it is stressed in this that analysts must:

(a) combine various types of analyses, as all are only indicative, and none are conclusive;

(b) be aware of the dangers of generalizing the results of localized or specific studies, since the extent to which markets are competitive may vary considerably between levels, places and times, and

(c) keep in mind the conditions, limitations and assumptions of the theory of perfect competition, and those under which it is argued to result in optimal resource allocation and the maximization of consumer satisfaction.

TESTING FOR ECONOMIC EFFICIENCY IN MARKETS

It was suggested in Chapter 2 that a market sub-system or parts of it can be said to be economically efficient if:

- all enterprises are technically and operationally, that is to say productively, efficient;
- the distribution of enterprises, plant and infrastructure is organized in a manner which enables scale and locational economies to be exploited; and

- the operation of exchange generates prices which conform to a competitive standard.

Therefore, in assessing the extent to which markets are economically efficient, or inefficient, these three conditions must be tested for. However, it was also noted previously that:

- in many instances, particularly under rapid reconnaissance conditions, accurate measurement will not be possible, and rough indications will have to suffice;
- there is likely to be an emphasis on identifying potential improvements, rather than comparing empirical situations to abstract optimal efficiency conditions;
- there are no generally accepted means of assessing O-efficiency, the second of the above three conditions of economic efficiency;
- for perfectly competitive markets to result in the static maximization of resource productivity, there must be no externalities, scale economies or other market failures; and
- even if there are no market failures, perfectly competitive markets may not lead to the optimization of resource productivity in the long term, or the maximization of social welfare where (a) income distribution is highly skewed and/or other non-economic objectives are socially important, or (b) market participants do not seek to maximize profits, returns to owned resources or subjective utilities.

Despite these contingencies, various types of data analyses are described below which are all aimed at assessing the economic efficiency of markets as defined above. They provide the basis on which to:

- analyse the workings, and economic efficiency, of current market operations;
- explain apparent inefficiencies;
- assess the potential for, and means of, improvement in relation to economic efficiency or other objectives, such as food security and greater socio-economic equality.

THE INTERNAL EFFICIENCY OF THE ENTERPRISE (FIRM)

As noted in Chapter 2, an index of technical efficiency can be calculated as the ratio of actual, to potential, maximum levels of output. Similarly, operational efficiency is indicated by the ratio of costs using optimal input proportions to those of actual inputs used. However, with limited time and data, research into the internal productive efficiency of firms is often aimed at the potential for incremental improvements, rather than the calculation of optimal variables. This can be undertaken through (a) comparing levels and values of inputs and outputs for different enterprises, and (b) enquiring into the internal organization of their operations.

Comparisons can then be made between the input and output levels, and the costs and returns for individual enterprises with:

- the average levels and values of a particular class of enterprise;
- those of the most efficient enterprise of the same type;
- the average of those of different classes of enterprise; and
- those of the same class, or particular enterprise, but for earlier years (if time series data is available).

In this way, two standards for comparison are obtained – firstly, the average levels of inputs, outputs, costs and returns for each category of enterprise and, secondly, those of the most efficient

enterprises. The latter will exhibit minimal costs and maximum output for any given level of input. An understanding of exactly how economic activities are organized is then necessary to explain differences in these parameters, and to suggest means of enhancing productive efficiency.

Data and Computational Requirements

Essentially, what is required in addressing technical and operational efficiency in this way is:

- The categorization of sample enterprises to be compared. Enterprises can be classified according to functional type, size, location or other factors, depending on research objectives.

- The identification and measurement of physical quantities, and monetary values, of all inputs used, and outputs produced, for the sample of enterprises. Usually, simple averages of the levels and values of inputs and outputs, over a particular time period, are used in these calculations and comparisons. The degree to which classes of input and output are disaggregated will depend on research objectives, and the availability of data. For example, labour may form a single category of input, or, if analysts are particularly interested in labour utilization and productivity, it may be broken down into casual, permanent, piece-rate, male, female and other categories. Some inputs and outputs are easier to quantify and value than others, and therefore, indicative values will sometimes have to be used (see Chapter 2). In addition, under conditions of rapid reconnaissance, it is unlikely that accurate measures of technical and operational efficiency will be possible. This is particularly the case where detailed accounting records are unavailable, and where estimates of input and output averages have to be obtained through market participant interviews and direct observation.

- The calculation of mean levels and values of each type of input and output, and for each category of enterprise, over the period under consideration, in order to provide a standard for comparison and relative evaluation. Often, ranges of levels and values of inputs and outputs are also provided for each group of enterprises.

- The explanation of variations in levels and values of inputs and outputs, between enterprises within the same category, and between different classes' averages. These will have to be based largely upon the general observations and experience of the researcher (French, 1977, p.122).

Problems and Limitations

Apart from the problems of data availability, and the measurement and evaluation of parameters, identifying the reasons for differences between enterprises' levels and/or values of inputs and outputs is probably the most important difficulty in assessing enterprise-level productive efficiency. Firstly, physical levels and monetary values of inputs used and outputs produced are influenced by numerous factors. Secondly, it is usually impossible to quantify organizational characteristics. For both reasons, great care must be taken when postulating and generalizing causes of variations in measures of productive efficiency. For example, the costs of providing a marketing service can be influenced by economies of scale; managerial efficiency; production techniques; organizational structures; rates of qualitative and quantitative crop losses; capital intensity and labour productivity; means of remuneration and motivation; use, or not, of unpaid family labour; input prices; degrees of capacity utilization, and of vertical and/or horizontal integration, and locational, environmental and infrastructural conditions. Given the inability to quantify all these variables, explanations of differences between enterprises' physical inputs and outputs, and their costs and returns, will have to be based on a thorough understanding of the internal organization of each of the enterprises under study, and a qualitative comparison between these, as well as on the experience of the analyst.

Identifying Means of Enhancing Productive Efficiency

The inability to calculate precise and absolute measurements of technical and operational efficiency, and of the functional relationships between these and organizational characteristics of the enterprise,

does not prevent attempts to increase productive efficiency. Through a combination of rough measures of technical and operational efficiency, and a detailed understanding of the internal organization of the enterprise and its marketing functions, researchers can begin to identify means of increasing such efficiency. For example, during fieldwork in Malawi, Scarborough (1990) found that a number of wholesalers only bought produce from their home villages, although grain was concurrently available in other places, which were either nearer to the selling point, and/or being bought by other wholesalers at a cheaper price. Thus, an apparent instance of operational inefficiency was observed, and the causes of it could be pursued though interviews with those concerned. It emerged that, in some cases, this buying pattern was due to lack of knowledge of alternative sources of supply and that, in others, the benefits of reducing risk through maintaining regular relationships with particular farmers, and/or the ability to establish familial divisions of labour within the marketing enterprise, were perceived as over-riding the costs of purchasing in home villages (Scarborough, 1990). Similarly, the handling of commodities in storage, transport and processing can be a crucial determinant of qualitative and quantitative crop losses, which are important in technical efficiency. Handling in different enterprises may contribute significantly to differences in enterprises' technical efficiency indices.

Beyond Enterprise (Firm)-Level Productive Efficiency

A different assessment is required if industry- or channel-wide productive efficiency is the object of study, since then O-efficiency becomes important. While ways of measuring this as a separate characteristic remain to be developed, various economic analyses of the economic efficiency of a market sub-system can be carried out. These should take into account potential economies of scale; the benefits of vertical and horizontal integration; the siting and quality of plants, market places and other infrastructure; the level of transport costs and the efficiency of different production methods (see Chapter 5).

ECONOMIC OR EXCHANGE EFFICIENCY

In attempting to characterize the economic efficiency of markets, the standard of perfect competition is most commonly used as a base for evaluation. This is because more dynamic models of economic efficiency are as yet less well-developed, and more complex, and because the hybridization of neo-classical economics with other political and social efficiency theories remains incomplete (see Box 2:1). Therefore, the analyses described below focus on assessing the degree of competition in the market sub-system under observation.

Using the Model of Perfect Competition

It is important when undertaking analyses of economic efficiency which are based on the conditions of perfect competition, to recall that markets may be more or less competitive in particular areas; times; commodities; functions; levels of marketing activity; scales of operation etc.. As previously noted, in the immediate post-harvest period, a number of petty traders or farmer/traders may enter the market for a short time, but constraints on storage may enable the monopolization of trade in later, pre-harvest periods. Similarly, competition may be stiff at the retail level of food marketing, where capital requirements for entry are not prohibitive, but wholesaling may be oligopolistic.

It is also crucial, in using the model of perfect competition, to:

- combine various types of data analyses, since none on their own can be held to be conclusive;
- to establish the sources of apparent imperfections, since the means to overcome them need to be identified, and not all of them will necessarily be deleterious in terms of the efficiency of resource allocation, or economic performance, more broadly; and

Box 4:1 Using the Model of Perfect Competition to Analyse Market Efficiency

Because of the stringent conditions necessary (a) to ensure markets are perfectly competitive and (b) for them to result in Pareto optimal conditions, (see Box 1:1) it is often necessary when analysing economic efficiency to refer to a standard in which competitive levels are defined as 'good enough', and to question the assumptions and objectives of the model.

No real-world markets are perfectly competitive, and the principal use of the model is as a yardstick against which to compare real situations. It enables the systematic analysis of the economic efficiency of markets; the isolation of departures from the perfect situation; the definition of causes of this; the characterization of these departures as either benign or harmful, and it aids policy decision making.

However, doubts concerning the usefulness of the model of perfect competition as a policy instrument in the context of real world imperfections, led to an attempt in the 1940s and 1950s to define conditions which were operational, and would define a state of 'workable competition'.

Workable competition

Sosnick (1958, 1968) summarizes the literature on workable competition. He defines the theory of workable competition as 'an attempt to indicate what practically attainable state of affairs are socially desirable in individual capitalistic markets'. He also lists sixteen conditions that would define an industry, or market, as workably competitive, as follows:

- the existence of as many buyers and sellers as scale economies permit, and enough buyers and sellers to ensure alternative possibilities;
- free access of buyers and sellers to the market, with no preferential treatment of particular individuals or groups;
- the absence of artificial inhibitions on mobility;
- moderate, and price-sensitive, quality differentials in the products offered;
- some uncertainty in the minds of rivals as to whether price initiatives will be followed;
- the absence of participants powerful enough to coerce rivals, or engage in exclusionary, or predatory tactics;
- responsiveness on the part of participants to profits and losses;
- the absence of agreements, or collusion, between rivals on commercial policy;
- the absence of misleading sales promotion;
- production and distribution should be technically and operationally efficient, and should not waste resources;
- output levels and qualities should respond to consumer demands;
- profits should be at levels just sufficient to reward investment, productive efficiency and innovation;
- prices should encourage rational choices, and should guide markets to equilibrium;
- opportunities for technological and product innovation should be exploited;
- promotional expenses should not be excessive;
- financial success should accrue to those who best serve consumer wants.

All these conditions are relative, and thus require value judgements. This is particularly the case when some, but not all the criteria, are satisfied. In addition, some of the criteria remain difficult, if not impossible, to measure, but these conditions do provide an indication of what can be expected in testing empirical situations for economic efficiency. They can also be used for attempting to identify means of improving the efficiency of markets.

- therefore to return to the assumptions of the theory of perfect competition, and to other performance objectives, to weigh up the costs and benefits of apparent imperfections. For example, where there are significant economies of scale in marketing operations, oligopolistic market structures may result in a more efficient allocation of resources than competitive ones.

ANALYSING THE CONDITIONS OF PERFECT COMPETITION

Determining the presence or absence of the requirements of the model of perfect competition can be used indirectly to assess the economic efficiency of markets. Many studies concerned with the efficiency of food, and/or agricultural markets begin with this form of analysis. In particular, there has been much emphasis on:

- relative numbers and sizes of different types of trading enterprise;
- barriers to entry into the market; and
- the availability of market information.

This focus follows from the assumptions that (a) inefficient pricing is often associated with oligopolistic market structures and poor market information, and that (b) in food marketing, participants are economically rational and products are divisible, and therefore these two conditions do not have to be tested. However, as Jones (1974, p.16) points out, although such exercises can provide a basis for enquiry, and a guide to further research, they do not allow for an evaluation of how well markets perform various functions in the absence of some of these conditions, nor of the costs of such imperfections. Hence the necessity for combining different types of analysis.

Approaches to assessing the size distribution of enterprises are discussed below. Bain (1969) suggests that barriers to entry into the market can be measured by the maximum ratio of the selling price to minimum long-run production costs that can exist without attracting new enterprises, but it is unlikely that this will be possible in LDCs, or under the constraints of rapid reconnaissance. Therefore, as detailed in Chapter 3, the nature and levels of barriers to entry will usually only be assessed relatively, and through interviews with current or potential market participants, and/or surveys of the age, gender and ethnic distributions of traders. Similarly, there are no absolute measures to quantify the availability of market information beyond those suggested in Chapter 3, so these latter two conditions are not considered further.

Assessing Market Structure – The Size Distribution of Enterprises (Firms)

Bearing in mind the problems associated with structural analyses of markets discussed in Chapter 2 and, in particular, the non-deterministic nature of the relationship between structure, conduct and performance, assessing market structure can nonetheless be a useful starting point in data analyses. It can be combined with observational surveys and participant interviews, aimed at determining the presence or absence of other conditions of competition, and in developing initial hypotheses about likely behavioral attributes, for further corroboration.

As noted above, market or industry structure is most commonly evaluated by examining (a) trends in the numbers and sizes of firms relative to each other, and to numbers of consumers and producers, in particular times and places, and (b) the presence, absence, levels, and nature of entry barriers faced by new enterprises.

Seller Concentration

In characterizing market structure in industrialized market economies, seller concentration, or the size distribution of enterprises' sales, has been the most commonly used criterion. It is hypothesized that the more concentrated an industry, and/or the greater the barriers to entry, the easier it is for enterprises to collude in their output and pricing practices, and the more likely that, in the long-run,

output levels will fall and prices will rise. Other performance criteria will similarly be adversely affected. For example, it is argued that inflation and unemployment will also increase, because highly concentrated industries exhibit some of the characteristics of monopolies, like lower production and higher prices than competitive ones.

In food marketing, very large numbers of consumers and farmers at each end of the marketing chain are suggestive of competitive conditions and, therefore, the main focus in analysing market structure is on the numbers and sizes of enterprises within the system, and the potential access of additional participants to it. If at any point in the market chain only one, or a few, buyers, or sellers, dominate the market, in terms of volumes of commodities handled, uncompetitive behaviour is possible.

For example, indications of the likelihood of competitive behaviour in, and hence performance of, the milling industry can be found through analysing data on the numbers and spatial distribution of mills in relation to centres of population, and hence demand for milling services. Changes in the number of mills over time will also be instructive. If there is a significant growth in the number of mills following market liberalization, one can hypothesize that barriers to entry were prohibitive though are not any longer. However, the capital investment and foreign exchange necessary to purchase mills should also be examined, because entry into the industry may be restricted by the lumpy nature of the investments, and by imperfect finance and foreign exchange markets. This information may be obtainable from secondary sources, since in many LDCs the allocation of foreign exchange is heavily regulated.

Concentration indices Having collected data pertaining to the numbers and sizes of enterprises, there are various indices which can be calculated to provide some form of measurement of the degree of market concentration. The most commonly used measure of market power, or seller concentration, is given by the proportion of total industry sales accounted for by, for example, the four largest enterprises in the industry, as follows:

$$C = (XP/IP)100;$$

where C = the index of concentration; XP = the aggregate output of a certain number of largest enterprises, in monetary or volumetric terms; IP = the total output of the industry.

Khols and Uhl (1985, p.187) suggest that, as a rule-of-thumb, a four enterprise concentration ratio of 50% or more is indicative of a strongly oligopolistic industry; of 33–50% a weak oligopoly, and less than that, an unconcentrated industry.

Limitations on the use of concentration indices Calculating and using concentration ratios as a measure of market structure is subject to empirical, theoretical and inferential problems. In most LDCs, where firm records are usually not available publicly, it would be difficult to determine such ratios on anything but the most local of scales. In addition, this single measure does not reveal anything about the distribution of sales between the number of largest enterprises, nor does it take into account product differentiation or other possible monopoly elements, and it does not allow for the possibility of different degrees of oligopoly through time, space, market levels, functions and products.

For example, there may be high levels of concentration in one area, without the same enterprises having a high share of the market in another. Alternatively, the level of concentration for the industry as a whole may be low whilst, simultaneously, local instances of high concentration may be found. This concentration index also falls prey to the inferential problems of forming hypotheses about conduct from structural characterizations. For example, a large number of similar-sized enterprises may result in a low concentration index, but the possibility that these enterprises could collude, to form effective oligopolistic conditions, has to be kept in mind. Alternatively, highly concentrated industries may nonetheless be intensely competitive. This may be particularly so where such enterprises face actual, or potential, competition from imports.

Localized use of the concentration index Nevertheless, the larger the number of participants in an industry, the more difficult it is to organize oligopolistic behaviour, and, depending on the objectives of the project, the concentration ratio given above can be usefully determined in local circumstances. In such instances, particular trader numbers in a specific market place can be estimated, together with the daily values of their total sales, and the monthly distribution of sales. This enables an estimation of the percentage of traders having monthly sales worth more than a certain amount of money, together with the proportion of the volume of the commodity concerned, traded in that market place, which they collectively handle. Another simpler indication of concentration is found through comparing the combined turnover of the largest enterprises with that of the remainder. If the former exceeds the latter some degree of concentration is implied.

Similar calculations of structural concentration can be undertaken in relation to storage and processing in a local area. This can be done either using the volume, or value, of commodities handled, or other measures of firm size, for example asset ownership or numbers of employees.

The data required for such calculations will probably have to come from interviews with traders and marketing officials, although local licensing and taxation offices may hold the required information.

Implications of results Where there appear to be relatively few enterprises dominating the market, it is necessary to understand why this is so if means of increasing economic efficiency are to be sought. For example, there may be barriers to entry, like minimal capital or storage requirements, or there may be collusion over buying and selling, credit or information, between members of particular ethnic or socio-economic groups. Alternatively, there may be significant economies of scale which may mean concentration is more economically efficient. Similarly, where there is an even distribution of relatively small enterprises, the efficiency of their operations cannot be assumed, but must also be verified. For example, there may be pervasive insecurity in the markets due, for example, to traders'

Box 4:2 Other Measures of Monopoly Power

The Herfindahl Index of industry concentration is calculated as the sum of the squared market shares of all sellers. A very small index indicates the presence of many firms of comparable size, whilst one of 1, or near 1, suggests that the number of firms is small and/or that they have very unequal shares in the market.

Lerner's Index of monopoly power measures the difference between marginal costs and prices, and is given by:

$M = (P - MC)/P$

where M is the measure of monopoly power; P is price; and MC marginal cost.

It attempts to measure pricing strategies, a behavioral characteristic, directly. This index needs a great deal of data and it is unlikely that under the conditions of rapid reconnaissance it would be possible to use it. In addition, the relationship between P and MC will, to some extent, depend on the price elasticity of demand, which only partly depends on monopoly power. Furthermore, marginal cost is an ambiguous concept.

Killick (1981, p.225), in response to some of the problems of the index described in the text, suggests the following measure:

$HC = (XP/IP + M)100$

where HC is a hybrid index of concentration;
M represents competitive imports;
XP = Total output (or employment) of X number of largest firms;
IP = Total output (or employment) of industry or market sector.

Economists have also attempted to classify market structure, and characterize conduct, by calculating the price elasticity of demand faced by firms, and the cross-price elasticities between firms. The hypothesis here is that, if a perfectly elastic demand curve is exhibited, markets are competitive and efficient. This is extremely complex and needs much data however, and does not always lead to mutually exclusive categorizations.

low incomes and assets, and/or large price fluctuations. This may lead to a preference for family labour and risk-averse market strategies, like those aimed at ensuring supplies, rather than maximizing profits. In addition, the appearance of numerous small enterprises may be seasonally or spatially specific, and efforts must be made to find out whether this is the norm.

PRICE ANALYSES

Further insights into the economic efficiency of markets, and particularly the costs of market imperfections, can be obtained through an examination of the ways in and degrees to which price behaviour departs from that predicted by the model of perfect competition.

Thus, for example, as a gross indication, if price series, and supply and demand, data are available, the frequency and magnitude of price changes can be analysed. In a perfectly competitive market, these should be directly related to the frequency and magnitude of shifts in supply and demand, and elasticities of supply and demand. For many agricultural commodities, demand is inelastic in the short-run, and supply shifts seasonally. Beyond such generalization however, the data required for analysing the relationship between prices and levels of supply and demand are often not available.

Another rough test of the conditions of competition can be undertaken through looking at price variation. Under competitive conditions, prices may vary from day to day due to 'transient factors', in addition to responding to underlying shifts in supply and demand (Tomek and Robinson, 1981, p.88). 'Transient factors' may be viewed as daily shifts in supply and demand, as a result of, for example, changing evaluations of market information on the part of market participants. Under monopoly conditions, prices are unlikely to respond to the latter. Therefore more frequent, but smaller, fluctuations in price levels, may be used to hypothesize that conditions are competitive, and vice versa.

Analysing prices in various ways can reveal a lot of other information about markets and marketing, and Box 4:3 provides a summary of the most important of these. However, these analyses are always subject to the problems of data availability and accuracy, and to those of inference. They should, therefore, be used with caution. Subsequently, only analyses of price correlation coefficients and market margins are discussed in detail, since these have been the two most commonly used means of assessing the economic efficiency of markets to date.

PRICE CORRELATION COEFFICIENT ANALYSES

Price correlation coefficient analyses are an indirect means of assessing economic efficiency, and have been used to indicate how well, and how far and fast, prices and price changes are transmitted through the market system. The latter has an important influence not only on resource allocation within a connected system, but also on the extent of the system, and hence on the possible degrees of specialization in production, and of the range of resource allocation.

The 'law of one price' (see Box 4:4) is the basis on which correlation coefficient analyses are used in both the following:

- determining the size, and degree of integration, of markets in various time, space and form dimensions, and

- forming hypotheses about the efficiency of market co-ordination and price formation.

This law implies that the spatial and temporal extent of markets, as well as the degree of integration and the efficiency of price formation, can be examined through an analysis of the correlation between movements of prices of the same commodity in different markets over space, time or form, and those of substitutes and complements over time.

Box 4:3 Price Analyses (adapted from Holtzman 1986:25)

PRICE ANALYSIS	OBJECTIVES	DATA REQUIREMENTS	PROBLEMS
Trends in real prices	Assessing how incentives to consume and produce different products change over time, and to see whether these concur with availabilities etc.	Farm gate prices Wholesale prices Retail prices De/inflator	Use of secondary data Definition of farm gate and wholesale price Changes in product over time Availability and representativeness of de/inflators
Relative price relationships	Assessing changes in agricultural/rural terms of trade, and in farmers' crop mixes, and regional patterns of resource allocation over time	Prices for key substitutes and complements; inputs and consumption goods	Availability and reliability of data
International/domestic price comparisons	Testing comparative advantage, or the economic efficiency of home production and marketing relative to the costs and benefits and importing and exporting	Import parity prices, including international transport costs Export parity prices, including domestic transport costs Exchange rates	Only applies to internationally traded products Specification of international prices; transport costs and exchange rate used Quality differences
Seasonal price variation	Testing the integration of markets, and modelling price formation, over time Calculating seasonal indices Comparing seasonal price movements with harvest times; storability; supplies of substitutes; changes in government policies; levels of supply and demand etc.	Average monthly, weekly or daily prices at the same level of the market, and at the same place for identical products	High rates of inflation may detract from seasonal component Availability of temporally disaggregated, and reliability of, secondary data
Inter-spatial price variation	Correlation coefficient analyses; testing market integration over space Modelling margins and price formation in space Hypotheses concerning direction of commodity flows, market connections and causes of these	Price data for at least several locations, collected at the same time and same level of the marketing system, for identical products	High levels of correlation between prices may indicate either effective integration and/or competition and economic efficiency, or monopoly conditions Thus, additional data and analyses required
Inter-form price differences	Correlation coefficient analyses; testing integration over form Modelling margins and price formation through processing Hypotheses concerning efficiency of different technologies	Prices of specific varieties and qualities of raw products, and of the same in relation to end- and by-products Various conversion ratios relevant to the technologies concerned	High levels of correlation between prices may indicate either effective integration and/or competition and economic efficiency, or monopoly conditions Thus, additional data and analyses required Complexity of taking into account different rates of extraction and qualities of raw and end-products
Gross market margins	Hypotheses concerning economic efficiency of marketing Analysing changes over time in relation to supply, demand, income, policy etc. Assessing different participants' relative market power positions	Prices of the same commodity at different levels of the marketing system through time, space, form and function	Gross market margins cannot be used as a measure of economic efficiency and deconstruction, using cost data is necessary

In a perfectly efficient and integrated market, correlation coefficients between the following variables would equal one. Prices over time for:

- the same commodity in different places;
- different forms of product in the same place;
- the same commodity, in the same place, but in different seasons; and
- complements and substitutes in the same season, form and place.

Thus, price correlation coefficient analyses can, theoretically, be used to test the economic efficiency of the market; the likelihood of the existence of a domestic market and whether it serves to effectively connect producers and consumers throughout a country. The latter is important if it is suspected that there is much fragmentation, and local monopolization, of markets, which then only react to local supply and demand conditions.

However, the technique is subject to serious interpretative problems, since different sets of circumstances can be consistent with similar results. For example, although competitive, efficient and integrated markets exhibit closely correlated movements of prices over space, time and form, inefficient, or even disconnected markets may, for various reasons, also be characterized by the same price relationships. Conversely, highly competitive and efficient conditions may not be revealed through price correlations; for example, if there is multi-directional trade which has not been taken into account. Thus, price correlations alone cannot be used as definitive indicators of market performance, and corroborative evidence is required to explain the resulting correlation characteristics.

Despite much serious criticism over the past decade (Blyn, 1973; Harriss, 1979a), static price correlations remain the most common measure of spatial market integration. Devoid of mono-deterministic assumptions, and combined with other information and analyses, they do provide a means of analysing this characteristic. This is particularly the case where 'one has no a *priori* basis for identifying a model of market structure' (Ravallion, 1987, p.114).

Box 4:4 The Law of One Price and Correlation Coefficients

There is a theoretical relationship under perfect competition between prices in space, time and form called the law of one price. This states that under perfectly competitive conditions, after taking into account the costs of adding place, time and form utility to products, all prices within a market will be uniform and aligned. Similarly, the prices of perfect substitutes and complementary products will be perfectly correlated. This follows from the profit seeking behaviour of marketing firms, which leads them to shift their products, services and resources from lower to higher valued uses. Shifting such resources depends on (a) the receipt of information concerning current and expected market conditions, like supply and demand, and the potential relative returns to resources, and (b) the capability to physically respond to profitable alternatives thus revealed. Given perfect information, and the ability to respond to it, together with profit-maximizing objectives, traders' arbitrage activities should lead to the fulfilment of this law, and an allocation of resources between alternative uses which ensures maximum output.

Coefficients of linear correlation ($rxy = \text{cov}(xy)/\overline{xy}$) measure the strength of association between two variables, when no other variables are taken into account. The square of the above, measures the proportion of variation in one variable that would be accounted for by linear regression in another, although neither variable can be singled out as causative, or dependent. The necessary computations can be found in any statistical text book, or results may be obtained using statistical computer packages.

Calculating and Interpreting Correlation Coefficients

Calculating coefficients of correlation between prices has usually only been used to test the spatial integration of markets, and economically efficient price formation in spatial arbitrage. This type of analysis is focused on below to illustrate the technique. Bivariate correlation or regression coefficients are estimated between the time series of spot wholesale or retail market prices for otherwise identical goods, at different locations. The computations are simple, and can be found in any standard statistical text book. Alternatively, calculations can be performed on micro-computers using a statistical analysis software package.

A coefficient of 1.00 indicates identical price movements in two markets, but this never obtains in reality due to imperfect resource mobility, resulting from transport, storage and/or processing costs; imperfect information, and, in some cases, product differentiation. As Lele (1971, p.23) points out, transport costs mean that prices for a commodity in two markets can vary within a range of plus or minus the transport costs without there being any transfer of commodities between them. The greater the transport costs, the greater the range of price movements possible without any physical transfer of goods, and the lower the correlation between prices. In addition, there may be errors in price measurements. Therefore findings of coefficients close to 1.00 have been used as evidence of spatial integration.

A correlation coefficient of 0.8 suggests that 64% (0.8 squared) of price variation in one market is associated with that in another. In spatial analyses, lines can be drawn on maps between pairs of markets, or towns, which exhibit high correlations, to graphically illustrate inter-connectedness. For example, lines can be drawn between places which exhibit price correlation coefficients equal to or exceeding 0.8 or 0.9 for the period under study.

Given that the direction of trade has been established, low correlation coefficients suggest that either (a) information on prices, supply and demand at various points in the system is lacking, and therefore traders are unaware of profitable alternatives, or that (b) the ability or motivation to respond to market opportunities thus revealed is lacking. Therefore market information or marketing resources may be the constraint. For example, transport bottlenecks of various types, including lack of vehicles and fuel, and impassable or insufficient roads, are very common in some LDCs.

Problems Related to Correlation Analyses

Using secondary data Because this technique analyses price movements over time, secondary sources usually have to be relied upon, and thus the perennial difficulties of using secondary price data have to be addressed. Some means of assessing the quality of such data were provided in Chapter 2. It is important in this instance to be aware, for example, of the following:

- average prices may not be means, but random samples of spot prices recorded sometime during a month or week;
- temporal, volumetric and weight dimensions may not be standardized; and
- prices may not refer to the same quality or grade of product.

Therefore, attempts should be made to establish when, where and how monthly/weekly prices were collected and calculated; what grading system was used, and how far this reflects trader's own differentiation between qualities and grades; and what weights and measures were used in collection.

The technique has been included here despite the data demands, because there are countries where the required data will be available; there are means of working with such data even if its quality is dubious, and it is expected that, particularly post-liberalization, price data collections will be improved and extended.

Inferring market characteristics The danger of leaping from correlation results to market characterizations is illustrated by various possible market situations. For example, in spatial analyses, time

series prices may be independent, yet synchronously and similarly affected by another variable, like the price of a related good traded in a common market; a shared dynamic seasonal structure of production, or prices in a shared destination market. It is possible then for two price series to exhibit high correlation coefficients in the context of market segmentation.

Conversely, monopoly control of prices, or procurement at fixed, pan-territorial or pan-seasonal prices, will result in high correlation coefficients. Spatially or seasonally integrated markets therefore do not have to be competitive or economically efficient. High coefficients indicate stable margins, and by themselves are not indicative of monopoly or competition.

Alternatively, markets may be spatially or seasonally integrated and highly competitive, but exhibit low price correlation coefficients, due to multi-directional trade which has not been taken into account. For example, markets may function simultaneously, and/or sequentially, as centres of supply, intermediate and final demand. Therefore, determinating the direction of product flows, and hence of price formation processes, at particular times of year, is a minimum requirement for meaningful interpretation of results.

Other influences on price series Correlation coefficients between price series are influenced by inflation and large seasonal price movements. If the prices being correlated were collected during a period of substantial inflation, the coefficients may reflect co-variations between prices in the series, which are due to their being equally affected by inflationary forces. As Harriss (1979a, p.202) points out, '*ceteris paribus*, in a time of secularly rising prices due to population growth and increased effective demand relative to supplies, the coefficient will rise because absolute distances from the trend line will be relatively less deviant if marketing costs remain constant'. Similarly, the necessity of working with price averages, may influence results. '*Ceteris paribus*, the longer the time period and/or the wider the range of varieties over which price series variates are being averaged for correlation, the higher the coefficient, the lower the significance level and the greater the likelihood that the day-to-day fluctuations which provide traders' profits are smoothed away'.

Using Price Correlation Coefficient Analysis

Selecting and pre-treating the data There are ways of addressing some of these constraints. For example, Blyn (1973) suggests that long price series should be deflated and deseasonalized, and then the series resulting from these residuals correlated. This would remove time trends, due to rising demand as population and income increases affect whole regions, and seasonal trends, to control for common supply patterns. However, this is more difficult where only urban deflators are available, and price series are short, which is often the case in LDCs. It is also less meaningful where short and seasonal trends are not spatially or temporally synchronous. Alternatively, periods over which inflation was moderate can be used (Timmer *et al.*, 1983, p.176).

Combining different analyses As noted above, high coefficients of correlation between prices may co-exist with physically unconnected or monopolized markets, and low coefficients with intense trade between markets and/or highly competitive conditions. No simple relationship between integration, competition and economic efficiency can be assumed. The need to combine correlation analyses with others, in attempting to characterize markets in terms of their degree of integration and competition is therefore clear. This type of analysis can only provide stronger evidence of market performance characteristics if combined with an understanding of how markets operate and are organized on the ground, and how the costs and returns to spatial and temporal arbitrage and processing compare. It should therefore only be used as an indicative measure and combined with other types of analyses, and researchers should always question the reasons for the results.

On a local scale, other problems with this technique can be overcome through collecting one's own data and comparing these with secondary sources; establishing trading routes, both current and past, and through understanding more about the exact processes of price formation. For example, Harriss (1981, pp.136–140) calculated the correlation coefficients for five varieties of paddy and rice wholesale and retail prices between ten towns, known to be physically connected. Combining the results of this analysis with an understanding derived from trader interviews about the primary influences on the determination of these various prices, she was able to suggest that the paddy

wholesale and rice retail trade were likely to be more spatially monopolistic, on a localized scale, than rice wholesale trade. Such conclusions are important in ordering policy priorities.

Other means of addressing the shortcomings of the technique have also been devised (see Box 4:5), but tend to lead to highly complex forms of analyses which would probably not be possible under rapid reconnaissance conditions.

Box 4:5 Further Means of Overcoming the Problems

The most comprehensive work done to date on the inferential problems posed by price correlation coefficient analyses in LDCs is that of Ravallion (1987). He argues that (a) 'by permitting each local price series to have its own dynamic structure (and allowing for any correlated local seasonality or other characteristics), as well as an inter-linkage with other local markets, the main inferential dangers of the simpler bivariate model can be avoided' and (b) 'spurious correlations can also be avoided by filtering the price series prior to calculating pairwise correlations; this can be done by testing for residual cross-correlations amongst univariate ARIMA models of each price series...or by similar Granger-causality methods.'

Another method, less commonly used, to test for spatial integration is to calculate the spatial variance of prices, and a long-run convergence towards zero. But it can be shown 'that if prices at different markets are generated by identical, but independent stationary autoregressive processes, then they will asymptotically converge to zero variance. Thus, nothing can be inferred about the interlinkage of markets from the results of such tests' (Ravallion, 1987, p.114).

This author (p.104) also suggests that with the same data, the static bivariate correlation method can be extended into a dynamic model of spatial price differentials.

MARKET MARGIN ANALYSES

Defining Market Margins

Market margins are the difference between prices at two market levels. The term market margin is most commonly used to refer to the difference between producer and consumer prices of an equivalent quantity and quality of a commodity. However, it may also describe price differences between other points in the marketing chain, for example between producer and wholesale, or wholesale and retail, prices.

Margins represent the price charged for one or a collection of marketing services. For example, the difference between producer and consumer prices is the amount charged for all the marketing services rendered between production and consumption, including buying, bulking, transport, storage, processing etc.. Under competitive conditions, the size of market margins would be the outcome of the supply and demand for marketing services, and they would equal the minimum costs of service provision plus 'normal' profit. The latter is not a clear concept, but can be defined as 'the least payment the owner of an enterprise would be willing to accept for performing the entrepreneurial function, including risk-taking, management and the like...it is the payment the owner must receive in order to keep him from withdrawing his capital and managerial effort and putting them into some other alternative' (Spencer, 1971, p.395).

Market Margins and Economic Efficiency

The formation of marketing margins, through their influence on price levels, is a major determinant of the efficiency of resource allocation in production, distribution and consumption. Productively efficient and low-cost marketing, together with efficient pricing of services, provides the market with its potential for co-ordinating production and consumption, and allocating resources in a way which maximizes output and satisfaction, and signals to producers and consumers the opportunity costs of

their decisions. Therefore analysing market margins is an important means of assessing the efficiency of price formation in and transmission through the system.

The Formation of Market Margins

The size of market margins is largely dependent on a combination of:

- the quality and quantity of marketing services provided;
- the costs of providing such services; and
- the efficiency with which they are undertaken and priced.

The quality and quantity of marketing services provided will depend on the demand and supply of marketing services and/or the degree of competition in the market place.

The costs of providing such services, are influenced by:

- factors exogenous to the marketing sub-system, like government policies; the price of fuel; the condition of roads; vehicle supply and demand; competitive conditions in factor markets; and
- endogenous factors, in particular the technical and operational efficiency with which marketing functions are carried out, including the realization of potential scale economies.

The efficiency with which marketing functions are priced, in the absence of scale economies, will be largely determined by the extent of competition between marketing enterprises at each stage of the marketing chain, since this is the dominant factor in limiting levels of profit.

Gross and Deconstructed Market Margin Analyses

Gross market margins cannot be treated as indicators of economic performance because (a) economically efficient markets also necessitate productive and exchange efficiency, and (b) gross market margins represent the sum of costs incurred by, and the returns to, market participants.

Large gross margins may obtain under widely varying circumstances. They may be associated alternatively with high costs and low profits; increased quantities or qualities of service; or high rates of profit. Similarly, large margins can be associated with low capital, labour or management productivity as a result of either monopoly control, and hence lack of incentives to reduce costs or increase productivity; absence of profit-maximizing behaviour and/or with risk-reducing market strategies. For example, wholesalers buying solely from their home villages or regular suppliers, may lead to increased costs and consumer prices; lowered producer prices and an economically inefficient allocation of resources. Conversely, small gross margins may co-exist with inefficient use of resources; poor co-ordination and consumer satisfaction; and disproportionate profit elements. Thus, higher marketing margins resulting from increased services, including better co-ordination, may leave producers and consumers better off, and low margins may be due to low productivity. Therefore, in using market margin analyses to assess the economic performance of markets, it is always preferable to deconstruct them into their cost and return elements. Despite the above caveats:

- a low distributive margin is often assumed to work to the economic advantage of producers and consumers in LDCs;
- it is often not possible to deconstruct margins due to lack of data on costs; and
- the analysis of gross margins, or absolute margin sizes, can provide insights into some aspects of markets and marketing, and therefore both types of analysis are discussed here.

Box 4:6 Small Gross Margins and Numbers of Middlemen

That small gross margins are assumed always to be beneficial is presumably because it is thought that increased services are not in demand by the mass of consumers in LDCs, and that they would have a higher preference for cheaper staples.

For example, Timmer *et al.* (1983, p.209) argue that the lowering of marketing costs potentially provides the most efficient and sustainable short-run means of addressing the dilemma between producers' desire for higher and consumers' for lower food prices. Similarly, Harrison *et al.* (1987, p.18) argue that lower marketing (and production) costs would lead to reduced food prices; increased demand for both food and non-food commodities; increased production of and demand for inputs, and therefore more income and employment generation in both the food and non-food sectors. From the discussion on gross margins above, however, it is obvious that, unless marketing is competitive, lowering the costs of marketing will not necessarily benefit producers or consumers. Similarly, unless consumer preferences are responded to, lowering the gross market margin will not necessarily benefit them. Thus, improving technical or operational efficiency, without simultaneously addressing exchange or economic efficiency, prevents such potential from being realized. Further, Mellor (1970, p.333) argues that where margins are already very small, reducing them further is unlikely to affect producer prices, whether they are the result of efficiency, or monopoly and inefficient marketing.

Another common fallacy is that margins are determined by the number of traders in the chain. A division of labour between merchants, resulting in greater specialization, may increase the efficiency of marketing, as may increased competition resulting from a greater number of participants.

Measuring and Analysing Market Margins

Measuring and deconstructing market margins needs much data and time, but provides a more accurate means of analysing the economic efficiency of markets than previous analyses, and it is important if profits and/or costs are thought to be excessive.

The most accurate means of calculating marketing margins is through detailed analyses of the accounts of trading firms, noting in particular the precise costs incurred, and value added, at each stage of marketing, and the prices charged for services rendered. However, not only do many traders not keep such records in LDCs, but where such data are recorded they may be inaccurate if, for example, levels of taxation are thought to be based upon them. This, together with research resource constraints, mean such analyses are often not possible, and secondary and interview data have to be relied upon.

Most LDC marketing margin analyses to date have been concerned with gross margins, and have provided simple computations of the share of the consumers' unit price obtained by producers and traders at each stage of the marketing chain. Thus, the part of the consumer price received by farmers, assemblers, wholesalers, processors, transporters and retailers is calculated. However, because costs are not calculated separately, these measures can only provide indications of the prices charged for marketing services, not of whether these result from efficient operations and/or pricing, or the ability to make large profits. Nevertheless, analysing gross market margins can provide insights into other aspects of marketing and can lead to the formation of initial hypotheses concerning economic efficiency.

GROSS MARKET MARGIN ANALYSIS

Data Requirements

In order to measure gross market margins, data on prices obtaining at different stages in the marketing chain are required. To interpret the results, information on the way the market operates on

Box 4:7 Market Margin Measures used in Industrialized Market Economies

In industrialized economies two commonly used measures of agricultural market margins are the food marketing bill and farm-retail price spreads. The former is calculated as the difference between total annual consumer expenditure on domestically produced foods, and total farmer receipts for the equivalent farm products. However, this reveals nothing about farm prices relative to the costs of production, or to the returns to other economic activities, which are important in assessing production incentives. Nor does this measure provide a means of comparing the costs of, and prices charged for, marketing services and hence assessing the relative economic efficiency of the sub-sector.

Unit farm-retail price spreads are computed as the difference between unit retail prices and the farm value of an equivalent amount of raw product. These allow a more detailed analysis of the division of consumer expenditure between farmers and traders, for individual food products. The spreads represent the gross unit returns to marketing – i.e. costs and profits. Again, little is revealed about absolute farm prices and incomes, since falling farm shares in the spread do not necessarily mean falling farm prices. Similarly, because marketing costs and profits are not differentiated, price spreads do not allow for an evaluation of the competitiveness and economic efficiency of the marketing system.

the ground, in particular on the temporal, spatial and institutional flow of goods is necessary. This can be obtained either from secondary sources, or through surveys and interviews, depending on data availability; the scale of the project; and research resources.

Price data should be as disaggregated as time, resources and secondary data allow. Simple attempts to calculate margins by subtracting average annual urban retail prices from average annual farm-gate prices will probably be misleading. For example, this approach assumes that the rural and urban markets are always connected by a flow of goods; that the flow is always from the rural to urban areas; that the commodity is marketed through the whole chain; and that there are no seasonal differences in trading patterns and margins. Hence there is a need to use monthly or weekly price data, and to find out the main direction of commodity flows. In addition, the nature of the relationships between marketing participants, and between them and consumers and producers, and the various price setting procedures in operation are instructive in explaining these margins.

Limitations of Gross Margin Analyses

Although gross margin and share computations reveal little about the economic efficiency of, or net returns to, farming and distribution, they have been used to compare margins for the same product in different times, regions and countries, and between product types in the same or different times and places, to suggest relative efficiencies of different markets. However, as Harriss (1981, p.140) points out, in attempting such comparisons it is necessary, though difficult, to take account of differences in product perishability; in the number of services necessary, or actually rendered; in the levels of capital intensity between firms; and in factor costs in different countries.

An additional weakness in these margin calculations is their static nature. They are often calculated by noting price differences between different levels of the market, for example between wholesale and retail prices, in the same town and at the same time. Therefore they do not allow for the temporal realities of storage, or the spatial implications of inter-market transfers (Harriss, 1979, p.79). These can, however, be incorporated, as will be seen below.

Uses of Gross Margin Analyses

Despite the limitations on the use of margins computed in this manner, analysing market participant shares of consumer prices, and the size of gross margins, may provide insights into other important market characteristics, and can aid the formation of hypotheses concerning market efficiency. The latter can then be tested through margin deconstruction, if data on costs are available or can be collected.

Changes in gross margins over time The size of different gross margins can be assessed over time to see if any patterns can be observed, and any explanations offered. It may also be important to assess who gains and loses if and when marketing margins do change.

Attempting to explain changes in particular gross margin sizes over time can lead to the formation of hypotheses concerning the efficiency of marketing. Under competitive conditions, marketing margins should change with shifts in the demand for and supply of marketing services, the latter depending on factor costs and technological changes, and the former on consumer income and preferences. In uncompetitive situations, changes in the size of the gross margin will be less determinate, since factor costs, the quality and quantity of services rendered, and the efficiency with which functions are undertaken and priced, will all be subject to forces other than supply and demand. For example, sticky market margins are very common in industrialized market economies, and Kohls and Uhl (1985, p.217) attribute this to a combination of the high proportion of margin accounted for by labour costs, unionized work forces, and a failure to increase labour productivity in line with wage increases.

Under the conditions of rapid reconnaissance research, analysts will probably not be able to assess the relationship between gross margin sizes and changes in demand and supply for marketing services, but it may be possible, depending on secondary data availability, to formulate hypotheses by analysing the relationships between various time series data, and through reference to economic theory.

For example, Timmer (1974) demonstrates that simple modelling exercises can reveal much about likely directions of commodity flows and price formation between markets (see Box 4:11). Goetz and Weber (1987, p.49) suggest that regression analyses can be used to determine the relationship between primary levels of supply, the consumer price index and market margins, as well as that between different market margins, over time. Harriss (1981, p.140) argues that, if markets are efficient, margins should move independently of raw product prices. However, it could also be argued that (a) in providing a marketing service, raw materials represent a factor cost, and (b) because the demand for marketing services increases with increased product supply, such shifts in the margin may form the basis for hypothesizing that conditions are competitive. Alternatively, if gross margins decline with increased raw material supply, economies of scale may be a factor, and if they rise with farm production, bottlenecks or constraints in the provision of marketing services may be implied. Similarly, with reference to economic theory, researchers could propose that, as demand for marketing services has a positive income elasticity, one would expect real gross margins to increase with development. Conversely, increased technical and operational efficiency and technological innovation may lead to reduced real margins.

The size of different participants' margins The relative size of various market participants' gross margins can indicate where in the marketing chain value is added and/or profits are made. Deconstructing the margins is then required to establish the part each of these plays, but gross margin analysis can be undertaken to form hypotheses about the relative productive efficiency, or bargaining positions, of different categories of market participant. For example, Harrison *et al.* (1987, p.43) argue that where wholesalers' gross margins are greater than those of retailers, a lack of competition, or a greater degree of uncertainty, spoilage, and/or cost inefficiency, is likely at the wholesale level, because one would expect higher volumes of turnover to compensate for smaller per unit costs and returns.

Similarly, changes in the ratio between various participants' shares in market margins over time can provide the basis for hypotheses. For example, changes in wholesaler and retailer shares of the consumer price, over time, may be the result of either (a) increased or decreased costs in one, or both, of these functions, with or without changes in services rendered, or (b) shifts in participants' relative market power. Deconstruction of the margin is needed to ascertain whether such changes are primarily due to changes in the cost or the profit component, which in turn will reveal which is the probable primary cause of the change.

Additionally, the difference in variability of market participants' gross margins over a certain period of time, measured through coefficients of variation (calculated by dividing the standard

deviation by the mean, and multiplying the result by 100) can be indicative of the locus of instability absorption in the marketing chain, and therefore of relative bargaining positions. For example, comparing the magnitude of variation in consumer prices, with that of the total marketing margin, will indicate whether the market is operating to increase consumer price stability in the short-run, or the reverse. Some or all of the market participants may reduce their margins when the prices they face rise and vice versa. Harriss' (1981, p.144) analysis of variation of wholesale and retail prices suggested that retailers in deficit areas were relatively passive in price formation, whereas most worked towards ironing out minor price fluctuations. This is important in raising the possibility that relatively high average margins may co-exist with intermittent trader losses.

Identifying apparently negative market margins can also be instructive. These may result from various factors, including incorrect assumptions about the directions of commodity flows; data errors; the combination of several functions within single enterprises; and losses on the part of traders.

Producer prices and the gross margin Farmers' share of the consumer price can similarly be analysed over time in order to assess their relative bargaining position in the market. There are a number of possible explanations for such shifts, and margins will have to be deconstructed in order to assess their relative importance. For example, changes in world prices for related final products, and/or in marketing costs, may, or may not, be passed on to producers. This will, to some extent, be determined by farmers' relative bargaining position in the market. If an increased share in consumer prices is the result of an improved bargaining position, it could be the consequence of producer co-operation and organization, and/or of increased competition in the marketing sub-sector. If farmers' share of the consumer price is taken as an indication of their relative bargaining position, it can be compared with that in other countries and regions to provide relative evaluations. For example, price differences at the point of sale may demonstrate that rurally selling farmers are disadvantaged, relative to those selling in towns. However, the fact that lower farmer prices may indicate greater profits for traders, or disguised interest rates on loans, means such measures should not be treated conclusively (Harriss, 1981, p.143).

DECONSTRUCTING MARKET MARGINS – COSTS AND RETURNS

Having reviewed the problems encountered in attempting to analyse the economic efficiency of market functions, through correlating prices in different space, time and form dimensions, and through analysing gross market margins, we now turn to a more direct means of evaluating the efficiency of marketing and price formation.

Much more can be learned about the efficiency of marketing through deconstructing gross margins into their cost and return components. Because the sum of costs and returns in the market margin tells us little about the efficiency of marketing in any of its dimensions, it is always preferable to deconstruct the margin into its component parts, in order to analyse economic performance. But this necessitates data on marketing costs, and it is more time-consuming than gross margin analyses.

Holtzman (1986, p.30) argues that deconstruction is too time-consuming in rapid reconnaissance projects, and that only gross margins should be calculated. An attempt to account for apparently high gross margins can then be made by observing the conditions of marketing. For example, they are often the result of inadequate transport systems, and/or the small-scale, isolated and dispersed nature of food production in LDCs. In such cases, investment in transport infrastructure should lower marketing costs, but, if the market is uncompetitive, this may not benefit producers or consumers. Where there are grounds for believing high gross margins are the result of oligopoly and barriers to entry, improved market information, and other means of enhancing competition, would reduce costs.

However, it is difficult to assess whether gross margins can be characterized as high in the absence of cost data, and where obvious explanations for seemingly large gross margins are not apparent,

Box 4:8 Market Margins and Consumer and Producer Prices

There are two ways of theorizing the relationship between changing market margins, and consumer and producer prices. Retail food price formation may be dominated by the costs of production, and hence the farm price, plus the costs of marketing. Alternatively, retail prices may be more determinate of farm prices, which are then conceived of as the residual of the retail price, net of marketing costs. In a competitive market, if the cost-plus price of food is more accurate, changes in either production, or marketing, costs will be passed on to consumers. If farm prices are residual however, changes in the costs of marketing would be more likely to be passed on to the producers.

In the long-run, at equilibrium, the two concepts are identical. However, this is never obtained. Khols and Uhl (1985, p.229) suggest that the cost-plus theory is more accurate in the medium term, when all production and marketing costs must be paid for by consumer, but that the derived demand theory is more realistic in the short-run world of economic activity, where there will be periods when farm prices do not exceed the costs of production. This theory is also more useful in that it recognizes that the market will distribute increased marketing costs between producers and consumers according the alternative opportunities both face. For example, if there is international food trade, and the consumer price is determined by the world price, then it will not shift in the face of changed marketing costs, and the burden of adjustment will fall on marketeers and farmers.

Alternatively, it can be argued that under conditions of competition, the effects of changes in the margin on producer and consumer prices will depend on the origins of such change (Tomek and Robinson, 1981, p.129). Where costs are reduced in supplying existing services, both producers and consumers should benefit, but the incidence of the benefits will depend on elasticities of supply and demand. Where margin changes are due to additional services, or products, being added, calculating the relative effects on producers and consumers is more difficult. There is, however, a tendency for farm prices to remain static, and for retail prices to rise, under these circumstances, since returns flow to the increased or value-added service, which occurs beyond the farm-gate.

However, as Timmer (1974, p.149) argues, in agricultural markets characterized by constant demand and seasonal supply, one price should never be assumed to be functionally dependent on another. This is particularly the case where markets are not competitive. For example, in the absence of international influences, urban retail prices may be determined by rural producer prices plus marketing costs in the post-harvest season, whilst, when commodities are more scarce in the pre-harvest period, demand may be more determinant, and urban retail prices may draw rural supplies into towns. In the latter case producer prices will be more dependent on retail prices and marketing costs.

and time and resources allow, market margins should be deconstructed to better evaluate sizes and likely causes.

Uses of Margin Deconstruction

Operational efficiency Deconstructing market margins can provide information on the costs of particular marketing functions, which can then be compared with estimates of possible minima, or to the costs incurred by other enterprises, to assess operational efficiency (see Chapter 4, p.63–65).

Market integration Knowing the costs of various market functions enables hypotheses to be generated about the direction of market connections and the size of the margin necessary to establish such connection. It can be hypothesized that markets are connected in space, time, and/or form when prices in destination markets exceed those in origin markets by the costs of storage, transport and/or processing. Most commonly, each of these functions has been studied separately, but they can be combined. For example, Harriss (1981, p.153) forms the hypothesis that two markets are potentially connected, when rice wholesale prices in destination X exceed paddy prices in Y by the milling conversion ratio, plus milling, storage and transport costs. (The milling conversion ratio determines the quantity of end-product obtained from a given volume/weight of raw material. It is

important to include it in the calculations, to ensure unitary prices, for example rupees/kg, between particular forms and grades of commodity are comparable.) If physical flows cannot explain the margin sizes, then other bottlenecks, or non-price constraints, can be sought.

Economic efficiency Through comparing costs and prices, more can be revealed about the economic efficiency of marketing, exchange and price formation. Under competitive conditions, returns to economic activities should be just sufficient to reward the investment of resources, and the taking of risks. Therefore:

- seasonal price differences should approximately equal storage costs;
- inter-spatial price differences, transport costs; and
- the price difference between forms of the same product should equate with processing costs.

Thus the relationship between the costs and returns involved in marketing activities has been used to test economic efficiency. This is important, since markets can be simultaneously high cost and efficient, and the possibility of such a combination may be overlooked where only gross margins are assessed.

Limitations of Margin Deconstruction

The main problems with this type of analysis are:

- how to determine whether costs are minimized;
- how to determine acceptable levels of return where margins always exceed costs and how to explain loss if they do not exceed costs, or oscillation between profit and loss (Harriss, 1981, p.145); and
- how to assess unitary returns over a number of seasons and years in the absence of reliable secondary data.

There are ways of addressing these problems. For example, the interest rate on credit markets to which traders have access, is usually used as an indicator of the opportunity costs of capital, and therefore of normal rates of profit, and acceptable levels of return. Likewise, rates of return to marketing activities can be compared to those of other economic enterprises. For example, the rates of return to storage can be compared with those to transport and processing. Alternatively, there may be secondary estimates of the rates of return to various agricultural enterprises, which can be compared with those of marketing firms of a similar size, in terms of capital investment.

Apparent losses, or oscillations between profit and loss, (a) may be revealed as being false, if it has been assumed that there are uni-directional, and constant, flows of commodities and price formation (Timmer, 1974), or (b) may be pursued through interviews and observations. For example, it may be found that aversion to risk among traders is a common, and explanatory, factor in loss-making operations. In terms of attempting to analyse cost and return components over time, secondary data and/or oral history have to be relied upon.

Data Requirements

The data required to deconstruct market margins can be sought through both secondary sources and primary collection. If available, reported prices at different stages in the marketing chain and official estimates of costs can be used. More often, surveys of price differences between markets and market levels, observations of cash and commodity exchanges, and trader interviews or case studies to establish the costs of various market functions, will be necessary, and will provide more accurate estimates of the variables concerned. But in this case accurate historical analyses are not likely to be possible.

Informants on these matters may over-estimate costs and under-report returns. Multiple interviews are therefore crucial, and Holtzman (1986, p.30) suggests that some traders, from a pur-

posively sampled homogenous group, can be asked about the costs, and others about the returns, in order to minimize such errors. Composite or synthetic budgets can subsequently be constructed.

THE COSTS OF AND UNITARY RETURNS TO STORAGE, TRANSPORT AND PROCESSING

The cost at which storage, transport and processing are undertaken, and the level at which they are priced, are both important in assessing the economic efficiency of the market. In an efficient market, costs will be minimal, and prices charged for various functions will lead to returns that are just sufficient to reward investment, risk-taking, management etc. at a rate of 'normal profit'. The productive and economic efficiency of storage and transport also play an important role in food security, since they have the potential to influence the level and stability of consumer prices over time and space.

Although the efficiency of these three functions is addressed separately here, they can and should be combined in an analysis of overall market performance. Harriss (1981, p.152ff) provides a good example of such a combination. To look at the transport and processing functions together, and account for time lags in transfers, she formulates the hypothesis that markets are connected in one way or another if the difference between the price of a specified product variety in town X, in week n, and the price of the same variety in town Y, in week $n + 1$, multiplied by the milling conversion rate, is greater than the costs of milling and transport. Storage costs can be added to this hypothesis by using the prices obtaining in other weeks, and including the costs of storage up to those weeks from post-harvest lows in town X.

Such an analysis will indicate the potential connectedness of markets. However, if the objectives of the research are aimed at assessing economic efficiency, and determining sources of inefficiency, the costs and returns to storage, transport and processing will have to be undertaken separately initially, since, if prices greatly exceed costs, researchers will want to know if this is the result of inefficient pricing in all, or only one or two, of the functions. Therefore, unless the research is directed solely towards assessing integration, it is necessary to calculate the unitary costs of and returns to the individual functions as detailed below. Following this, results can be aggregated to assess the economic efficiency with which the combination of functions is undertaken. In addition, the costs of and returns to buying, assembling, bulking, debulking and selling may have to be considered separately, if they are undertaken and accounted for as functions separate from these three functions.

It is crucial that these analyses of costs and prices are combined with a qualitative understanding of the operation and organization of the market. This is not only to ensure that relevant costs and prices are compared, but also to inform subsequent explanations of results and policy decision making, and to avoid simplistic characterizations of markets as wholly competitive or monopolistic.

The costs of and returns to various market functions are likely to be affected by differences in:

- enterprise size and location;
- combinations of functions;
- the internal organization of enterprise operations; and
- the nature of horizontal and exchange relations, particularly where the latter are linked with credit.

Although it will usually not be possible to cover the entire range of trading enterprises, and means of market organization, an empirical understanding of the operation of the market on the ground will ensure that analysts compare relevant costs and prices, and can be aware of and explicit about the implications for their research results. Therefore, the analysis of costs and returns should be combined with detailed information about who undertakes these functions, when, where and how.

As noted above, in the absence of detailed accounting data, the economic efficiency of temporal arbitrage and storage can be evaluated through comparing seasonal price changes with the costs of storage incurred. If the model of perfect competition is being used as an ideal standard against which to measure economic efficiency, off-season prices should be just sufficient to cover the costs of storage including an element of 'normal profit'. This analysis is not only important for assessing the efficiency of storage, and for identifying improvements, but also in understanding the incentives or disincentives to undertake storage. Where there is no correspondence between price differences and costs, research can be directed towards locating causes and posing policy options.

Various techniques can be used to assess the relationship between costs and price changes, but the simplest is to calculate monthly price changes, and to compare these with monthly, unitary costs of storage. Other ways of assessing the efficiency of storage tend to be more complex, and are therefore not covered below. For example, Ravallion (1987) tests the efficiency of storage, in terms of its volumetric and temporal dimensions, by (a) calculating the divergence between actual price movements, and those predicted by rational price expectations formed in competitive markets, and (b) comparing mathematically calculated expected future prices, using all currently available information, with traders' price expectations.

Measuring Seasonal Price Changes

The way in which seasonal price changes are measured will partly depend on the quality, and degree of disaggregation, of the data being used. It is likely under rapid reconnaissance conditions that secondary price data will be relied upon, but their accuracy can be tested, particularly in local-scale studies, through trader interviews which cover recent seasonal price movements.

The most straight-forward means of assessing intra-annual price changes is to calculate the difference between prices at harvest time, and those obtaining in each post-harvest month, or the percentage increase from the minimum to the maximum over the year. This allows for a subsequent comparison of price rises with unit storage costs either monthly or annually. This, in turn, will provide an indication of the unitary returns to storage over a specified period of time. It is a particularly useful means of calculating monthly price rises where releases from storage are distributed throughout the year, and where analysts wish to avoid techniques based on some form of averages. For example, Harriss (1979a, p.205) is critical of the measurement of price changes based on the variation around an average, because the highs and lows have contributed to this average.

However, others argue that estimating seasonal price rises in this manner does not enable analysts to distinguish between trend, cyclical, seasonal and random components in temporal price changes. This may not be important for storage incentives or for efficiency tests, if the costs of storage are influenced by similarly diverse forces, but it may be important where this is not the case. Given adequate data, these various components of intra-annual price movements can be isolated, and seasonal indices calculated, as shown in Box 4:9.

Using Seasonal Price Data

Information on seasonal price changes, however calculated, can provide insights into the temporal dimensions of marketing, even if data on storage costs are unobtainable. For example:

- Correlation coefficients between prices in different seasons over several years can be calculated to indicate the degree of co-variation.

- Jones (1972, p.122) argues that a preliminary investigation of the consistency between price movements and harvest times; the specific storage characteristics of different commodities; and the seasonality of supply of substitutes, can provide an indication of the impact of economic forces on the market.

- The relationship between the magnitude of intra-annual price rises with, for example, changes in government marketing policies, or in levels of production, or marketed surpluses, can also be analysed. For example, where the data are available, prices and quantities produced over time

Box 4:9 Moving Averages and the Grand Seasonal Index

The most common means of isolating the seasonal component in intra-annual price movements is to:

- calculate a 12-month moving average series, which isolates the trend;
- divide monthly time series observations by the moving average, or calculate the difference between the two.

The ratios of time series observations to the 12-month moving average are equivalent to dividing the trend, cyclical, seasonal and random components of the price series by the trend and cyclical ones, to leave seasonal and random elements. The latter can then be removed by simply averaging the monthly ratios to, or deviations from, the moving average, over a specified number of years. Alternatively a 'grand seasonal index' can be calculated, as described below.

A seasonal index, calculated as the ratio of the time series observation to the moving average, of 1.06 indicates that the relevant price is 6.5% above the trend in the period of analysis, or visa versa for results below 100.

The computations required for calculating moving averages can be found in most standard statistical text books, but many micro-computer packages will also be able to provide them, for example the Statistical Package for Social Scientists (SPSS).

'In the n-period moving average technique, individual observations in a time series are replaced by the average of $n/2$ values in the preceding periods and the $n/2$ values in the subsequent periods. Therefore any observations will depend on some of the previous and subsequent values of that variable, or the observation will carry a weight of $1/n$ instead of 1. This means that if an individual observation is unusually large or small, the averaging procedure will bring that value more in line with the other values in the series and the short-term fluctuations will be eliminated' (Goetz and Weber, 1987, p.69).

Twelve-month centred moving averages, because 12 is an even number, are calculated through (a) adding 24 consecutive monthly observations, for example those reported for January to December and February to January the following year; then February to January and March to February the following year etc. and (b) dividing these sums by twenty-four and allocating the resulting value to the middle month of the two series. Alternatively, 12 monthly observations can be summed, and the average between consecutive pairs of these can be calculated to centre the moving average.

Random elements can, if necessary, be removed by constructing a grand seasonal index which 'is calculated by finding the average seasonal index for each month over the period of analysis, and then adjusting those averages so that they sum to 1200. Because of this averaging procedure, the GSI should in principle be purged of all random variations in the time series data' (Goetz and Weber, 1987, p.74). This can also be used to test the statistical significance of the seasonal index and to forecast seasonal patterns. However, it is more often assumed that random variations cancel themselves out.

can be plotted on the same graph to establish the nature of their relationship, or correlation coefficients between price and quantity data over time can be calculated (Goetz and Weber, 1987, p.97).

- Jones (1972, p.125) also suggests that the strength of seasonal forces, or their domination over other influences on price changes, can be assessed by the degree to which annual highs of the ratios between reported prices and the seasonal indices occur in the same month as the index high. In doing this, Jones uses the averages over several years of the ratio of reported prices to a twelve-month centred moving average as a seasonal index (see Box 4:9). This analysis suggested that seasonal variation in prices was greater in producing than consuming centres in Nigeria. Various explanations are offered including the ability of the latter, but not the former, to obtain supplies from elsewhere with different harvest dates; the wider range of incomes, and staples consumed, in urban areas and the greater volumes of storage undertaken in towns.

Calculating Unitary Storage Costs

If data on storage costs are available, further insights can be gained into the technical, operational and economic efficiency of storage, and the role storage costs play in marketing decision-making. For example, if prices rise rapidly above the costs of storage, current allocation of commodities to future times could be inhibited, which may lead to later scarcity. If prices fail to rise above storage costs, or only do so to a minimal extent, storage may not be undertaken at all. For crops which are seasonal in production, and have constant demand throughout the year, explanations for such relationships will have to be sought.

Cost categories The costs of storage can be categorized in several ways, and it is important in calculating total unitary costs to be clear about the nature of each item. Total storage costs consist of:

- costs that vary with the volume of stocks, and/or length of storage time, and those that are relatively independent of these;
- operating costs; and
- costs associated with quantitative and qualitative product losses, which are important to the extent that they reduce the value of the produce. Operating costs and crop losses may increase or remain relatively constant over the time of storage.

Examples of costs which vary with the volume of stocks include those of borrowing finance; materials used in storage and weight reductions due to drying or pest attacks. The costs of store maintenance or rental, salaries of permanent employees and of obtaining market information will not vary with the size of stocks except for those on a per unit basis. Similarly, handling and overhead expenses will not vary with the length of storage, whereas interest charges will.

Data requirements Timmer *et al.*, (1983, p.174) suggest that the opportunity cost of tied-up capital; interest on loans; commodity losses; payment for labour and facilities used; and normal profits, including payment for risk-bearing, are the most important cost elements in storage. Therefore, unless secondary estimates of the total, average costs of storage are being used, data are required on the following costs, where available:

- compound interest rates on loans;
- the opportunity costs of capital tied up in inventories;
- weight losses, due to pest or rodent attacks, or to drying;
- rates of quality deterioration;
- warehouse rental, or depreciation, rates;
- depreciation on bags if reused; costs of bags if used only once;
- labour costs – both piece rates for carrying and stacking, and payments to temporary and permanent employees;
- the price and rate of application of pesticides and other chemicals, if used.

Sources of data Estimates of some or all of these data may be obtainable from secondary sources. For example, there may be government or academic estimates of the rates of quantitative storage losses. Measuring physical losses and quality deterioration and their associated costs is very difficult though and, if secondary sources are used, the means of estimation should be established and described. Moreover, in understanding storage incentives, and assessing the efficiency of storage at different points in the marketing chain, it is crucial that costs are calculated according to where, when and by whom storage is undertaken. For example, labour and building materials may be cheaper in rural than urban areas. This means that trader interviews are often necessary, especially when data

listed above are not available from secondary sources. Where they are available on storage costs, initial evaluations of the returns to storage could be compared with those calculated from a few detailed case studies, to determine how much primary data collection should be undertaken.

Unitary cost calculations Various assumptions may have to be made in these cost calculations. For example, it can be assumed that bag depreciation declines with time, and increases only slightly with length of storage (Lele, 1971, p.137), and that labour for carrying and stacking will be charged only in the first month of storage. Similar assumptions may have to made about the life expectancy of stores in calculating rates of depreciation, or about rates of depreciation *per se*. For example, in calculating enterprise level profitability among various types of trader in South India, Harriss (1981, p.74) assumes depreciation rates of 10% for all buildings, and of 5% for all machinery.

Where time, research resources, data and terms of reference allow for more detailed calculations, the following equations indicate how costs of storage/commodity unit/month, can be calculated (Goetz and Weber, 1987).

(a) Store depreciation/commodity unit (for example a bag)/month

$$= \frac{\text{Original price of building/Current value of store}}{\text{Total/current life expectancy} \times \text{No. of units stored} \times \text{No. of months stored}}.$$

Monke and Pearson (1989, p.180) suggest that the current value of buildings or vehicles can be obtained from suppliers and/or purchasers, or that an index of inflation can be applied to historical purchase prices.

Where stores are leased rather than owned, depreciation costs are not included in the costs of storage, but those of renting are. Rental charges may be made on a per unit basis, or for whole stores. Similarly, the costs of managing the store may be undertaken by the owners of the store, or by the renters of the store. Usually, where stores are rented, whole buildings are paid for on an annual basis, and the individual or firm renting the store is responsible for its management and for operational costs. In this case, the unitary costs of renting storage facilities per commodity unit per month are:

$$= \frac{\text{Annual rate of rent}}{\text{No. of units stored} \times \text{No. of months stored}}.$$

(b) Interest on investing in a store, or the opportunity cost of investment capital, per commodity unit per month

$$= \frac{\text{Value of investment} \times \text{Participants' prevailing annual interest rate}}{\text{No. of units stored} \times \text{No. of months stored}}.$$

The costs of storage, and hence the relationship between seasonal price rises and storage costs, are very sensitive to the interest rate used, and that chosen must be justified.

If the store is rented, the opportunity cost of the capital invested in renting storage facilities can be calculated and allocated on a unitary basis, using the same equation, by replacing the value of investment with the annual rental charges.

(c) Interest on borrowed and/or the opportunity cost of own working capital per unit per month

$$= \frac{(\text{Unitary harvest price} + \text{Handling costs}) \times \text{Annual interest rate}}{12}.$$

This, and the following costs, may be incurred by all those undertaking commodity storage, whether they rent or own stores, unless the renting of storage facilities is combined with the buying of a complete storage service, including the operation and management of inventories. In the latter case, operational costs are covered by the rental charged, but the owner of the produce is likely to bear the burden of qualitative and quantitative crop losses.

(d) Handling and treatment costs per unit per month

$$= \frac{\text{Total handling and treatment costs per year}}{\text{No. of commodity units stored} \times \text{No. of months stored}}.$$

Handling and treatment costs include the costs of all types of labour and chemicals used. Crop losses in handling will be included in the overall losses experienced between buying and selling and are thus incorporated in the equation below. As noted above, where storage facilities are hired, inventory management costs may either be paid for by the owners of the store, in which case a per unit fee for a complete storage service will be paid by traders, or, more commonly, traders will rent a building and assume all other costs of storage themselves.

These costs, added together, represent the unitary capital costs of storage. Cumulative operating costs can then be calculated by multiplying the former, by the number of volumetric units stored and the number of months over which they are stored.

(e) The value of quantitative and qualitative crop losses per unit per storage period

= Release price × (% Weight loss + % Quality loss)/100.

Often very little is known about physical crop losses in storage and their valuation and assumptions will be unavoidable but should be made explicit.

The above account for the most important operational and crop loss costs. In subtracting these costs from selling prices, to indicate returns, and embarking on an evaluation of such returns, a rate of 'normal profit', and a risk premium should be permitted, since the returns to storage are always uncertain.

Box 4:10 Two Summary Equations

Goetz and Weber (1987, p.125) suggest the following summary equation can be used to calculate total per unit storage costs:

$$\frac{(r + i)\, p_h}{12} + s$$

where:
r = rate of crop loss in storage over a year
i = the annual rate of interest
p_h = the unit market price at harvest time (including handling costs)
s = unit operating costs of storage per month

These authors also suggest that the following can be calculated to determine whether overall, storage is profitable:

$$\frac{\text{Post-harvest release price}}{\text{Harvest price + Costs of storage till release}} = 1$$

If the left-hand side of the equation is greater than 1, a storage gain has been obtained and vice versa. The unitary returns to storage are dealt with in more detail below.

The Relationship Between Storage Costs and Intra-Annual Price Rises

In order to calculate the returns to storage, and thus assess the economic efficiency of temporal arbitrage, costs must be compared with seasonal or monthly price changes, over the same period. There are various ways of analysing this relationship. The simplest and most commonly used means is to calculate the unitary returns to all resources used in storage. These can be represented either as an absolute measure, through subtracting costs from the selling price, or as a ratio of, for example, the original buying price, or the returns that would have been obtained without undertaking storage.

However, although these unitary returns are indicative of efficient or inefficient storage, a more accurate assessment of this characteristic can be obtained by calculating the returns to storage, in combination with other functions, at the firm level. This is dealt with at the end of this chapter, in the section on profitability. Here, only the unitary returns to resources used in storage, and later transport and processing, are considered.

Assumptions and specifications In any of these calculations, significant assumptions may have to made about when, where and by whom transactions are undertaken, particularly where secondary data are used. These assumptions can be verified through interviews with those undertaking storage or with knowledgable observers. The interviews should help to establish the timing and locations of such transactions. Such assumptions must always be made explicit so that the accuracy of the results can be assessed. Lele (1971, p.146), for example, assumes that all stocks are bought 4–8 weeks after the harvest, and that they are sold at the pre-harvest high prices. In this case, it is likely that unit storage costs are underestimated, and that returns are overestimated.

Similarly, a distinction between producers' and wholesalers', or owners' and renters', returns to storage should be made. For example, the buying price would be included in the storage costs of wholesalers, but not in those of producers (farmers). In addition, in the former case, the role of transport in price formation should be distinguished from that of storage. If, as is commonly the case, traders buy crops in one location and store, and/or sell, them in another, isolating the returns to storage from those to transportation means that the price in the selling, rather than the buying, location should be used as a base line.

Care should also be taken in generalizing from results, particularly if calculations are based on primary data. Storage may be highly competitive in one area, but monopolized in another. This is particularly the case with market functions which utilize fixed facilities and require lumpy investments. Likewise, the returns to owning a store may be excessive, where as those to renting one may be 'normal'.

Calculating, and representing, unitary returns The following equations aid the calculation, and representation, of the unitary returns to storage. The simplest means of indicating the absolute, net unitary gains from storage, and of distinguishing between the gains from storage and those from transport, can be estimated by calculating the following:

$$PS_m - [PB_h + C_m],$$

where:
PS_m = post-harvest selling price (monthly average or actually obtained, depending on data) at time and place of release;
PB_h = unit purchase price at the time of harvest/purchase and at point of sale;
C_m = unit storage costs, including handling costs incurred in buying and selling transactions, but excluding transport costs.

Where an historical element is included in the research, current costs can be deflated in comparison with past price series data, if a relevant deflator is available. However, this absolute measure of the returns to storage does not reveal the rates of return to total, or specific, resources used in the function. Calculating rates of return to such resources is useful in assessing economic efficiency, because it allows comparisons to be made between the returns to this, and other economic activities, and between those to different types of enterprise undertaking the same function.

Total and gross returns to all resources used in storage can be estimated per unit, assuming traders have to buy their stored commodities, and do not grow them themselves, by calculating the following:

$$\frac{PS_m - PB_h}{PB_h} \times 100$$

where:
PS_m = post-harvest selling price in the month in which the crop is sold.
PB_h = the unit purchase price at time of harvest/purchase and at point of sale.

This equation can be used to provide an indication of the size of gross rates of return to storage, per unit of commodity, where data on storage costs are unavailable. If storage costs are largely accounted for by the opportunity costs of capital, rather than by operational expenses, this calculation can also

be used to indicate the returns to capital in storage, and hence, assuming economically efficient storage, shadow interest rates (Goetz and Weber, 1987, p.122). It can, additionally, be used to indicate the optimal lengths of storage, based on past experience. More accurate estimates of returns require the inclusion of costs in the equation.

Another means of evaluating and representing the net unitary rate of return to all resources employed in storage is through comparing the net return which could have been obtained if commodities were sold at harvest time, with that actually obtained from the later release of stocks (Goetz and Weber, 1987, p.126). This rate of return to storage, expressed as a ratio to the potential returns of immediate sale, indicates the opportunity costs of storage. Assuming that (a) buying and selling at the time of harvest and in the post-harvest period are undertaken in the same location, and that therefore any returns to traders are the result of storage and/or breaking bulk, rather than transport, and (b) that all crops were purchased at harvest time, this ratio can be calculated as follows:

$$U_m = \frac{PS_m - [PB_h + C_m]}{PS_h - [PB_h + C_h]} \times 100,$$

where:
U_m = the net rate of return to storage until month m, including that to capital, management, own labour, risk etc.;
PS_m = post-harvest selling price prevailing in the month in which the crop is sold;
PB_h = the price paid for the crop at harvest time;
C_m = the costs of storage up to month m, including buying, selling and handling costs;
PS_h = the price which would have been obtained on selling the crop at harvest time;
C_h = the costs of the buying and selling transactions at harvest time.

Calculating returns to specific resources None of the above calculations provides an indication of the rates of return to particular factors of production. Estimating the rate of return to capital invested in storage is particularly important, since one means of evaluating the economic efficiency of marketing functions is comparing the rates of return to capital invested in them, to prevailing interest rates. Moreover, for example, the returns to labour provide a measure of the technical and operational efficiency of storage, as well as of the 'fairness' of labour remuneration rates. This will be returned to in more detail in the section below on profitability, but one example of the way in which the returns to specific factors of production can be estimated is provided here.

Lele (1971, p.141) calculates the unitary rate of return to variable capital in storage per quintal of grain as follows:

$$\frac{\text{Off-season price} - (\text{Purchase price} + \text{Variable costs of storing from harvest to off season})}{\text{Purchase price} + \text{Total storage costs}} \times 100.$$

She ignores fixed costs because of the difficulties of allocating these between functions, and of accounting for economies of scale. This may be reasonable in comparing costs and prices over a single year, but is less justifiable for longer-term analyses.

Results and implications Once estimated, the causes of high or low returns need to be investigated, if marketing policy is to be better informed. For example, if returns are small relative to other economic activities, it is possible that:

- storage is highly competitive and/or economically efficient, and profits and costs are low;
- storage is motivated by a desire to ensure regular business, rather than to maximize profits *per se*;
- there is market dissociation in time;
- there are multiple harvests of the product annually;

- the product is substituted in consumption later in the year by another product, and/or
- government policies place effective ceilings on intra-annual price rises.

Conversely, where returns to storage are high relative to those to other economic activities, there may be a monopoly on access to storage facilities, related to inadequate capital, stores, or information concerning future supplies. Alternatively, there may be high levels of crop losses in storage, and technical and/or operational inefficiencies. Where unitary returns to storage vary widely between firms, there may be economies of scale in storage, such that large firms have much lower costs but face the same product prices.

It is important to recognize that storage costs are only one input into storage decisions. Southworth *et al.* (1979) suggest that the importance of prices and speculative storage for producers, can be illustrated by comparing the timing of farmer sales (possibly reported in farm surveys), with the seasonal behaviour of wholesale prices. But these authors also stress that there are likely to be many other factors affecting the decision to sell, including the following:

- government price, storage, marketing or food-aid and import polices;
- the production and marketing of cheaper substitutes later in the year, all of which may make storage unprofitable;
- price expectations;
- inflation;
- risk aversion;
- the quality of information on supplies; and/or
- access to storage facilities.

For small farmers, decisions as to whether and when to market their crops may also be influenced by:

- own consumption needs, particularly where food markets are less than reliable;
- timing of cash needs;
- the inability to sell at harvest time, and
- fears of theft.

Thus, storage decisions are influenced by a complex set of forces, and the importance of assessing qualitative market characteristics through primary research is stressed. For example, it was found that in both Tanzania and Malawi in 1988/9, most wholesalers were unable to build up stocks, in the context of substantial seasonal price increases, due primarily to limited working capital (Scarborough, 1990). These types of constraint will usually only be established through fieldwork.

Spatial Price Differences and Transport

In a competitive and economically efficient market, at any one time, differences between prices obtaining in spatially separated markets for otherwise identical commodities are a function of transport costs, including normal profit. Therefore, as with storage, in assessing the economic efficiency of spatial arbitrage and transport, inter-spatial price differences can be compared to the costs of transport. Again, various techniques of comparison are possible, but the simplest is to calculate unitary transport costs, and to compare these with price differences between two spatially separated market places.

The computations and processes necessary to undertake such an analysis are similar to those involved in assessing the unitary returns to storage and readers are referred to the previous section.

Measuring Price Differences in Space

Obtaining the difference between two prices separated only by space is usually easier than attempting to isolate the seasonal component of price changes over time, depending on specific research objectives and the availability and quality of secondary data.

Most assessments of the economic efficiency of food markets are concerned primarily with the relationship between rural producer and urban consumer prices. A transport service may also exist between the farm gate and assembly, parastatal, redistributive or other markets, and to and from stores and processing plants, but the focus is usually on that between rural and urban markets. Though often assumed, these are not always, respectively, centres of supply and demand.

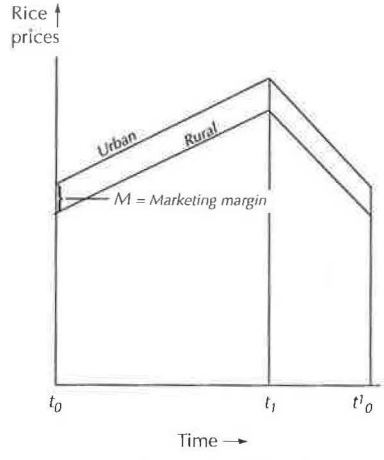
When secondary price data is being used to analyse the efficiency of spatial arbitrage, it is usually assumed that crops bought in one place are sold in another, in the same form, and within the same week, or month. Therefore time series prices in two market places, relating to the same varieties, grades, weights and types of commodities, within the same month, week or day, can be directly compared. Bearing in mind the common problems associated with such data, analyses would be improved if they are (a) subject to the consistency and plausibility tests reviewed in Chapter 2 and (b) combined with information on:

- prices in different places, collected by analysts;
- transport networks to check that the market places are physically connected;
- the lengths of time taken to provide commodity at a place useful to consumers, and
- the actual direction of physical flows at different times of year.

Box 4:11 Modelling Gross Market Margins

In analysing the relationship between monthly prices of prime quality paddy, in eight Indonesian provinces, and the retail price of medium quality rice in their capital cities, Timmer (1974) initially undertakes a direct comparison using the official Indonesian conversion ratio of 0.52, and assuming the transformation from rural paddy, to urban rice, takes place within a month. In doing this, he constructs several models of expected price behaviour, and price relationships. Here only transport and processing are considered, but similar models may be constructed through plotting intertemporal price differences, or other combinations of the above.

In the first, and simplest, of Timmer's models it is assumed that rice flows from rural to urban areas throughout the year, and that therefore storage is undertaken rurally; the marketing margin (here including transport and processing costs and prices) is constant, and that rural and urban prices, separated by this margin, rise in unison from the end of the harvest until the beginning of the next as follows.

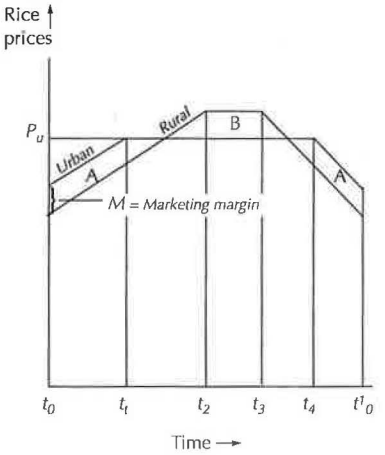


In this instance, the size of the transport and processing margin can be calculated by solving:

$$M = P_u - (1/c)P_p,$$

where:
M is the marketing margin;
P_u the urban retail price of rice;
P_p the rural price of paddy, and
c the milling conversion ratio.

However, where the above simplifying assumptions concerning the continuity and direction of commodity flows cannot be made, this model would be unrepresentative of the relationship between rural and urban prices. For example, Timmer argues that a government policy of floor and ceiling pricing in Indonesia, effective in the urban areas only, can lead to seasonal disconnection between rural and urban markets, and possibly even reverse flows of rice from the urban to rural areas, as illustrated below.



Because placing a ceiling on rice prices is only effective in urban areas, rural prices continue to rise throughout the post-harvest season reflecting the costs of storage, and rural demand for rice, until they exceed the urban price by the marketing margin, when shipment of rice from urban to rural areas may begin. This pattern of price relationships may occur under a variety of circumstances, which make it profitable for the urban area to obtain supplies from places other than the rural region under analysis, or to export to that region. For example, storage costs may be lower in the urban area or the urban area may be able to obtain supplies from regions with lower costs of production, and/or lower paddy purchase prices, and/or different harvest periods, whilst the rural region is unable to obtain supplies from these areas. 'Thus, all that is required is that rice be available from sources other than the currently available supplies in the rural areas for the model...to become operative' (Timmer 1974, p.151).

This model illustrates the meaninglessness of comparing average annual urban and rural prices, and assuming constant and uni-directional commodity flows, in an attempt to measure the size of market margins, and analyse the economic efficiency of spatial arbitrage.

Timmer also provides a third model representing a situation between the above two extremes, in which the price difference between urban and rural markets never becomes reversed, but is considerably reduced during the pre-harvest season, and the two markets are disconnected in terms of physical flows of commodities. Timmer then calculates monthly transport and processing margins between reported rural paddy prices and urban retail prices, for four seasons, in 8 provinces over 1969–1972, using the equation

$$M_i = P_{ui} - (1/0.52)\, P_{pi}$$

where:
M_i is the measured margin for month i;
P_{ui} is the urban retail rice price for month i;
P_{pi} the rural paddy price from month i,
and 0.52 the standard Indonesian rice milling conversion ratio.

These margins varied considerably between seasons and provinces, but this variation more closely resembled the pattern illustrated in his second and third models of price formation than the first, except when the size of the harvest was large enough to maintain urban prices below the official ceiling level.

Harriss (1981, p.154), in testing Timmer's models, compares weekly price data for 3 varieties of paddy and rice in 10 markets, known to be connected, in Tamil Nadu, South India, between 1972 and 1974. She found that price levels for paddy and rice, in large consuming centres, fell below those in rural markets, in both regular and random, short-term, ways. She similarly explains this in terms of urban centres having spatial monopoly control of trade, because of their exclusive control of imports from areas outside the local system, where prices are cheaper, to export to rural markets within the local system.

Similar modelling exercises could be undertaken with reference inter-seasonal, and/or inter-form price differences.

Using Inter-Spatial Price Data

In the absence of data on transport costs, the differences between prices in space over time can be subjected to correlation coefficient analyses, and graphically plotted to illustrate the nature of the relationship between them, and to formulate initial hypotheses about market connections and commodity flows. For example, Timmer (1974) suggests that simple models of market connection and margin formation can be constructed through the combination of price data and an understanding of how the market functions on the ground (see Box 4:11). Once again, however, more can be learnt about the technical, operational and economic efficiency of the function if data on transport costs, and the direction of actual product flows, is obtainable.

Calculating Unitary Transport Costs

As with storage, because of the difficulties of calculating enterprise level profitability, the economic efficiency of transport is often assessed through comparing the unit costs of moving commodities with the price differences per unit of the same commodity in different places. Thus analysts may need to calculate unit transport costs.

Cost categories *By Distance*: Using this system, the costs are divided into a fixed element, related to handling, insurance and taxes and a variable one which increases with distance, including, for example, fuel and wear and tear. Furthermore, variability in road conditions will affect the per kilometre transport costs. Transport costs increase with distance, but not in direct proportion.

By Numbers of Units of Commodities: Here again, there is a fixed element in the costs, but, in this case, total fuel, tax, and insurance are constant, while handling costs, often paid on a piece-rate basis, are variable.

Using either of the above systems, the actual costs will differ according to the mode of transport and, because economics of scale in transport are common, with the size of vehicle and rate of capacity utilization (see Box 4:13).

Data requirements Unit transport costs will also vary according to the source of the transport, and detailed data will be necessary when investigating more than one type of transport. When only a rough indication of the costs and returns to transport is needed, for the country generally, secondary price data can be compared to official estimates, but otherwise, the way of organizing transport will have an effect on the data needed to assess the unit transport costs.

Three forms of organizing transportation are common in LDC agricultural markets. The first is that the owners of vehicles engage in buying and selling commodities, and use their vehicles, exclusively or otherwise, to transport their own goods from market to market. In this case, the costs incurred by those undertaking the transport function are the actual, or factor costs, of transportation. The most important of these are:

- depreciation of the vehicle;
- the opportunity costs of investment and working capital;
- interest charges on any money borrowed;
- fuel and oil;
- maintenance and spare parts;
- road, or vehicle, taxes and insurance;
- possibly a driver's wage and other labour costs;
- tarpaulins, roping etc.;

- crop losses; and

- the operational costs of buying, loading, unloading and selling commodities.

With reference to the latter, Lele (1971, p.100) includes, for example, unloading, cleaning, weighing, cartage, loading, filling bags, stitching and twine, in-kind payments to labourers; payments to commission agents or local wholesalers; market fees; sales tax; illegal gratuities; and market and handling expenses at destination markets.

As with storage, some of these costs will be easier to estimate than others. For example, although handling costs will probably be widely known, and can be discovered through interviews, assumptions about the opportunity costs of capital invested in vehicles, and the latters' rates of depreciation, will often have to be made. In subsequently calculating the unitary returns to transporting commodities in this manner, data on the following is also essential, in order that fixed costs can be allocated, and relevant costs and prices can be compared:

- volumes of commodities bought, carried and sold, over the period under consideration;

- numbers of kilometres travelled over the same period;

- the gross returns to each unit of commodity bought, transported and sold, or the price differences over the time period and geographical area under consideration.

Alternatively, if researchers cannot obtain such data, or if they are only interested in the returns to transport for a particular route, the returns to working capital used in specific trips can be examined in isolation.

A second way of obtaining transport is by whole vehicle hire. This is usually at a fixed cost for a certain number of days or a specified journey, or, less commonly, on a per kilometre basis. In this instance, the costs incurred by the trader are likely to include:

- the rental;

- fuel;

- commodity handling;

- tarpaulins and rope;

- crop losses;

- possibly lubricants, repairs and a driver's wage;

- possibly interest on borrowed finance.

In all these, except handling, the number of commodity units carried, or the rate of capacity utilization, will affect the level of unitary costs, and therefore must be established. If the vehicle is hired on a per trip basis, the per kilometre unit costs need not be calculated since, unless storage is simultaneously undertaken, there will probably be only one buying and one selling price.

The third common means of obtaining transport is hire of the service. In this case, the trader and his or her commodities are transported for a fee usually based on the number of commodity units. Only the following cost data are required:

- the per unit commodity fee charged for the transport service;

- loading, unloading and handling costs;

- the rate of crop losses;
- possibly interest rates on borrowed finance.

The first two of these cost items will be paid for per commodity unit, and crop loss rates are likely to be estimated in percentage terms. Therefore, in calculating unitary costs, data is only needed on volumes handled if the traders concerned have borrowed money, and are paying interest on it.

Researchers may also be concerned with the rates of return to the owners of vehicles in hiring them out, either to one trader, or on a per commodity unit, per trip, basis. Ideally, in analysing the economic efficiency of the transport function, data which enables researchers to calculate both the returns to owning vehicles, and to various means of hiring transport services, should be collected. This is because, although the returns to wholesaling, and to moving commodities from one area to another, through hiring transport services, may imply economically efficient spatial arbitrage, the transport industry itself may be oligopolistic and the price of transport services, and the returns to owning vehicles, may be very high as a result.

In this case, rather than comparing the costs of owning and running a vehicle with price differences in space, the former have to be compared to the gross returns to renting the vehicle out. It is likely that the latter will be highly variable according to seasons; location; type of vehicle etc. and therefore, in the absence of detailed accounts, it will only be possible to obtain rough indications through interviewees' estimates of, for example, annual average total costs and returns.

As stressed previously, obtaining qualitative data on the organization and operation of the various market functions is necessary. In this instance, the main forms of transportation used, and how it is obtained, need to be established, together with the relative importance of each form, in terms of volumes of commodities transported. The owners and users of the means of transport need to be identified; how transport services are hired; prices agreed and payments understood. The implications for capacity utilization; and the ability to engage in, and the costs of spatial arbitrage need to be assessed. For example, where vehicles are rented out to a number of traders, there may be transportation brokers, in which case, the way in which they organize and allocate space, and the level and source of their payment, will provide insights into their impact on the operational and economic efficiency of the transport functions evaluated. As Harriss (1981, p.40) notes 'centralization and fixed rates reduce competition, but speed the allocation process and secure supplies of both lorries and of commodities'.

Sources of data In the absence of enterprise accounts, information on the costs of hiring transport services, either through renting a whole vehicle or through paying for shipment on a per commodity unit basis, is usually easy to obtain through interviews with wholesalers, since these services are often paid for with out-of-pocket cash.

Gathering data on the costs of, and returns to, owning a vehicle, whether used for the trader's own buying and selling operations, or for hiring out to other traders, may be more difficult. Rates of vehicle depreciation and the opportunity costs of capital are likely to be uncertain, and running costs will be highly variable, depending on road conditions, the type of vehicle, and the uses to which the vehicle is put. Moreover, sampling and interviewing the owners or operators of vehicles is often more difficult than collecting information from traders, largely due to the transporters' greater mobility.

Aside from interviews with vehicle owners, various estimates of the costs of transport, rather than the price charged for buying a transport service, can often be obtained from government, academic or parastatal agencies, or large haulage companies. For example, governments often set minimum transport rates, and parastatals, or other companies, may hire transport services at a fixed rate. It may be necessary to rely on these indicators for any historical, or time series, analyses, but their relevance to particular contemporary situations needs to be assessed. Initially, this can be approached through establishing traders', or transporters', current attitudes to official rates, and by observing the ease or difficulty of obtaining transport at such prices. In particular, economies of scale, in terms of the size of vehicles used and distances travelled, are likely to be realized by larger organizations, and this will

reduce their costs relative to those of smaller concerns. Alternatively, the latter may overload vehicles more often, and be able to evade taxation, licensing and other legal costs more easily than the former. For example, authors' interviews with Co-operative Union managers in Tanzania revealed that they thought that private traders could undercut the co-operatives' transport costs in this manner. Similarly, costs may vary in different areas and along different routes, because of local oligopolies, differing supply and demand conditions or variability in road conditions. Hence the importance of being wary of generalizations, of observing various transport functions in the field, and estimating transport costs for a number of types of operation.

Unit cost calculations Calculating unit costs refers here to either per commodity units alone, or the combination of these with costs per unit of distance travelled. The combination is only required where research is on the economic efficiency of transport over a wide area (in which case an indicator of per kilometre costs will probably be obtained from secondary sources) or where it is concerned with the returns to owning a vehicle.

Where transport services between two points in space are bought on a per commodity unit basis, as is often the case, per commodity unit costs, including crop losses, can usually be obtained directly from interviews with those hiring such a service. Only interest payments on borrowed finance then have to be allocated between commodity units. In such cases, it is also likely that research will be more localized, and that buying and selling prices obtaining in specific locations can be used to calculate gross returns. Thus per kilometre costs need not be calculated.

Where whole vehicles are hired, the fixed costs the hiring individual or firm will probably be liable for, are those of fuel, tarpaulins, rope and possibly oil, repairs and driver's wage. Therefore these need to be allocated between the commodity units handled. It will probably be unnecessary to estimate per kilometre costs, since the vehicle is likely to be hired for a specific journey, and the costs of that particular journey should only be compared with the buying and selling prices relevant to it.

Where analysts are concerned with the returns to owning a vehicle, and deploying it in the movement of own commodities, calculations must be done (similar to those outlined for storage) for the costs of transport per unit of commodity and per kilometre traversed. In subsequent comparisons with geographical price differences, the costs per kilometre travelled will have to be multiplied up to account for relevant distances, or estimates of average numbers of commodity units and kilometres travelled will have to be used against those of annual gross returns.

For example, in allocating the annual costs of vehicle depreciation incurred by the vehicle owners, between units of commodities and kilometres travelled, the following equation needs to be solved:

$$\frac{\text{Current value of/original investment in vehicle}}{\text{Current/original life expectancy of vehicle (years)} \times \text{average No. of units of commodities carried annually} \times \text{No. of kilometres travelled annually}}$$

However, unit costs are likely to be highly variable depending on the vehicles used; rates of capacity utilization; differing road conditions and conditions of competition along particular routes etc., and therefore generalizations will be difficult. Decisions concerning the focus of research according to the size of vehicle, types of usage, and routes travelled, will often have to be made. These will usually be based upon relative importance in terms of the quantity of commodities moved through each system, or upon perceived problem areas. In either case, preliminary fieldwork aimed at identifying these differences is likely to be necessary.

Comparing Costs of Transport and Inter-Spatial Price Differences

As with the other market functions, comparing the costs of transport with inter-spatial price differences can provide insights into the economic efficiency of the function, and into the degree of integration of markets separated by distance. In terms of the efficiency of transport, transport costs can be compared with spatial price differences, and/or the returns to owning vehicles, however deployed, depending on the focus of the research. To assess the degree of potential integration, the hypothesis that if markets are economically efficient the price difference between two markets that trade will approximately equal transfer costs, and between two that do not trade will be equal to, or

less than, the latter, is used. If markets are some distance from each other, or trading transactions occur over more than a week for example, time lags can be built into the comparison of prices obtaining in the two markets.

Economic efficiency Where transporters specialize in providing a service, and are not themselves involved in buying and selling, only the returns to owning a vehicle, and renting it out to traders, will indicate the efficiency with which the service is priced. Conversely, where transport is hired, comparing the costs of hiring the service, with inter-spatial price differences will be indicative of the efficiency of spatial arbitrage. Lastly, where vehicle owners are also engaged in buying and selling, comparing the costs of owning and deploying a vehicle in this manner with inter-spatial price differences will be revealing. As with correlation coefficient analyses however, qualitative data should be combined with these calculations, in particular the direction of physical flows at different times of year.

The simplest, and most commonly used, means to compare costs with commodity or hire prices is through calculating the unitary net returns to all resources invested in the function. These can then be represented as either absolute values, or as ratios to the value of all, or one, of the resources invested, or to the opportunity costs of buying and selling more locally. Equations similar to those given in the section on storage can be used for these calculations.

Depending on the data available, it is likely that the calculations will involve some assumptions, for example concerning annual volumes handled and kilometres travelled; the temporal dimensions of transport; the most common means of obtaining transport; vehicle depreciation rates etc.. Again, these assumptions should be made explicit and justified.

Market integration Although price incentives are important in transport decisions, the ability to respond to such incentives in the form of, for example, the availability of vehicles and fuel and the passibility of roads, also has to be assured if a physical flow of goods is to ensue. In addition, prices may be even higher elsewhere; information about price differences may be unavailable, and traders may have risk-reducing, long-term contracts (Ravallion, 1987).

Therefore, in forming hypotheses about market integration through comparing costs and prices, computing, for example, average weekly price margins between towns alone will only demonstrate the potential for markets to be connected. Such an analysis will demonstrate where and when profitable trade is possible, but it will not show (a) whether price incentives are actually responded to; (b) how high profits have to be to ensure such trade; or (c) whether the means to respond to such differences, including information, are available. For instance, it is possible that although the price difference between two markets exceeds transport costs, physical flows of produce between the two are insufficient to reduce the disparity, due to monopoly control of commodity flows, or the means of transport; insufficient supplies of vehicles, labour, capital or fuel and spares; inadequate allocation of transportation services to this particular function; lack of information about such price differences; greater differences existing elsewhere or other factors. It is, therefore, possible for price differences to greatly exceed transport costs without there being any trade between the two markets, and data on actual flows are necessary to test the integration hypothesis.

Results and implications Once calculated, the returns to transport need to be explained, whether they appear to be high or low relative to those to other economic activities. For example, low returns may be the result of poor information; risk aversion or poor managerial decision making, rather than highly competitive conditions. High returns may be the result of poor information on the part of buyer and sellers, or they may be due to a shortage of vehicles relative to demand; the high risk of the operation; higher rates of depreciation than assumed; oligopolistic market structures or other imperfections. Such explanations can be sought through reference to secondary data, but, in most cases, interviews with participants and knowledgable observers will be more revealing.

Box 4:12 An Example of the Analysis of Transport Costs and Inter-Spatial Price Differences

Harriss (1981, p.148) provides a good example of the complexity of comparing spatial price differences and transport costs, and of the need for disaggregated data.

She analyses transport costs and inter-spatial price differences over 3 years, for 3 varieties of rice and paddy, between 10 towns of varying size in South India, using official weekly price data and per kilometre minimum transport rates, by calculating for each pair of towns the following:

$$M_w = P_{wx} - (P_{wy} - T_{cxy}),$$

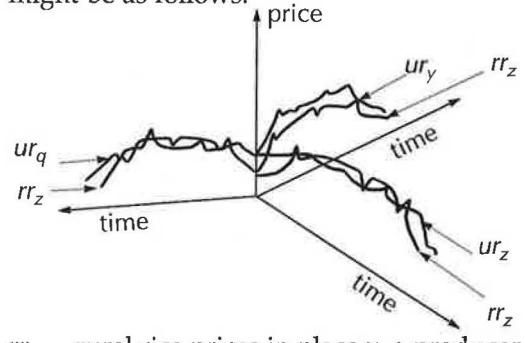
where:
M_w = the weekly price margin,
P_{wx} = the weekly average price for a specified form of a specified variety in town x,
P_{wy} = the same for town y,
T_{cxy} = the total transport and handling costs between towns x and y.

This analysis illustrates when, and in which direction, profitable spatial arbitrage is possible. The results suggest that Timmer's second and third models may be insufficient to explain patterns of price formation and inter-spatial price relations in some instances (see Box 4:11).

'Out of 102 pairings, there are 3 where markets are always connected (but in two directions). There are no cases at all where markets are always connected in one direction only (Timmer's Model 1). There are 14 cases where markets veer between disconnection and dissociation and trade in one direction only (Timmer's Model 3) and the remaining 85 pairings oscillate between profitable trade in both directions and dissociation (Timmer's Model 2).'

Various market imperfections can be argued to cause some of this uncertainty and irregularity. Harriss (1981, p.150) includes for example long time lags in market connections; imperfect systems of market contacts; movement restrictions, and the government taxation system.

Whatever the precise causes, the result is an extremely complex pattern of spatial trade in which towns are related to each other in various ways, depending on time, commodity form and variety, and commodity flows and price formation are multi-directional. 'We have here a regional system of producer centres of supply of paddy and of non-final demand for paddy and rice and final demand for rice; intermediate centres where both paddy and rice are supplied for non-final demand, and rice for final demand; and centres of final consumption with supplies of paddy and rice and final demand for rice' (p.150). Harriss suggests that in such a system the process of price formation and the potential pattern of trade might be as follows:



rr_z rural rice prices in place x–a producer market
$ur_{z,q}$ urban rice prices in places z and q. Timmer's Model 2.
ur_y urban rice prices in place y. Timmer's Model 3.

Spatial equilibrium models enable the determination of least cost spatial trading patterns under competition, and are useful in analysing spatial price relations where there are numerous consuming and producing regions within a single network, but are not covered here due to their complexity, and the likelihood of their not being possible under the conditions of rapid reconnaissance.

Processing and Inter-Form Price Differences

In a perfectly efficient market, the prices of raw materials and their processed products should be (a) perfectly correlated over time, and (b) differentiated according to the rate of conversion, the costs of processing, and normal profits.

As noted above, perfect correlation over time is inhibited by processing costs, which means that end-product prices can move within a range of +/- the costs of, for example, milling, in relation to raw product prices, without any milling actually being undertaken. Therefore, the greater the costs of milling, the lower the correlation between raw material and end-product prices. High correlations between raw material and equivalent end-product prices may also be a result of vertical integration and monopoly power, the determination of the two prices being located in a single or a few firms, and thus this type of analysis must be combined with an understanding of the nature of the vertical relations involved.

In comparing costs with the difference between raw material, and end-product, prices, there are again various possible techniques, but the simplest is to calculate unit costs and subtract these from gross unit returns.

Data Requirements and Comparisons

Data on physical volumes, and monetary values and/or prices, of all inputs and outputs are required to assess the technical, operational and pricing efficiency of processing. As above, if the degree of competition in the industry is accepted as the primary determinant of economic efficiency, then the proximity between prices and costs, and the minimization of the latter, can be analysed to assess such efficiency.

Before embarking upon an analysis of the efficiency of processing in any of its forms, a qualitative understanding of the operation and organization of the function is required to ensure that (a) relevant input and output, or cost and return, data are compared, and (b) explanations of apparent inefficiencies are better informed.

Qualitative data Analysts will need to identify what processing functions are necessary, and/or actually rendered, and by whom, and how and where are they undertaken. For example, in processing maize in Malawi, the raw product is often subject to drying; de-hulling; winnowing; soaking; washing; further drying; pounding and sieving. In some cases, all these processes, together with the treatment of by-products, is undertaken domestically by consumers. In others the de-hulling and final milling are carried out by specialist millers using mechanized technology (Kydd, 1989).

In grain marketing the focus in processing is usually in milling, and in this instance the following need to be defined, since all will be influential in determining costs and returns:

- the types of technology used;
- variations in management practices;
- pre-milling processes;
- the rate at which raw materials are transformed into various end- and by-products;
- variations in the qualities of end- and by-products, and their respective monetary values;
- rates of capacity utilization;
- the ownership of mills; and
- the way in which milling services are obtained by others.

Owners of mills may operate as wholesalers, and only process their own produce, or they may hire out their mills, or milling services, in various ways. Differences in the organization of processing will have implications for the costs of milling and the incidence of those costs. Therefore, as with the transport function, the distinction between the performance of the mill-owning industry, and that of buyers of grain and sellers of transformed products, needs to be made.

The types of technology used will, in part, determine the rates at which raw materials are converted into end- and by-products, the qualities of those products and the factor costs of milling. 'For example, techniques for processing paddy rice vary from hand pounding with a pestle and mortar to processing a few hundred kilograms per hour with small mills, to dehusking, cleaning and bagging several tons per hour with large mills' (Monke and Pearson, 1989, p.174). Variations in management practices will also affect these variables and, like the transport function, rates of capacity utilization will vitally influence the level of unitary fixed costs.

Because milling markets may be segregated along technological lines, with small mills being unable to meet the demands of very large consumers, it is likely that analysts will have to categorize enterprises into two or more groups, and analyse the conversion rates, and costs and returns, in each.

Box 4:13 Capacity Utilization

Capacity utilization is important in that it is a prime influence on the level of unit fixed costs, and thus the operational efficiency, of milling. The same is true of the storage and transport functions. Under-utilization will increase unit costs, since fixed costs are allocated proportionately.

Lele (1971, p.188) distinguishes between the following:

- engineering capacity – the maximum number of working hours possible, based on mechanical feasibility;
- effective capacity – the maximum number of working hours possible given social, physical and environmental constraints;
- optimum capacity utilization at which the difference between total revenue and total costs is greatest.

In assessing the economic efficiency of processing it is the latter which should be used as the standard against which to compare actual utilization rates, but policy can also be directed at closing any gaps between engineering, and economic, capacity utilization rates.

Cost and price data and comparisons Establishing unit milling costs is relatively easy where the service is paid for on a per unit basis, by buyers and sellers of grain and its products. However, there is likely to be considerable variation in these unit costs related to the volumes of commodity being processed, and to the technologies used. Thus, a range of milling service cost data should be collected on the different types of mills and consumers of this service, unless analysts are only concerned with one such category.

These costs can then be compared with the price difference obtaining at the same time and place between, for example, specified varieties and qualities of paddy and rice, or maize grain and maize flour, using the conversion ratio appropriate to particular technologies and qualities of end-product. Where data on various conversion ratios are unavailable, or unobtainable through fieldwork, official or standard estimates can be used.

The costs incurred by the mill owners may be more difficult to obtain and calculate, but, in order to assess the economic efficiency of the milling industry, these need to be compared with the prices charged to clients for milling. Unless secondary sources are available, interviews with the owners and operators of mills will be necessary. The most important costs which vary in relation to the quantity of commodity milled, include:

- oil, diesel and/or electricity;
- salaries of temporary workers; and
- possibly packaging materials and chemical additives.

Fixed costs include:

- depreciation on buildings and machinery, which may have to be assumed;
- interest on capital borrowed and/or invested, which also may have to be assumed;
- insurance; maintenance, repairs and spare parts;
- salaries of permanent employees; and
- in some instances, storage facilities and costs.

It is important to distinguish between these two categories in calculating unit costs. In addition, as Lele (1971, p.191) points out, if variable costs form a major part of total milling costs, increased capacity utilization will not lead to a significant decline in average costs, and therefore incentives to increase such utilization will be less. This may also imply that management and operation are efficient, and that any inefficiencies suggested through subsequent comparisons of prices and costs, lie within the technical or economic, rather than operational, realm.

As well as exhibiting different qualitative and quantitative conversion characteristics, various processing systems will have different capital and labour requirements. Therefore, data on the costs of operating different sizes and types of mill are required. If costs are highly variable within similar ranges of technology, this variation must be explained. For example, it may arise from miscalculations, such as over- or under-estimates of labour requirements, or from differences in managerial and operational efficiency. These variations may also provide clues as to the competitiveness of the milling industry in particular areas, since competition is a major force in motivating cost minimization.

To calculate the unit costs of owning and operating a mill, data on the volumes of commodity processed need to be obtained, in order that fixed costs can be allocated between them. In the absence of reliable records, interviewees' estimates of average annual costs, and average annual throughput, can be used. Monke and Pearson (1989, p.178) argue that expected annual throughput may be a better measure to use here, because this is the level of demand that motivates investment in processing, and because actual throughput in any one particular year may be unrepresentative for various reasons, including the age of the enterprise; infrastructural or agricultural bottlenecks; business cycles etc.. In addition they suggest that, where time and resources allow, 'visits to a large number of enterprises and time-series data can be helpful in the formation of an estimate of expected annual throughput. When capacity utilization rates vary widely and chronically, multiple processing budgets can be constructed to represent alternative scenarios.' The equations detailed in the section on storage may aid the calculation of unit costs.

If whole mills are rented, and deployed either in processing own products, or in selling milling services, an intermediate level of cost and return calculations is required, as with the case of renting out a whole vehicle. If a mill is rented to process own products, the unit costs of renting and running the mill over the period during which it is hired must be compared with the price difference between raw and end- plus by-products, over the same time span. If the mill is rented over the longer term in order to sell milling services, then the costs incurred by the individual, or enterprise, renting the mill in hiring and operating the technology, must be compared with the prices received from selling the service.

PROFITABILITY ANALYSES

The profitability of marketing enterprises provides the most direct indicator of the degree of competitiveness in the system. It is hypothesized that if markets are competitive, profit levels will be 'normal', since if they rise relative to other economic activities, new enterprises and resources will be attracted to the sector; the supply of goods, or services, will increase; prices will fall and profits will revert to a normal level. Conversely, in an oligopolistic or monopolistic market, it is possible for

enterprises to maintain profit levels at a higher level over a longer period of Ōtime. Aside from effective oligopolistic and/or collusive practices and barriers to entry, resource immobility may also allow 'super-normal' profits to be maintained.

Leaving aside the problems of income distribution, technological innovation and dynamic growth, economies of scale and externalities, and hence this limitation on perfect competition in maximizing productivity and social welfare, analysing the profitability of enterprises remains the best means of assessing the static economic efficiency of price formation and transmission. There are no simple means of directly relating private, or actual, prices to social costs and benefits, but by accepting the assumption that competition leads to the best allocation of resources under certain conditions, calculating levels of enterprise profitability can be used to provide indications of conditions of competition and the efficiency of price formation within the system. Subsequently, the stringent conditions of the perfectly competitive model, and those necessary for its resulting in optimal resource allocation, can be returned to and questioned.

Limitations on Profitability Analyses

There are however methodological and inferential problems in defining and measuring profitability, and in specifying an absolute standard against which to judge profits as acceptable or normal. Probably the most serious of these is data availability. In addition, calculating rates of profit is far from straightforward, and the relationship between profit levels and economic efficiency is not unilateral. For these reasons, the less direct approaches to assessing competition and economic efficiency in the market are usually necessary, and the review on profitability analyses here is kept brief.

Data availability and the use of secondary data To calculate enterprise level profits and profitability accurately, a detailed analysis of the quantities and values of inputs and outputs over a period of time, usually a year, is necessary. Not only does the common absence of accounting records make this very difficult, but research and analytical resources may also be limiting.

In most marketing studies to date, firm accounts have not been used to calculate profitability. Often such records are unobtainable. Rather, secondary price data have been used to calculate average annual price differences between various markets, which are then compared with average transport, storage and/or processing costs. The latter are obtained either through surveys or from official estimates. However, such analyses assume constant and unidirectional market connection and may be highly unrepresentative of enterprise-level profits where there is multi-directional and intermittent trade, and where enterprises are multi-functional, deal in a variety of commodities, and differ greatly in size, capital intensity etc.. Therefore, where secondary data is used, the following need to be defined:

- the direction and timing of commodity flows;
- the number of markets through which commodities flow;
- the particular times of year over which costs pertain and profits are reaped;
- the various functions undertaken by different enterprises and when and where they operate; and
- quantities handled; technology used; numbers of labourers employed etc..

In addition, in using aggregated and averaged-out data, a low average rate of return may conceal large-scale accumulation by a few, in the commonly occurring combination of subsistence, and monopoly, trade (Harriss, 1978, p.33). Conversely, high average rates of profit may co-exist with non-subsistence meeting operations. Thus, case-studies of enterprise-level profitability for at least a few types and sizes of enterprise need to be undertaken.

Interpreting results Once again, a single cause cannot be assumed. For example, low rates of profit are not necessarily the result of economically efficient and competitive marketing, since monopolistic

conditions can lead to higher costs and prices through technical and operational inefficiency, rather than to excess profits. Thus the profit maximization assumption may not be upheld. Low profits may also be due to risk aversion and pervasive uncertainty. The absence of a managerial profit maximization objective has often been the case with parastatal marketing boards, where objectives have been politically determined, and where employees have had no incentives to maximize profits. Conversely, seemingly high rates of profit may be the result of particular productive efficiency, short-term luck, or monopoly power in factor markets, rather than within the agricultural marketing system itself. Thus, as with other indicators of performance, profitability must be analysed in conjunction with additional phenomena, in particular the structure of the marketing system, and the technical and operational efficiency with which marketing functions are undertaken.

Comparing results Cross-country comparisons of profitability are hard to interpret, due to differing labour and capital costs; varying degrees of horizontal and vertical integration, and different levels and types of service performed. Comparisons between different firms' labour and capital productivity, within the same market or economy, for example between different-sized, functional, commodity and geographically located institutions, are more likely to be meaningful.

Calculating Enterprise (Firm) Level Profits and Profitability

Calculating enterprise level profits is highly complex, due to various empirical, methodological and theoretical problems. There is a tendency for merchants to overestimate costs and to underestimate returns and often trading enterprises deploy unpaid family labour and deal, concurrently or sequentially, in several commodities, and various functions and combinations of function. This necessitates a means of allocating fixed costs between commodities and functions, and of determining the degree to which vertical integration leads to higher profits. Moreover, the way in which profits and profitability are calculated depend on the precise definition of these concepts, which will be determined by different research objectives and the availability of data.

In the absence of access to detailed accounts, the best means of collecting the data required on costs and returns is through extended case studies of a few representative types and sizes of firm. The latter can be identified through an initial survey; secondary sources or interviews with knowledgable observers. Measurements of current inputs and outputs, and costs and prices, can be supplemented with interviews concerning seasonal changes and annual values.

Absolute net profit There are various ways in which profits can be defined, calculated and expressed. The examples below of various profit calculations are taken from Harriss (1981) and Monke and Pearson (1989).

The return to all resources used – what Harriss (1981, p.74) refers to as absolute net profit – is calculated by subtracting total costs from the total gross value of output, usually on an annual basis. This cannot be used to assess economic efficiency, or make comparisons between enterprises, because of differences in resources invested in varying types and sizes of enterprise. Thus a rate of return to resources invested, i.e. a rate of profitability, has to be calculated.

Profitability as a return to capital The standard convention in economics is to calculate profitability as the rate of return to capital invested in the firm. Thus, absolute net profits must be expressed as a ratio to, or percentage of, the total value of capital deployed. This allows comparisons to be made between marketing enterprises, and between the returns to capital invested in different sectors of the economy. Harriss (1981, p.74) defines this measure as:

$$\frac{(O - C)}{(CS + WC)},$$

where:
O = total gross value of output, i.e. total revenue;
C = total costs incurred;
CS = value of capital stock, including land, buildings and machinery;
WC = value of working capital.

In many cases this equation will provide a measure which will be sufficient to allow an analysis of economic efficiency, through comparisons between enterprises, and between profitability and interest on credit. However, where owners of enterprises also run them, and where unpaid family labour is deployed in them, further calculations may be necessary. This is because 'pure profits' are preferred in profitability comparisons.

Pure profits and profitability Pure profits represent dispensable income after own and family consumption needs have been met. The rate of return to capital they imply is important in (a) analysing economic efficiency through comparing the profitability of different enterprises with each other, and with prevailing interest rates, and (b) determining potential levels of investment, and hence enterprise viability. In many cases the above equation will provide an indication of pure profits and profitability. Usually payments for management and labour are included in the costs. However, where owners are also managers, and where unpaid family labour is used in the enterprise, as is common in LDCs, particularly among smaller enterprises, imputed values for these factors have to be added to the costs to obtain a measure of pure profit.

Management and unpaid family labour can be costed out according to relevant, observed market wage rates (which may exhibit a gender differentiation). Alternatively, shadow or minimum wage rates can be used. Harriss (1981, p.74) calculates unpaid family labour costs by using a hypothetical minimum subsistence budget for each family interviewed, including the costs of food, clothing and housing. This may provide a better indication of the pure return to capital, and of investible surpluses, where not all members of the family work in the enterprise, but is dependent on greater research time and resource availabilities, since family size is crucial. Also, because minimum consumption needs are income-elastic, these calculations will overestimate pure profit levels of wealthier enterprises.

It is also important here to count consumption from own inventories as a benefit, or to subtract the value of such consumption from minimum subsistence budgets, since failure to do so would result in double counting. Similarly, a means of defining the contribution of marketing functions to family consumption needs, in the context of multi-enterprise family enterprises, needs to be found, or at least pure profit rates increased or decreased to take this into account.

Other measures of profitability Depending on research objectives and data availability, absolute net profit can also be expressed as a ratio to, or percentage of, the following:

- gross earnings, or sales value, in order to determine how much of the value added constitutes profit;
- annual turnover, to provide an indication of the rate of profitability in the absence of data on capital investments, or to assess the differences between profit rates of various-sized enterprises, and thus the nature of economies of scale in the industry; and
- wage labour costs, which provides an indication of labour productivity, and/or rates of labour exploitation, within the marketing system.

These measures cannot be compared between enterprises, or groups of enterprises, in an attempt to evaluate the economic efficiency of different parts of the marketing system, because of differences in capital and labour requirements; in the extent to which they employ own, or borrowed, capital and in rates of turnover and volumes of sales.

Using and Interpreting Results

In attempting to determine whether the returns to capital invested in trade represent 'normal' or 'excess' profits, they can be compared to that invested in other economic activities, like different marketing functions or agriculture, and/or to prevailing interest rates on the credit markets to which traders have access. Estimates of the returns to various agricultural enterprises may be obtainable from secondary sources, and normally public sector enterprise profits will be available. However, the ways in which the latter are defined and calculated must be ascertained in order to ensure

comparability. Moreover, comparisons with interest rates will not provide an indication of the static economic efficiency of marketing where, for example, the credit market is subject to monopoly control or other imperfections, and thus caution is needed in interpreting results.

Alternatively Monke and Pearson (1989, p.19) suggest a private cost ratio can be estimated. This is calculated by dividing the sum of the cost of all factors used in marketing, by total revenue less traded inputs (ie. by value added). If the private cost ratio is equal to 1, 'normal profits' are being reaped. If it is less than 1 'super normal profits' are being made. This is discussed in more detail in Chapter 5.

Comparing average rates of profit of different enterprises can also provide insights into the structure of trade; the locus of monopoly power and capital accumulation; and the implications for income distribution within the system. For example, Harriss (1981, p.73) suggests that profits, calculated by various methods, can be compared to determine whether they increase with the number and combination of services performed to provide an indication of the returns to vertical integration, which may be disproportionate and lead to oligopolistic concentrations of capital. Similarly, profitability differences between enterprises differentiated by size (defined by capital investment or turnover); age and geographical location can also indicate whether there are barriers to upward mobility in marketing, in terms of scale of operation or in time and space.

Simpler, but less accurate, indicators may also be used where research constraints do not allow for the above. For example, average annual incomes from different types and scales of trade can be compared with various official or observed wage rates. However, the effects of incomes policies on the latter should be taken into consideration. Per capita income of the commercial population can be compared with that of other sectors, if the necessary data is available. But, the limitations noted above in relation to averaged and aggregated data also apply to both these exercises.

Chapter 5
Analysing Marketing Policies

- **defining agricultural marketing policy**
- **policy objectives and instruments**
- **the neo-classical economics approach to policy analysis**
- **social prices**
- **divergences**
- **market failures**
- **distortions**
- **policy hierarchies**
- **nominal protection coefficients**
- **effective protection coefficients**
- **domestic resource costs**
- **the policy analysis matrix**

This chapter provides a guide to the analysis of agricultural marketing policy. The discussion opens with the question, 'what is agricultural marketing policy?'.

Neo-classical, partial equilibrium analyses of policy are then discussed and presented. This is a theoretical framework rooted in the belief that, broadly speaking, free competitive markets serve society well, but, nevertheless, there are a range of circumstances in which government intervention can serve to advance economic efficiency goals. Partial equilibrium theory considers individual markets in isolation: where there is a change in the market under analysis, partial equilibrium theory ignores any feedback effects on this market which may be transmitted though the wider economy. Thus, in contrast to general equilibrium approaches, which aim to model the main feedback effects, partial equilibrium theory has substantial limitations. On the other hand, it is more readily comprehended and applied.

Basic concepts from economic theory of policy are set out, and the application of these concepts to agricultural marketing policy is considered. It is unlikely that most researchers will wish to undertake partial equilibrium analysis of markets (indicating equilbrium levels of price, supply and welfare), due to data limitations. Therefore a number of indicators are explained, which can be used in a rough and ready way to assess the effects of government interventions on the economic efficiency of marketing. These indicators point to appropriate directions for government intervention or policy change, but do not indicate with any precision what the outcome of particular intreventions may be.

Finally, a number of spreadsheet-based examples examined to guide readers in the estimation and interpretation of policy indicators.

INTRODUCTION

Government Intervention in Agricultural Marketing

Having discussed various ways of analysing the economic efficiency of marketing operations, we now turn to marketing policy. Governments intervene in agricultural marketing at a number of levels; in a variety of ways and for a wide range of reasons. This chapter begins by providing some examples of the influences on the policy decision-making process and the objectives of, and instruments used in, agricultural marketing policy.

Influences, Objectives and Means

Government regulation of markets is often shaped by the political action of interest groups which may gain or lose. But it is also influenced by theories about the consequences of particular interventions and non-interventions in the market. These theories affect the sphere of political action by providing ideas to governments and to interest groups, about the likely consequences of interventions for the 'national interest' and for particular sections of society. If new theories of the effects of various market interventions grow in popularity, reducing the influence of previously dominant ideas, this may have a major impact on policy because the consequences of particular policies come to be understood differently.

Economic efficiency versus monopolies and free-trade Quite contrary theories can be encountered. For example, the proposition that free competition is necessary for economic efficiency may be opposed with arguments that monopoly may be required to justify desirable, but risky, or lumpy, investments in capital assets. Monopolies, controlled by government or by producer interests, may be advocated on the grounds that they will make it possible to protect the interests of producers and/or consumers from factors such as price instability; private trader monopolies and/or damaging government intervention in linked markets.

Similarly, interventions which restrict or tax interprovincial and international trade may be justified on the basis that they protect producers, consumers, or both. Producer protection results from interventions rendering outputs more expensive, and/or inputs cheaper, than would otherwise have been the case. Consumer protection results from measures which hinder exports from a province or country and which cause local prices to be lower and (possibly) stocks to be higher.

Contradictions in food security policies Food security objectives may be furthered by interventions which have the effect of lowering food prices, and ensuring that these lower prices can be sustained even when supplies are affected by such developments as a shortfall in the local food harvest, or a surge in prices in a linked food market. For a number of governments, tariff or quota interventions in interprovincial and international trade are only part of the range of instruments which may be used to provide food security.

To make it possible to sustain lower prices in the face of market pressures for price increases, governments may have a policy of holding high stock levels, to be released onto the market while awaiting a new harvest or while securing imported supplies. But, holding large food security stocks is expensive, and, if the costs of this are passed on to consumers, food security objectives may be compromised. The alternative of passing the costs on to producers may be possible, but courts the danger that incentives may be reduced to the point that supplies become inadequate and farm incomes lowered unacceptably. For these reasons it is often found that a substantial part of the costs of holding food security stocks is borne by the government.

Reducing transactions costs Governments also intervene to directly reduce the transactions costs (i.e. those of exchange) experienced by participants in the market. Generally, transactions costs are raised when there is (a) doubt about the enforceability of contracts, and (b) limited information available to contracting parties about general market conditions, and about specific matters such as the quality of the produce being exchanged. A specific equity concern arises when there is a sharp asymmetry in the availability of information to parties to an exchange. For example, larger traders, with good market intelligence, may be able to exploit this in transactions with producers and small

traders. Thus governments often provide rules concerning standards of quality and grading, product handling and hygiene.

The inadequacy of market information, as a result of the lack of development of transport networks; communications and of specialized marketing information services, has been used as an argument to justify the public provision of market information. This is normally collected by observation of prices and quantities in different places, by obtaining intelligence about anticipated developments in connected markets (e.g. size of harvest), and by the timely dissemination of this information in mass media.

An additional approach to reducing transactions costs is for governments to set the temporal and spatial dimensions of marketing by specifying places and times at which marketing should take place. Temporal regulation (e.g. ordering that there will be a 'Monday market' for potatoes every week from March to May) may be justified on the grounds that it makes marketing more predictable for producers, traders and consumers. In the absence of an imposed framework of temporal predictability, it is argued that a satisfactory matching of supplies and demand in the system, with damaging effects on economic efficiency, would result.

Spatial planning and competition It is often argued that intervention through spatial planning is a critical function for government. Left to themselves, private individuals may not be able to obtain sites which provide good access to producers, wholesalers, consumers and storage facilities. There may be links between spatial planning and the competitiveness of the market, as highly concentrated private control of key marketing sites may be conducive to monopoly. This problem may be addressed not only by spatial planning to ensure that marketing sites contain adequate space for a number of competing participants, it also may be held to provide a justification for government ownership and management of marketing sites (which may be rented or leased in sections).

DEFINING AGRICULTURAL MARKETING POLICY

Government intervention in agricultural marketing can have effects which are similar to non-marketing interventions. Conversely, government intervention in other areas of the economy can influence the conditions under which marketing is undertaken. Therefore marketing and non-marketing interventions can often be evaluated as alternative means of achieving particular objectives of policy.

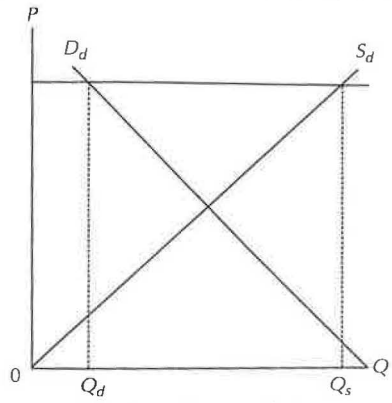
The Problem – Comparing Three Policies

For example, assuming markets are competitive, if private traders normally find it profitable to export a staple food from a province, but the government limits such exports, by quotas or bans, then prices for producers and consumers within the province will fall. Facing reduced incentives, producers will be likely to undertake a degree of substitution into other products, increasing supplies of these products to provincial markets and, perhaps, to export markets.

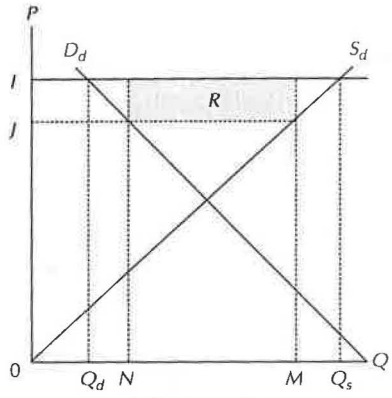
Comparable results could have been achieved by a policy of taxing the export of the staple food, by applying an export cess which would lower the price marketeers obtained for exports and hence the price they were prepared to pay producers. As long as it remains profitable to export, i.e. that the export cess does not rise to the point that there ceases to be a market connection, the prices that traders obtain for exports will determine the prices which they pay to producers. In this case, the export price to traders would represent the opportunity costs of the staple food, and thus consumer prices within the province would also fall.

A further possibility is that the government might intervene by announcing that a per-unit subsidy would be paid to all marketeers purchasing the staple food within the province, and then selling this on to consumers within the province. Sales to markets outside the province would not receive a subsidy. Here the effects of the subsidy would be only partially analogous to the two earlier

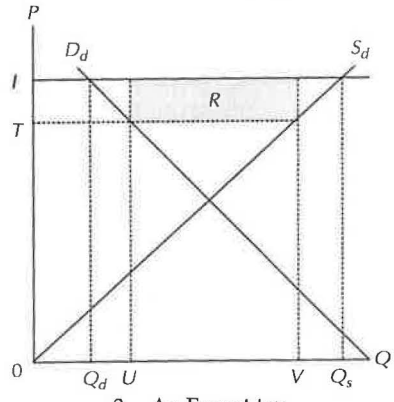
Box 5:1 The Economics of Export Quotas; Export Taxes and Consumer Subsidies



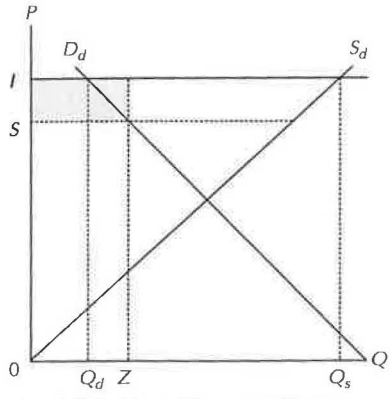
1. Non-intervention



2. A Quota on Exports



3. An Export tax



4. A Subsidy to Domestic Consumers

D_d = domestic demand schedule
S_d = domestic supply schedule
I = the export parity price from the province or country
Q_d = domestic consumption
Q_s = domestic production

In this case, the export parity price is the opportunity cost of the staple food and there is no divergence between the export price and the domestic price. The quantity exported is Q_dQ_s.

A quota on exports, fixed at *NM*, reduces exports below the free-market level. Because of the reduced size of the market, prices to producers fall to J, and total production falls to *M*. With lower consumer prices, domestic consumption is able to expand to *N*. The export parity price remains I, but whether exporters will be paid this, or the domestic consumer price *J*, or a price in-between these, will depend on how the government allocates the quota. A total 'quota rent', equivalent to rectangle *R* is available. This may only benefit exporters, if it is allocated to them free of charge. However, if it is sold by auction, or by tender, then most or all of *R* can accrue to the government. Another possibility is that the public officials responsible for the allocation, may seek to obtain a private share of *R*, through soliciting bribes.

This diagram looks similar to the case of a quota on exports, but the sequence of market shifts is different. An export tax, or tariff, at the rate *IT*, reduces the opportunity cost of the staple food to *T*, lowering both consumer and producer prices. Thus production declines to *Y*, but consumption expands to *X*. Exports are now *XY* and, in this case, the government obtains a revenue, *R*, equivalent to the tariff rate multiplied by the quantity exported.

Assuming the subsidy is a fixed monetary sum, *S*, then prices to domestic consumers fall to P_s. However, the opportunity cost for producers, and traders, is still given by *I*. The consequence is that producer incentives, and therefore production, remain unchanged, while lower prices cause domestic consumption to expand to A, thus squeezing exports which decline to ZQ_s. The costs of the subsidy to the government will be *IS* multiplied by Z, shown as the shaded area in the diagram.

examples, as producer prices would be unaffected, but consumer prices in the province would be lower.

The distributional effects of these alternative policies also differ. The export quota hurts producers, but benefits consumers and, to varying degrees, may benefit export traders, raise government revenue and serve the private interests of public officials. Thus there is scope for a coalition of consumer, public sector and, possibly, export marketing interests to co-operate in lobbying for the introduction/preservation of export quota arrangements. The case of the export tax is simpler. Consumers and the government (or taxpayers) gain, while producers lose. In the case of the consumer subsidy, producers are unaffected (exports are simply diverted to the domestic market), consumers gain, but government (taxpayers) pay. The political-economic possibilities for support for a consumer subsidy are likely to turn on the relative powers of, and perceived costs and benefits to, consumers of the product in question versus taxpayers.

Market, or Non-Market, Interventions?

Which of these three types of intervention, namely, (a) quotas on exports, (b) taxes on exports and (c) subsidies for marketing to domestic consumers, may be described as marketing or non-marketing interventions ? In a general sense, all three involve interventions in markets which may alter the volume and direction of flows, and the prices at which exchange takes place. However, further consideration does provide a basis for making distinctions.

The quota achieves its effects through a direct intervention into marketing by denying traders the option of exporting at will, and instead setting up procedures for applying for the right to undertake strictly limited exports. Clearly, this is a marketing intervention. On the other hand, the export tax amounts to a change in the environment in which marketeers operate, because, in assessing their options, they now have to take into account that they have to pay a tax on exports and, possibly, that their activities may be impeded by new administrative requirements necessary for the administration of the tax. However, marketing activity is less directly controlled, because traders are free to export without reference to the government, as long as they pay the tax. Finally, the consumer subsidy option can be thought of as the mirror-image of the export tax as it is applied to the domestic market rather than the export market, and it is a negative rather than a positive tax. Again, administrative procedures will be necessary for the government to verify sales onto the domestic market, and to subsidize traders for these.

If it is accepted that the quota is an example of a marketing intervention, while the tax and subsidy are not marketing interventions but changes in the market environment, what is the significance of this distinction? From the broader perspective of policy analysis, the distinction does not seem very useful. It can be argued that alternative interventions which have similar consequences, in terms of their effects on prices and volumes traded, should be analysed and compared together? The separation of 'marketing policy' and 'tax and subsidy' policy as discrete fields of analysis is likely to obstruct understanding, because policy analysis is essentially a matter of simulating the outcomes of alternative policies, and assessing the relative desirability of these outcomes.

Marketing Policy Defined

Thus marketing policy analysis is approached here from the following perspectives:

(a) It is appropriate to apply conceptual tools which have been developed for economic policy analysis more generally.

(b) Marketing policy analysis should not be undertaken in isolation. Analysts should be aware that a particular intervention in marketing will often represent one of a number of options which may be under consideration for the achievement of a more general (i.e. non-marketing) objective. Here marketing interventions should be analysed and compared with other interventions which have been proposed.

(c) Notwithstanding point (b), there will be circumstances where the objectives of policy are purely concerned with marketing objectives. In such cases, it is acceptable to restrict the analysis to a comparison of different interventions in the marketing system.

USES OF POLICY ANALYSIS

The analytical techniques described here could have a number of objectives. One may be to compare the economic efficiency different institutional structures, or channels, for marketing. From this a hierarchy of marketing structure in terms of economic efficiency may be derived. The ordering of the hierarchy could be examined by assuming different relative factor prices, different degrees of market failure and differing internal efficiency parameters for particular institutional structures.

An example of this might be where there are two alternative systems for the production and supply of a staple food crop. One might involve geographically dispersed production by small farmers, with bulking-up at village level, sales by farmers and small-scale traders to local markets, further bulking up at local markets as a result of purchases by larger traders, who then sell-on to wholesalers, who in turn deliver to millers. The other system might involve geographically concentrated production by large commercial farmers, with direct delivery to millers. Again, the initial task could be to assess and rank the efficiencies of these systems. Subsequently, the analyst would consider policy changes to make these systems more economically efficient and consider how these systems would expand or contract, and change internally, in response to the proposed policy changes.

A further objective may be to identify interventions which would enhance the efficiency of a marketing sub-system. For example, in a recently liberalized grain market, there may be a channel based mainly on small-scale traders, who are shown to be incurring high storage losses. The effects of possible technical improvements in storage efficiency on the overall efficiency of the system can then be modelled. By taking into account estimates by grain storage scientists of the extent to which reductions in storage losses are feasible, it may be possible to indicate the benefits of research and extension on grain storage and also the effects of this in the relative efficiency of alternative marketing channels.

OBJECTIVES AND INSTRUMENTS OF POLICY

A key distinction in policy analysis is made between the objectives of policy and the instruments which may be used in to achieve these objectives. Once objectives and instruments have been identified, it is possible to:

- examine potential conflicts between objectives;
- where conflicts exist, to consider the weights that should be attached to particular objectives, in order to devise optimal trade-offs; and
- to consider the efficacy of individual instruments as means of realizing policy objectives.

While the difference between objectives and instruments is conceptually straightforward, in practice there is often confusion. In addition, stated government goals may, in reality, be given little weight; there may be disagreements within government concerning objectives, and there will certainly be disputes over the relative weights to be assigned to different objectives.

Problems in Identifying Policy Objectives

The economist's approach to policy analysis, which entails the diagnosis and appraisal of the resource costs and distributional consequences of a policy instrument, may not be the dominant approach in the wider discussion of policy.

In lobbying governments, vested interests can have powerful reasons for concealing the effects of the interventions they advocate under attractive slogans, which decision makers in government may find more persuasive than purely economic goals. For example, food producers will tend to favour interventions which produce a substantial national food surplus, which may then have to be exported at a loss, or stored locally. The costs of exports and storage, likely to be paid by government and/or food consumers, may be justified as a necessary cost for national food security, and the impact on the incomes of food producers may hardly be discussed.

Another example might be that of parastatal crop marketing authorities, which justify their existence with reference to the development of marketing services and the protection of producers and consumers from, for example, price instability and long-term declines in prices. On the other hand, the parastatals may operate as instruments for taxation and/or for expanding public sector employment. The question of economic efficiency losses due to the absence of competition would be unlikely to feature in the parastatals' lobbying of government.

Ways of Identifying Policy Objectives

The separating out of objectives and instruments is as much an art as a science. Statements of government objectives will almost certainly exist, for example, in development plans and election manifestos of the governing party. But it may be the case that some of these stated objectives are in practice given low priority and that other objectives, less frequently publicly articulated, are more important.

The recommended approach to this problem is for the analyst to begin by developing a 'long list' of possible policy objectives derived from:

- the official documentation;
- discussions with civil servants and politicians;
- the views of political scientists, economists and others who have observed the government in operation from a more detached perspective, and
- the analyst's own appraisal of the actual distribution of the government budget, and of the effects of its price and trade policies.

If circumstances allow, this 'long list' could be circulated for comment within the government and discussed at meetings. Out of this process a 'short list' of higher priority policy objectives should begin to emerge. There will never be total agreement on priorities, and thus the policy analyst, with the agreement of the policy makers at whom the advice is targeted, will eventually have to make the final decision on the composition of the short list. In circumstances where, initially, there is no agreement on objectives among policy makers and senior policy advisers (the distinction between these categories may in practice be blurred) then the analyst must seek to foster a consensus, and this may prove a difficult task.

Primary Objectives, Subsidiary Objectives and Instruments

As the identification of objectives and instruments proceeds, a hierarchy will begin to emerge. Some objectives are clearly major goals, but others, while not being policy instruments, are subsidiary goals. Box 2 illustrates this with reference to the major objective of lowering food prices. Subsidiary objectives, the achievement of which will contribute to this primary outcome, are:

- raising the efficiency of marketing;
- undertaking additional research and development on food crops;

Box 5:2 An Example of a Hierarchy of Major Objectives, Subsidiary Objectives and Possible Instruments – Lowering Consumer Food Prices

MAJOR OBJECTIVES	SUBSIDIARY OBJECTIVES	POSSIBLE INSTRUMENTS (which may be mutually exclusive)
Lower consumer prices for staple foods	Raising the efficiency of output and input marketing	(a) support the development of co-operatives; (b) set up a parastatal agency to develop marketing services; (c) provide support services for the development of private trade; (d) regulate the market to reduce anti-competitive practices; (e) set up publicly funded market information services; (f) improve spatial distribution of marketing facilities
	Promoting increased technical research, to raise production	(a) funding to public research and development system; (b) remove impediments to the operation of private research and development
	Improving the availability of credit to farmers	(a) establish and subsidize organizations supplying credit to farmers; (b) identify and change policies inhibiting the supply of credit to farmers by private financial institutions
	Lowering transport costs	(a) public investment in roads and rail; (b) deregulation of transport operators to encourage investment in, and better use of, existing stock
	Subsidizing (a) inputs; (b) outputs and/or (c) transport	(a) subsidize marketing parastatals; (b) subsidize private traders
	Restricting food exports, where an export surplus exists	(a) impose quotas; (b) institute tariffs

- improving the supply of credit to farmers;
- lowering the costs to producers of transport services;
- subsidizing inputs, outputs and transport, and
- restrictions on food exports.

For each of these subsidiary objectives a number of possible policy instruments are shown. The lines between the three categories shown in Box 5:2 are, inevitably, somewhat arbitrary. Yet the process of categorizing policies in this way can be useful in bringing out important issues which need to be addressed.

To take an example, government may support marketing co-operatives in a number of ways. These might include:

- an advisory service;
- arranging access to finance at preferential rates;
- awarding co-operatives contracts for services which they would not win in open competition with the private sector;
- protecting co-operatives by limiting or banning competition in certain activities, and/or
- subsidizing co-operatives for marketing services performed (where private competitors are either less generously subsidized or not subsidized).

The central question, in deciding on instruments here, is why the government undertakes this support. Two broad types of answer may be forthcoming:

(a) that in the longer run co-operatives can develop into the most efficient marketing service, and, therefore, they need temporary support through a development, or infant industry, phase; or

(b) that although co-operatives may be somewhat less efficient than private traders (or parastatal agencies), the government places a higher value on activities which are co-operatively undertaken, rather than performed by private business. In this case, co-operation is an end rather than a means.

If the first line of argument is felt to be dominant, then support for co-operatives must be a subsidiary goal, with the major one being marketing efficiency. The various ways of supporting co-operatives then comprise policy instruments. Thus the main policy questions are (a) how support for co-operatives compares with other possible ways of promoting economic efficiency in marketing and, (b) the effectiveness of the various instruments which may be used to support co-operatives and/or marketing efficiency.

However, if policy makers lay stress on the value of co-operation for other reasons, and the analyst is persuaded that this is a genuine goal, then the promotion of co-operatives is the major objective. Whether the means of promoting co-operatives should then be elevated to the status of subsidiary goals, or remain as policy instruments, is a debatable point. The precise outcome of this debate is not crucial. What is important is that this categorization exercise has allowed the analyst to clarify the goals of policy, and to construct a framework in which different means can be compared as tools for achieving specified ends.

Conflicting Objectives and Multiple Instruments

As noted above, primary objectives are usually in conflict. Box 5:3 shows a simple example of possible major objectives of agricultural policy, and of how potential conflicts can be identified.

The policy analysis literature contains a useful, though inconclusive, debate concerning the number of instruments which may be required to reconcile conflicting objectives. For example, consider the consequences of a policy of lowering consumer prices of food through consumer/marketing subsidies. As the subsidy is introduced, and then increased, the main objective of lower

Box 5:3 Agricultural Policy Objectives and Possible Conflicts

MAJOR OBJECTIVES	POSSIBLE CONFLICTS
A. Lower consumer prices for a staple food	A, B, C
B. Increasing farmer incomes	A
C. Increasing the supply of raw materials (e.g. fibres) to agro-industry	D
D. Increasing export earnings from high value cash crops (e.g. beverages)	A, C

domestic food prices is achieved. However, the subsidy has a budgetary cost (which will be an increasing function of the per unit subsidy, because the higher the subsidy, the more subsidized food will be consumed). Additionally, export earnings will be reduced, as food is diverted to the domestic market.

These two by-products of the subsidy policy may well prove inconvenient. If the additional subsidy costs are to be accommodated without increasing the government budget deficit, then new policy objectives and instruments will have to be introduced. If the objective is to keep the government budget deficit constant (on the basis that otherwise additional government borrowing will be required and that this, other things being equal, will be inflationary), the instruments for achieving this could take the form of (a) increased taxation and/or (b) reduced government expenditure. The fall in exports may also cause difficulties, and may require the introduction of policies to promote more exports from other sectors of the economy. Here the objective would be the maintenance of a given balance of external payments, and possible instruments would include an devaluation, export subsidies and import taxes.

Killick (1981, p.29), in summarizing the literature on policy management in the face of conflicting objectives, describes two 'rules of thumb' as follows:

- that, in general, each objective will require at least one policy instrument, and
- when objectives are loosely formulated, there may be single policy instruments which can achieve multiple objectives. However, if objectives are tightly formulated it is unlikely that a single instrument will fully satisfy both objectives.

Placing a tax on food exports, in order to reduce consumer prices, (Case 3 in Box 5:1) provides an illustration of the latter 'rule of thumb'. An export tax on food, applied initially at a low rate, reduces food prices and raises government revenue. Both cheaper food and higher government revenue are plausible objectives of policy, and so it seems possible to conclude that we have here an instrument which is able to achieve progress in the direction of two objectives. The snag is that this happy result will only hold over a limited range of the application of the export tax. Beyond a certain point, further application of the policy instrument will continue to achieve the objective of lowering domestic food prices, but will negate the revenue objective. Box 5:4 shows that if the government was determined to pursue the food price objective through a higher export tax rate, then, beyond a certain rate, it would have to formulate a new objective, that of maintaining revenue, and to find a new instrument(s) to achieve this.

THE NEO-CLASSICAL APPROACH TO POLICY ANALYSIS

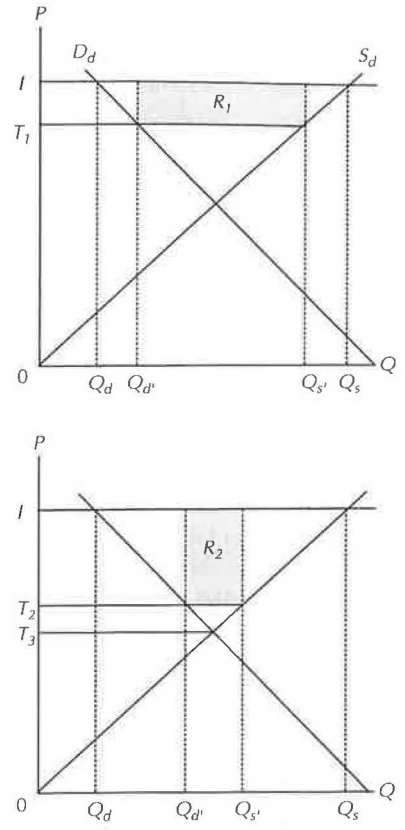
So far it has been assumed that policy objectives arise out of the political process, reflecting societal values (or, more realistically, the consensus values of politically dominant sections of society). Thus, in policy analysis, the identification of objectives was described as the setting out of a list of major and subsidiary objectives which, in an approximate fashion, might be described as representing the

Box 5:4 Example of the Conflicts and Complementarities in Using a Single Instrument for Multiple Objectives – an Export Tax on an Exported Staple Food

An export tax is initially applied at the rate IT_1, which has the effect of raising government revenue, and also reducing the consumer, and producer, prices of food. The adjustment to equilibrium includes an expansion of domestic consumption, because prices are lower, and, for the same reason, a reduction in production. Revenue to the government is given by the rectangle R_1. D_d is the domestic demand curve and S_d is the domestic supply

Now the export tax is increased to IT_2 and, as a consequence of further increases in domestic consumption, and reductions in production, the volume of exports is severely reduced. Although taxation per unit of export is higher, the fall in exports is such that R_2 is less than R_1. If the tax is increased to IT_3 then revenue falls to zero.

In summary, over the range of possible values of the export tax up to IT_3, the effect is consistently to reduce the domestic price of food. However, although the revenue effects are initially positive, beyond a certain value of the tax (less than IT_3) the revenue benefits will decline.



'goals of policy'. The analyst reaches a judgement as to the goals using approaches which include examining explicit policy statements, making inferences from actual behaviour and interviews and discussions with policy makers. Under this approach any ranking of policy goals is a matter of the analyst stating what appear to be the priorities revealed by the investigation of policy goals. Policies and instruments should then be judged with reference to these goals.

The Role of Policy in Neo-Classical Economics

Neo-classical economic theory takes a different approach to the assessment of policy objectives and instruments. As expounded by Corden (1974), the basic perspective is that, under certain assumptions, *laissez-faire* will optimize economic welfare. However, within this general perspective, it is acknowledged that there will be conditions under which *laissez-faire* will not produce optimal welfare. The most important of these are:

- instances of market failure,
- the presence of other government policies which create a divergence between social and private costs and benefits, and
- when *laissez-faire* fails to result in a 'socially desirable' distribution of income.

The first two of these will be discussed before we turn to specific techniques of policy analysis. But to summarize the neo-classical economists' basic approach to policy objectives and policy analysis Cordon (1974, p.4) notes that 'one can believe that there are many reasons for the government to intervene in the economy – to maintain full employment, to bring about a desirable distribution of

income, to adjust resource allocation and consumption patterns in the light of external economies and diseconomies, and so on – and yet one can also believe that, broadly, 'free trade is best".

Divergences, Market Failures and Distortions

Corden's neo-classical analysis of policy starts with the concept of a divergence, defined as a divergence between private and social costs. Social costs are equivalent to social prices, and they represent the costs to the community as a whole, rather than to particular individuals incurring them. A divergence between private and social costs and prices implies an economically inefficient allocation of resources.

Market failures lead to a particular sub-set of divergences, namely those which exist in the absence of any government intervention. Divergences, however, can also be created by government intervention, and for these Corden applies the term distortion. Each of these concepts is discussed in more detail, before the uses to which such an analysis can be put are discussed.

Social costs and prices

Most textbooks on social cost-benefit analysis provide a guide to the measurement theory and practice of measuring social prices (often known in this literature as economic prices or shadow prices). A recommended source is Gittinger (1982, Ch7) which provides advice relevant to the agricultural sector. Here we only provide some examples of the reasoning involved in developing appropriate conversion factors for calculating social prices from private ones.

Foreign exchange Often, analysts may observe that the exchange rate maintained by the government is above a market equilibrium rate. Over-valuation can be effected through foreign exchange rationing, import licensing and the prohibition of foreign exchange transactions at any rate other than the official one. An illegal, or semi-legal, 'parallel market' for foreign exchange may exist, at which the national currency will receive a lower price in terms of foreign exchange.

The implication of over-valuation is that the price of traded goods in domestic currency understates their true scarcity value. To correct for this in any economic analysis, an adjustment must be made to the nominal exchange rate, by a conversion, known in the project literature as the foreign exchange premium, to produce a shadow exchange rate. The foreign exchange premium will be no more than a 'guesstimate', because the equilibrium exchange rate cannot be observed directly. The parallel market rate may be a useful guide to the shadow rate only if this market is widespread and officially tolerated. Otherwise the parallel rate is likely to contain a substantial risk premium, reflecting the chances of prosecution and the severity of the penalties applied. Essentially, the analyst has to make a judgement as to what exchange rate would allow the country to maintain a sustainable balance of payments position and an open trading system without rationing of foreign exchange. (A sustainable balance of payments does not imply any particular outcome on the balance of payments current account. Rather it implies that, whatever the position is, it will be balanced by privately motivated capital inflows and outflows, rather than by government actions, such as borrowing for balance of payments support).

It may be that the government, or an academic institution have developed a general equilibrium model which is able to make estimates of the equilibrium exchange rate. In the absence of this, cruder approaches may be adopted (Dornbusch and Helmers, 1988). One such approach would be to compare the basic agricultural wage rate of the country in question, expressed in dollars at the official exchange rate, with that of countries at a similar stage of development, but known to operate an open trading system without foreign exchange rationing. Thus, if in our country the wage was the equivalent $6 per day, while in the comparator countries it was the equivalent $4 per day, then our exchange rate may overvalued to an extent indicated by this 6:4 ratio.

Capital and labour In circumstances in which capital markets are distorted by government-imposed lending rate ceilings and associated rationing of credit, difficulties can be encountered in determining the opportunity cost of capital. A short-cut method, often used in practice, is to

construct an interest rate from first principles. For example, one estimate of the social price of capital to a particular sector will be the sum of the following:

- the risk-free price of capital (say, the current rate of inflation plus 4%);
- financial sector operational costs (say, 2% for large borrowers up to 15% for small dispersed borrowers);
- a risk premium (say 2% to 10% depending on past performance).

The existence of minimum wage legislation may cause wages paid to exceed the social opportunity cost of labour. This has been a major theme in the social cost/benefit analysis literature. Here the analysts would be looking for indicators of wages paid (and implicit returns to family employment) in unregulated labour markets.

Direct taxes (applied to labour) and indirect taxes (applied to goods and services) have a private cost, but, from the point of view of society, are simply a transfer, to which a conversion factor of zero will apply.

Market failures Market failure, covered in more detail below, is the most difficult terrain of all. Some instances, for example, where pollution is imposed, are in principle measurable, although this may, in practice, prove too expensive. Others are more a matter of the subjective opinion of the analyst. For example, analysts may agree that there is a degree of market failure in agricultural marketing, due to a lack of information, but disagree on the importance of this. Another example is that of the weight to be given to infant industry arguments. Where a country has recently started up its first fertilizer factory, it may be argued that substantial learning costs are being incurred, which will eventually result in internationally competitive levels of efficiency. Here it might be justified to apply a conversion factor of, say, 1.2 to the import parity price of fertilizer in the first year of operation, scaling this down over a six-year period to 1.0.

Divergences

Some marketing examples of a divergence between social and private profitability can be given. Private traders, undertaking what is privately optimal, may operate a marketing system characterized by insufficient stock-holding, inadequate investment in transport and physical infrastructure and insufficient producer prices, relative to socially optimal provision,. The quantity of resources in the industry (in terms of finance and manpower) may not be socially optimal, and entrepreneurs may be excessively cautious. These characteristics might be explained by the existence of a number of divergences, falling into the categories of market failure and distortion. For example:

- The private cost of finance may exceed the social opportunity cost (e.g. traders having to borrow at very high rates on thin informal credit markets). This could be the result of market failure, perhaps because appropriate financial institutions have not developed; the legal framework is inadequate (e.g. borrowers cannot recover debts effectively) or because credit markets are monopolized. Even if there is no market failure, interest rates in credit markets serving smaller- and middle-scale traders will be likely to be relatively higher than in markets for larger-scale traders, due to the higher real transaction costs in lending and, probably, greater risk exposure by the lender.

Additionally, or alternatively, distortions may be present in financial markets. A common example is where the government has imposed interest rate ceilings which means real lending rates are low, perhaps negative. Under such a constraint, rational lenders will concentrate lending on the safest borrowers, because they are unable to charge more risky borrowers an acceptable premium. The safer borrowers are likely to be large, formal sector firms with substantial collateral and/or government guarantees. Lending to agricultural traders, other than the largest and/or government-backed ones, is likely to be avoided.

- The marketing system may exhibit excessive consumption of resources which are tradable internationally (e.g. vehicles, prefabricated steel sections, energy, pesticides etc.) and make sub-

optimal use of non- tradable resources (e.g. labour and land). This would reflect circumstances in which the private cost of tradables was less than their social cost. This is found where the exchange rate of domestic currency for foreign exchange is overvalued, or there are subsidies for particular tradable inputs (e.g. vehicles and fuel).

- The existence of a marketing monopsony allows traders to pay producers a price below the social value of their production. This situation may have its origins in government legislation, or may exist because of highly concentrated ownership of resources required for agricultural marketing (e.g. finance and storage facilities).

Market failures

The consequence of market failure is that, for the commodities or services in question, market prices do not accurately reflect the social costs of their supply. Well-known examples of market failures are:

- The externalities which exist when the legal framework fails to require a polluting industry to compensate (in full or in part) for the costs imposed. External economies or diseconomies mean that the costs to a private decision maker of a particular economic activity may be more or less than those to society. The implication is that, in the absence of government intervention, the good or service in question will not be supplied in the socially optimal quantities and that therefore government intervention will be required to correct the mis-match in supply.

- The infant industry case, which is the argument that pioneer industries or institutions may, from a private point of view, incur some costs which, when viewed from the point of view of society, are not costs but benefits. The benefits created will be in the nature of learning about how to undertake the production in question in a particular country. These benefits, the costs of which will have been incurred by the pioneer industry, can then be transferred at below their real cost to new entrants to the industry by, for example, attracting away trained personnel, sharing a common service infrastructure, or simply avoiding costly errors which the pioneer industry may have made in its early phases.

- The existence of monopolies, which allow sellers a degree of control over prices and the possibility of prices to consumers being higher, and quantities supplied lower, than would be the case under a competitive market.

- The existence of public goods which confer general benefits in society, but which it is not in the interests of any private producer to supply. An example of a public good is the legal system, and the linked activity of police services, for the enforcement of contracts and regulations. The transport and telecommunications infrastructure are other examples of public goods.

In the domain of agricultural marketing, illustrations of these categories of market failure are plentiful. The infant industry argument is often applied to private commercial sectors to justify public management of, and/or subsidies to, marketing services. Concern about monopoly may also justify public management of marketing, and/or regulatory activity by government. Further examples of market failure in marketing are:

- Where private action produces a weak and highly asymmetrical supply of market information, leading to economic inefficiency. Intervention by government to increase the supply of information may raise the efficiency of marketing, bringing benefits to society in excess of the costs incurred by government.

- Spatial planning, which, when done well, can confer major benefits. This is an archetypical activity for government. Left to themselves private organizations are likely to undertake insufficient spatial planning because the perceived benefits to individual firms are below the social value of the activity.

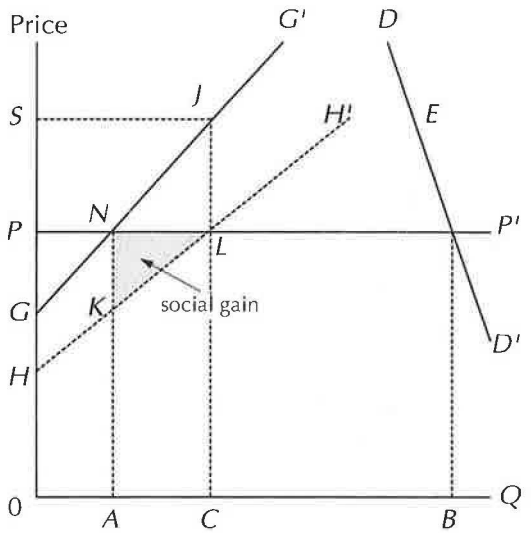
Corden (1974, p.9–14) provides a simple illustration of the analytical power of the theory of divergences, showing how it may be used to (i) examine the optimum application of a policy instrument, and, (ii) to rank alternative policy instruments. The examples analysed are the optimum subsidy and the comparison of subsidies and tariffs. The key point which the analysis makes is that, under certain restrictive assumptions, alternative policies designed to correct a particular instance of market failure can be ranked in order of desirability, with respect to economic efficiency objectives. In this case, it is concluded that a subsidy is to be preferred to a tariff. The grounds for this are that while both instruments successfully correct for market failure, the tariff has the disadvantage of creating a distortion, by raising the social costs of consumption above the private costs.

The example is that of the market for an importable product, i.e., one which is traded internationally and, therefore, in which domestic producers face competition from imports from the world market. Market conditions on the supply and the demand side are competitive. The argument assumes that we start with a situation of *laissez-faire*, in which a single market failure exists, this being on the supply side. Because external economies attach to the supply of a particular product, say, for infant industry reasons, private costs of supply exceed the social costs of supply. In other words, private prices exceed social prices. This is illustrated in Diagram I by showing the curve of the social costs of supply, *HH'*, to the right of the private supply curve, *GG'*. It is assumed that there is not a distortion on the demand side and, therefore, that *DD'* indicates both the private and the social value of the various quantities which may be consumed. The international price, *PP'*, indicates the private and social costs of imports, and does not vary with the level of imports (the small country assumption).

The socially desirable level of consumption is at *B*, where the marginal cost of imports is equal to the marginal value of consumption. The socially desirable consumption level is obtained without intervention. The socially desirable level of domestic production of the commodity is at *C*, where the marginal social costs of production are equal to the marginal costs of imports. However, in the absence of intervention, production is only equal to *A*.

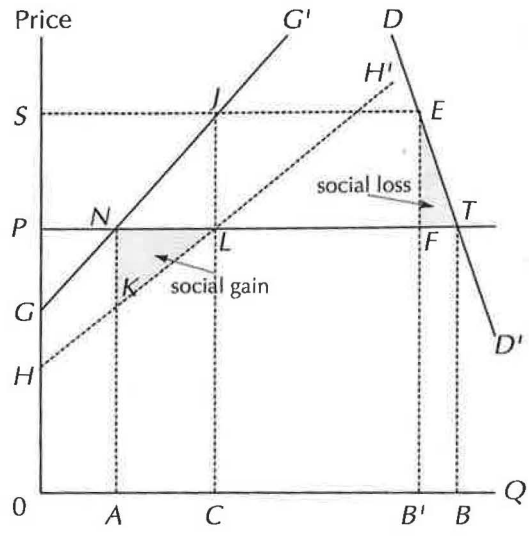
Production will expand from *A* to *C* if a subsidy is applied on output at the rate *PS* per unit. (This is because the price to producers will be raised). This move to the socially desirable level of output has been achieved at a cost to the government of *PSLJ*. This subsidy produces a social optimum only if three assumptions are made: (i) that the financing of the subsidy does not affect the structure of reward as and incentives in the economy; (ii) that there are no collection or disbursement costs for the subsidy; (iii) that it is possible to neglect the redistribution of income which will occur from taxpayers to the owners of the factors of production in this protected industry.

The social gain is quantified in diagram 5:51 as the difference between the opportunity cost of the imports which have been replaced by expanding domestic production up to *C* and the social costs (i.e. costs measured by social prices) which have been incurred to produce the extra domestic production.



Box 5:5 continued

In diagram 5:52 an alternative instrument for expanding output to the socially optimal level is illustrated, this being a tariff on imports at the rate *PS*. Consequently, output expands to the socially desirable level of *C*, but there is now one other change, which is that consumer prices rise by the amount of the tariff, and therefore consumption falls from *B* to *B'*. This means a reduction in consumption levels below what is socially optimal. The loss of welfare is represented by triangle *EFT*, which is a loss of consumer welfare. We now have an example of a divergence which has been created by government intervention, i.e., of a distortion. In fact, this is a particular kind of distortion, one that has been created as a result of government policy which was itself designed to correct a divergence. Corden described these as by-product distortions.



Distortions

In Corden's view, government interventions in the economy can be divided into two basic categories:

- those which reduce or eliminate market failure, thus contributing to economic welfare, and,
- those which actually create a divergence – i.e. are distortive.

Distortions may be created either because the government has misunderstood the nature of market failure (i.e. bad design of policy instruments) or because the government is pursuing a non-economic objective. An example of the latter is the that of achieving food self-sufficiency in a country which, under *laissez-faire*, would be a food importer.

This distinction between economically beneficial government interventions (those which correct for market failure) and damaging government interventions (those which create distortions) provides a conceptual basis for appraising and ranking policy instruments. In Box 5:5, a simple example of this approach is explained. It is argued that, under certain assumptions, a market failure with respect to the production of a particular commodity can be corrected either by use of a producer subsidy, or a tariff. However, the producer subsidy is preferred because, unlike the tariff, it does not cause any further divergences. The tariff, conversely, brings about a divergence on the consumption side, with the private cost of the commodity exceeding the social cost, and hence sub-optimal consumption occurs.

The central point of the analysis in Box 5:5 is not that subsidies are always preferable to tariffs, but that it is possible to rank policy interventions through an approach which assesses their net effect on economic efficiency. This will apply irrespective of the motive for the intervention, which may be to achieve an economic efficiency goal or a non-economic efficiency goal.

Limitations and Uses of Neo-Classical Analyses

Analysis using the neoclassical theory of policy is a mammoth task, impracticable for most situations of policy analysis. In the case of the examples in Boxes 5:1 and 5:5, it would be necessary to have data to model demand and supply schedules, as well as the ability to quantify differences between private and social prices.

In addition, the discussion so far has been concerned with only one market, ignoring connections to other markets. In other words it is a partial equilibrium approach, although conceptually a general equilibrium approach would be more satisfactory. Using a general equilibrium approach is even more demanding of analytical capacity and of data, and is only likely to be worthwhile for a few specific applications.

However, the concepts deployed in partial equilibrium analyses are important and have been used to develop other analytical techniques which capture, in a rough and ready way, the effects of policy interventions on economic efficiency. Three of the most commonly used of these are those based on measures of:

- nominal protection coefficients;
- effective protection coefficients, and
- domestic resource cost ratios (see pp.128–138).

In addition, partial equilibrium analysis can be used to address the problem of policy optimization under constraints which rule out the use of the most preferred instruments, through developing a policy hierarchy.

Policy hierarchies

In cases where the analyst concludes that private and social prices diverge, the policy implications are varied. The obvious and direct solution is to redesign intervention in the economy to more effectively correct market failures and/or to reduce distortions. However, two factors may stand in the way of such an approach.

First, decision makers may not be willing to allow the economist's preferred solution, insisting on the continued use (or non-use) of a certain policy instrument, on political or ideological grounds. In this case, 'second-best' solutions will have to be sought within the existing political constraints.

Second, there is the dimension of time. Past policies will have induced a particular pattern of marketing development, and, in some cases, governments will have directly created marketing institutions. Sharp changes in the private prices facing marketeers (e.g. large increases in interest rates and in prices paid for tradable resources) could precipitate a collapse of marketing services, which would be seriously disruptive to the economy as a whole. Here, rather than immediate and drastic changes to bring private prices in line with social prices, a planned sequence of carefully judged reforms is likely to prove preferable.

Box 5:6 provides a simple example of a policy hierarchy taken from Cordon (1974). It is taken as given that the market failure on the production side, described in Box 5:5, cannot be tackled by a producer subsidy, because the decision maker will not countenance this. Instead, a tariff has to be used. The analysis shows that it is possible to apply this instrument at a level which is a second best optimum, by trading off the marginal benefits (in terms of market failure corrected) against the marginal costs (in terms of a distortion on the consumption side).

Experience with policy reform in agricultural marketing has provided numerous examples of policy analysts being required to seek second-best solutions, i.e. to optimize under constraints, and some of these are provided below.

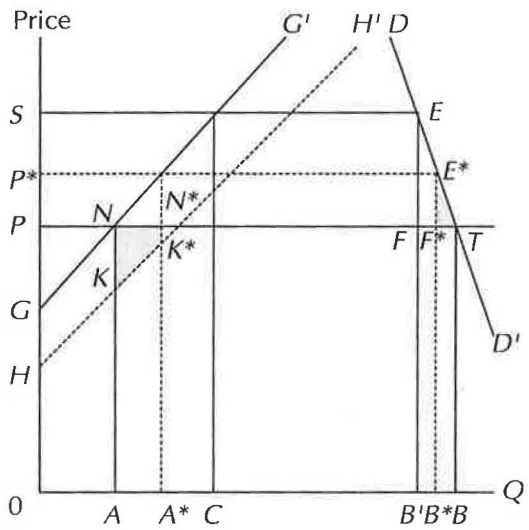
Grain marketing policy constraints in Zimbabwe In Zimbabwe, grain marketing services have been provided by the parastatal GMB, which maintained a marketing network with a relatively dense geographical coverage and paid farmers the same price for delivery to GMB buying points, irrespective of the location of these points (pan-territorial pricing). By 1990, it was realized that, although this service was beneficial to many farmers, and may have corrected for market failures and distortions which existed before Independence, the budgetary costs of the service were in danger of becoming unacceptably high. In reviewing options for reducing the budgetary costs, while retaining socially efficient aspects of the system, policy analysts examined the possibilities of:

Box 5:6 Optimizing Policy Under Constraints

This box presents the most straightforward example which can be devised to illustrate the basics of policy optimization under constraints. The example chosen is not taken from marketing, because to do so would involve a more complicated argument. The general principle is that, if policy makers are required to use a second-best instrument (one which causes by-product distortions) then optimization is a matter of balancing the benefits gained from correcting market failure against the efficiency losses resulting from the by-product distortion.

In Box 5:5 it was shown that a subsidy was preferable to a tariff as a means of correcting an instance of market failure, as it did not itself create a by-product distortion. This finding was subject to certain restrictive conditions, which can be simplified as the assumption that the means of financing and administration of the subsidy did not create a distortion. In the case shown here, it is assumed that the policy maker is not prepared to use a subsidy, but that latitude does exist concerning the level of the tariff.

The diagram shows that the second-best optimum tariff will be at *PP**. This is where the marginal benefit from correcting for market failure, *N*K**, is equal to the marginal cost of the consumption distortion caused by the tariff, which is *E*F**. This can be understood by imagining the gradual application of a tariff, which has the consequence, as the rate of tariff rises, of inducing expansion in the production of the importable from *A* to *A**. At each stage the marginal benefit (in terms of market failure corrected) declines. On the other hand, the marginal cost (in terms of the consumption distortion created) rises. The total welfare gain which is achieved by the optimum tariff is equivalent to the area *NN*K*K* less the area *F*E*T*. This is the maximum welfare gain that is achievable, given the constraint that the tariff is the only instrument acceptable to the policy maker.



- reducing the cost of the marketing network by closing certain low-volume purchasing points;
- abandoning the principle of pan-territorial pricing, by paying a premium in areas in which marketing costs were lower; and
- maintaining the principle of pan-territoriality, but lowering producer prices and accepting the consequence in terms of a smaller national grain surplus.

Here the initial task of the policy analyst was to work with policy makers in an iterative way, setting out basic options and their likely consequences, and receiving guidance from policy makers as to which aspects of the policy framework might be subject to change. It appeared to be the case that the principle of pan-territorial pricing was an immovable constraint. This was on the understandable non-economic efficiency grounds that the gainers from an abandonment of pan-territoriality would have been mainly European commercial farmers, while the losers would have been mainly African peasant farmers. There appeared to be more room for manoeuvre with respect to the density of the marketing network, and the level of the producer price. Thus, the subsequent tasks of the policy analysts were to devise optimal interventions using politically acceptable instruments.

Co-operatives in Tanzania and Zambia In Tanzania and Zambia, governments responded in the mid-1980s to the perceived inefficiencies of parastatal marketing agencies by transferring some of the

assets and functions of these agencies to co-operatives. Additionally, a degree of market liberalization was allowed (private traders being permitted to buy and sell most crops) and government intervention in pricing was reduced (generally from specifying single buying and selling prices to setting floor and ceiling prices).

Governments supported co-operatives in a various ways including channelling external aid funds to the development of co-operative infrastructure and allowing co-operatives relatively generous borrowing facilities in the banking system. In return, co-operatives were supposed to be responsive to governments' wishes, undertaking operations which private traders would have avoided, like crop purchases in high cost areas and the maintenance of high stock levels.

Policy analysts had some difficulty establishing the precise reasons for governments' objective of providing substantial support for co-operative marketing. One possibility was that, on both economic efficiency and non-economic efficiency grounds, governments were sceptical of the case for unmodified private marketing, fearing that this could lead to a deterioration in the service provided to locationally disadvantaged producers, unsatisfactory quality control, an insufficient marketing effort and sub-optimal storage. Co-operative marketing may have been seen as an acceptable compromise, embodying a degree of social control of assets but also an operational flexibility and arms-length relationship with government more characteristic of the private sector.

However, although governments' motives for supporting co-operative marketing remained the subject of some speculation, it was clear was that proposals for policy reforms had to be placed within a framework in which co-operatives were to continue to play a major role. Thus, the terrain for manoeuvre covered such matters as:

- the scope for raising the operational efficiency of co-operatives;
- alternative disbursal mechanisms for, and the size of, subsidies to co-operatives;
- the closely linked question of payments to co-operatives for undertaking uneconomic activities;
- the interface between co-operatives and the private sector, and
- the extent to which the private sector would be allowed to compete with co-operatives.

Other Indicators of the Impact of Policies on Economic Efficiency

In the real world, policy analysts have to study systems of production and marketing, the current shape of which has been determined, in part, by the presence in the economy of elements of market failure and of distortion. The question to which the analyst is seeking answers is that of how the quality of policy affecting a particular production and marketing system may be ameliorated.

The guiding principle in preparing options for policy change will be to bring social and private costs (and therefore social and private benefits) more closely into line. It is therefore assumed that:

- efficient allocation of resources is the primary objective, and
- the production, marketing and consumption systems affected by recommended policy changes will, over time, adjust in such a way as to raise the social profits which they generate. The adjustment may involve expansion or contraction in the volume of the activity, in technology and techniques, and in the proportions in which resources are used.

However, as the discussion earlier in this chapter has shown, policy recommendations will not be simply a matter of advocating more *laissez-faire*. For example, where market failure exists, intervention may be recommended.

The three indicators of economic efficiency to be discussed here (the nominal protection coefficient, the effective protection coefficient and the domestic resource costs ratio) all rely on the same basic principle of comparing private prices and social prices. This raises the key question as to how divergences between private and social prices are measured, a matter which is passed over now, but taken up later.

As is explained later, of the three indicators themselves, the domestic resource cost ratio (DRC) is preferred on theoretical grounds, but is also the most data-hungry. Effective protection coefficients require less data, but are less useful, while nominal protection coefficient are the least useful, but the least demanding in terms of data.

Nominal protection coefficients

The nominal protection coefficient (NPC) of a commodity, or service, is the ratio of the private price of a commodity to its social price. Usually, world prices are taken as equivalent to social prices, and therefore the standard against which to compare domestic prices in terms of comparative advantage and allocative efficiency. This is because world prices represent the opportunity costs of the production and consumption of tradable – i.e. the costs and benefits which would obtain if goods were imported or exported, instead of being domestically produced and consumed.

Calculating NPCs Thus, if the commodity is normally imported into the country, import parity prices are found as the c.i.f. prices of imports delivered to a reference point in the country. Typically, the reference point is a major focus of consumptions. Alternatively, if the commodity is normally exported, then the export parity price, f.o.b., will be found. In practice, conversions to world prices, at the existing, official exchange rate, are often the only adjustments undertaken to convert from private to social prices. In this formulation, the NPC reduces simply to:

$$\frac{\text{the domestic price of the commodity/service}}{\text{the relevant parity price of the commodity/service}}$$

Limitations and uses of NPCs This measure can be used to indicate how competitive domestic prices are relative to imports and exports and whether domestic prices favour producers or consumers. In addition, the size of the divergence between the two variables indicates whether government policy and/or market failure are very influential in marketing and price formation (Timmer, 1987, p.73).

In general, where domestic prices are higher than world prices it can be assumed that government revenues are being generated, and that consumers are being taxed and producers subsidized, and vice versa. Often producer prices are less than 1 in LDCs, implying farmer taxation. For example, an NPC of 0.8 suggests that a tax of 20% is being placed on the commodity. But the implicit assumptions in the equation are that:

- free trade is the most economically efficient policy;
- world markets are economically efficient; and
- domestic policies will not influence world prices.

In theory, other adjustments should be made. For example, for market failures of an infant industry, the social value of local production should be raised. Where this is not done, market failure may be considered in an indirect way, as a possible justification for the existence of a positive rate of protection.

Other problems in using NPCs include:

- choosing a world price reference point in the face of fluctuating prices;
- calculating different parity prices for a range of domestic prices obtaining in different production and consumption locations;

- using official exchange rates, since these may be overvalued, which will overstate internal prices and hence effective taxation may be greater than that indicated by resultant NPCs; and

- understatement of rates of protection, or overstatement of rates of taxation, where inputs are subsidized.

The value of the NPC is that it is not very demanding in terms of data and it is the easiest means of assessing whether government policy tends to tax, or protect, consumers and producers. But it is a poor comparative indicator, as different commodity systems will use different proportions of internationally traded inputs and non-internationally traded domestic factors of production. It is the margin between the costs of inputs and the value of outputs, known as value-added, which provides the return to factors used in production, including profit. A more useful measure of economic efficiency therefore is that which shows how policy interventions cause value-added at private prices to differ from value added at social prices.

Effective protection coefficients

The concept of effective protection was developed in the 1960s in response to the latter problem. EPCs are calculated as follows:

$$\frac{\text{value-added at private prices}}{\text{value-added at social prices}}, \text{ or EPC} = \frac{V_d}{V_w} = \frac{P_d - C_d}{P_w - C_w},$$

where:
V_d is value-added at domestic prices;
V_w is value-added at world prices;
P_d is the domestic price of output;
C_d is the domestic price of material inputs;
P_w is the world price of output, and
C_w is the price of inputs at world prices.

(Note that in the above world prices are taken as representing social prices. In practice, world prices are modified to take into account transport costs. Importables are valued at import parity, and exportables at export parity.)

Limitations of EPCs Effective protection coefficients do not respond to many of the other problems posed by NPCs. For example, Singh *et al.* (1985) are highly critical of their wide usage, because they:

- remain static;

- do not measure the costs of inappropriate pricing policies nor of the effects of non-tariff means of protection, and

- provide no guidance on the effects of changes on other variables of interest to governments.

In addition, as it is conventionally used, the EPC only takes into account the adverse consequences for efficiency of policy interventions (i.e., distortions), and not interventions with a positive impact on economic efficiency (corrections of market failure). However, EPC measurement can be based on a broader view of the effects on efficiency of government intervention and market failure, as the subsequent discussion of the policy analysis matrix will show. As has already been stated, the choice of indicators of the efficiency of policy must be a pragmatic judgment based on data availability, costs of further data collection, and an assessment of the importance of market failure.

Both EPCs and NPCs are often very difficult to calculate in practice due to data constraints. Where data is prohibiting, Timmer (1987, p.73) suggests that an indication of effective rates of protection can be sought simply through comparing the domestic price of a commodity with the prices of key inputs, for example fertilizer for grains. This eliminates the need for exchange rate conversions and for data on measures of value added. It also provides a better insight into producer, or supplier, incentives than NPCs. Timmer also suggests that another rough indication of allocative efficiency

and comparative advantage can be found through comparing the domestic prices of pairs of commodities with the same relative prices in international markets. Potential substitution between commodities in production and consumption allows such price ratio comparisons to suggest whether certain commodities are being produced or consumed too much or too little, relative to the quantities that would be produced and consumed if world prices obtained domestically.

Domestic resource cost ratios

Definition and calculation In recent years, the domestic resource cost ratio (DRC) has come to the fore in policy analysis for developing countries, notably for agricultural policy analysis (see Masters, 1989; Monke and Pearson, 1989). The most simple definition of the DRC is that it measures the ratio of the cost of the domestic factors used by the commodity (production or marketing) system (at social prices) to the value-added of the system (again at social prices). The value-added of the system is its total revenue less the cost of tradable inputs. They are calculated, using social prices, as follows:

$$\frac{\text{costs of domestic factors of production}}{\text{revenue} - \text{costs of tradable inputs}}$$

Implications of results Where costs are exactly equal to value-added (i.e. DRC = 1) the system produces only normal profits. However, in cases where domestic factor costs are less than value-added, (DRC < 1), then super-normal social profits are earned. Systems in which DRC < 1, are said to have comparative advantage and the lower the DRC, the greater the comparative advantage.

The interests of economic efficiency will be served by encouraging the development of commodity/marketing systems with DRCs which are low relative to those of existing systems (and, at least, having a DRC < 1). With respect to existing systems, policy analysts will be concerned to find ways of designing and implementing interventions which have the effect of reducing DRCs. Thus, policy analysts use DRCs for two broad purposes:

(a) To compare social profitability (i.e. the underlying comparative advantage) of commodity/marketing systems with their relative competitiveness at private prices. The divergence between the ranking of systems via DRCs and the ranking given by its private price analogue [the private cost ratio (PCR), calculated using the same equation but private prices] can be attributed to the net effects of market failures, policies which reduce market failures and distorting policies. Useful insights can also be obtained by comparing DRCs with nominal and effective protection coefficients (see below under examples of uses of DRCs).

(b) To inform investment policy. By identifying the comparative advantage of different commodity systems, DRCs can point to systems for which support through public investment should either be increased or run-down.

Data requirements and currencies The data requirements for the calculation of DRCs are substantial, as is shown below. To calculate the numerator of the ratio (i.e., factor costs) it is necessary to have information on factor use at all stages in the system, and on prices which are paid for the factors. To calculate the denominator (i.e., value-added), it is necessary to know the total revenue of the system, and the use of, and prices of, tradable inputs. These then have to be converted to social prices by using conversion factors as described above under Social costs and prices.

DRCs can be calculated in domestic currency or foreign exchange. The trend appears to be firmly towards using local currency for both numerator and denominator. Any distortion in the market for foreign exchange is taken into account by shadow pricing tradable inputs and outputs. However, some analysts have used a DRC formula expressed as the ratio of value-added at domestic prices in local currency (at social prices) to value-added in world prices in foreign currency. Assuming world prices are equivalent to social prices, the latter formula expresses the rate of exchange between the social value-added of the commodity system in domestic currency and the same value-added in foreign currency. Thus, the formula results in a rate of exchange which can be compared with the official rate of exchange.

For example, if the official rate of exchange is 300 francs-CFA per $, and a commodity/marketing system is found to have a DRC of 250 francs-CFA per $, then such a system is socially profitable. What this implies is that a dollar's worth of imports of this particular commodity can be produced for 250 francs-CFA, thus 'saving' 50 francs-CFA, which may be deployed elsewhere. Socially unprofitable systems would be those with DRCs in excess of 300 francs-CFA per $. In this case, resources may be saved by reducing support to the system and importing instead.

The disadvantage of this approach is that, although it provides a ranking of commodity systems in terms of comparative advantage, if the exchange rate is distorted, it is not immediately clear where the cut-off lies between systems which produce a social profit and those that produce a social loss. However, identification of the distinction becomes possible by making an assumption about the equilibrium exchange rate. For example, if the equilibrium exchange rate was believed to be 425 francs-CFA per $, then a system with a DRC cost of 400 francs-CFA per $ would be characterized as socially profitable.

The strengths of the DRC An important feature of the DRC is that it is a ratio. It might be argued that it would be more straightforward simply to find the private profitability of the system, and then to recalculate this, making adjustments for social prices to indicate social profitability. However, the concept of social profits falls down when we compare dissimilar commodity systems. For example, 'system A' may produce social profits of $100,000, while 'system B' produces social profits of $120,000. In the absence of further information we might be tempted to prefer 'system B'. But if we are then told that 'system A' produces its profit from a very low cost base, while 'system B' has much higher costs, we might think again. The point is that to make a useful comparison of social profitability we need some index of the scale of the activity which has been producing these profits. DRCs provides this dimension by asking the question, 'what is the cost base in relation to value-added?'

Examples of the use of DRCs It is possible to undertake policy simulations in which various distortions or market failures are wholly or partially removed, and then to observe the extent to which the ranking of commodity/marketing systems derived from private cost ratios may change to reflect more closely the ranking given by DRCs. The results of these simulations may be useful in the design of a sequence of policy reforms.

Another application of such findings is to help decide which systems ought to receive additional policy support, in the absence of changes to existing policies. This is the domain of the policy hierarchy and the preferred route to raising efficiency would be to remove policies which support commodity systems with high DRCs. If, for political reasons, this is not possible, then it is better to find countervailing policies to support systems with low DRCs than to do nothing. The result may lead to the creation of further by-product distortions, but the consequence will be that more resources will flow into systems with high comparative advantage than would otherwise be the case. An example of this would be where a government is not prepared to remove a parastatal from a central role in the marketing of staple food crops. Despite this, there will still be room for manoeuvre concerning the terms on which the parastatal obtains access to financial resources, its policy on producer and consumer prices and on sub-contracting to private traders.

DRCs may also be used for the analysis of ways in which investment may be used to reduce the DRCs of existing commodity systems. Most investment analysts are likely to regard this as a somewhat esoteric application, and certainly not a priority. However, some policy analysts (Monke and Pearson, 1989) have ambitions to do more work on this topic and may be able to develop guidelines which project analysts can use. An example of this would be in the assessment (or design) of the public investment programme in a highly distorted economy, where the government is beginning a process of policy reform, aimed at improving economic efficiency through the progressive reduction and elimination of distortions. Here the DRCs help identify systems for which there is a reasonable likelihood of a comparative advantage existing at the completion of the policy reform process. The systems with low DRCs would be those to which public investment should be directed.

Another example of the use of DRCs in investment planning is where the components of particular commodity systems are studied in detail to determine how investment resources might be most effectively used to reduce DRCs. For example, what might be the effects of public investment in transport infrastructure, processing facilities, the development of new plant varieties and/or in improved market information? This approach is unlikely to be used by consultants undertaking *ad hoc* appraisal of particular investment projects, but it is possible that it may be used in national planning, for the development of policy guidelines on public investment. These guidelines would indicate the categories of investment which would be expected to prove effective in reducing DRCs.

In highly distorted economies, there is a potential danger in a policy of channelling investment to systems with low DRCs. If the anticipated policy reforms are not implemented, there will remain only investment in systems which, while socially profitable, are not attractive at market prices. Production levels in these systems will be lower than anticipated, depressing the returns on the investment. In these circumstances a second-best solution will be to persuade the government to bring in policies which target support the systems which have underlying comparative advantage. But the government may prove resistant to such persuasion, while support measures will create by-product distortions.

Comparing DRCs and protection coefficients The example in Box 5:7 shows estimates for the nominal protection coefficient (NPC), effective protection coefficient (EPC) and the domestic resource cost ratio, in the case of the production and marketing systems for four staple food crops. For each commodity, the analyst has distinguished three or four distinct production and marketing systems. These systems can be considered on a spectrum of intensity. 'System I' is 'low technology', making relatively high use of domestic resources such as land and labour, while the 'high technology' end of the spectrum is system III and irrigated production.

The interest in these estimates lies in their interpretation and the implications for policy. For example, in the case of maize, all systems have comparative advantage (DRC<1), although 'system II' has the greatest advantage and irrigated the least. The estimates for the NPC and the EPC imply that policy towards maize systems is presently discriminatory, with the exception of irrigated production. Thus, in general, the analyst can recommend policy reforms to make government policy neutral

Box 5:7 An Example of the Use of Domestic Resource Cost Ratios and Protection Coefficients

INDICATORS OF POLICY AND COMPARATIVE ADVANTAGE OF FOOD CROP PRODUCTION AND MARKETING SYSTEMS BY TECHNOLOGY LEVELS

	Technology level	*NPC*	*EPC*	*DRC*
MAIZE	I	0.89	0.89	0.55
	II	0.89	0.89	0.49
	III	0.89	0.91	0.53
	IRRIGATED	0.96	1.06	0.65
RICE	I	1.22	1.35	0.89
	II	1.22	1.35	0.92
	III	1.22	1.40	1.19
	IRRIGATED	1.22	1.70	1.50
CASSAVA	I	1.00	0.90	0.61
	II	1.00	0.90	0.63
	III	1.00	1.01	0.75
SORGHUM	I	1.05	1.10	0.80
	II	1.05	1.17	0.54
	III	1.05	1.25	0.65

towards maize systems (i.e. a position in which EPC = 1), knowing that these policy changes will improve incentives for systems which have comparative advantage. As 'maize systems I, II and III' are expanded, resources will flow into systems which have comparative advantage, and the overall efficiency of the economy will be enhanced.

In Box 5:7, rice presents a more complex picture. Only two out of four rice systems have comparative advantage, but all systems are protected by policy. If protection were to be reduced by government reforms which made policy towards rice more neutral, then, as a result of declining incentives, there would be a reduction in rice output, particularly of the 'higher technology' systems, which do not have comparative advantage.

The difference between the estimates of the nominal and the effective protection coefficients are because the former only captures the effects of intervention in output markets. The latter takes into account all policy interventions which affect value-added, (examples of which would be input subsidies/taxes). This point is amplified in the discussion of the policy analysis matrix in the next section.

Finally, it is important to bear in mind that the process of policy reform may induce managerial or technological innovation. For instance, if effective protection is gradually withdrawn from a system which presently has comparative disadvantage (DRC>1), entrepreneurs within the system may respond by increasing the efficiency with which they use resources and/or by introducing new technology.

The Policy Analysis Matrix

The policy analysis matrix (PAM) is a logical framework for policy analysis developed by Scott Pearson of the Food Research Institute, Stanford University, and explained in detail in Monke and Pearson (1989). The purpose of the PAM is to provide a means of integrating micro, sectoral and macro work.

'The study of agricultural economics spans three levels – micro-economic behaviour of producers, marketing and trade and macro-economic linkages. Practitioners of agricultural economics typically give different emphasis to these three topics; micro-production issues receive the greatest attention, marketing and trade get less, and macro-economic links receive little or no coverage....excessive specialization precludes successful policy analysis: applied agricultural economists need to understand all of the components of and links among farming systems, domestic and international markets, and macro-economic policy' (Monke and Pearson, 1989, p.16)

Construction of the matrix The PAM is constructed through double entry book-keeping, with the purpose of ensuring complete and consistent coverage of all policy influences on the returns to, and costs of, agricultural production and/or marketing. Indicators of the economic efficiency of policy, of which the DRC is one, can be derived from the parameters in the matrix. The main empirical task is to construct accounting matrices of revenues, costs and profits. A PAM is constructed for each system to be analysed, using data collected through the methods described in Chapter 3. Thus, the impact of commodity and macro-economic policies is gauged by comparing results in the 'presence' and the 'absence' of policy.

Entries into the PAM The matrix consists of revenues, costs and profits, at private and social prices. Revenues and costs are based on marginal prices, because these establish the opportunity costs which act as price signals.

The top row of the matrix is a budget showing costs of production and marketing at market prices, the only unusual aspect being the division of cost elements into tradable and non-tradable, or domestic resource, categories. Tradables are anything which could be internationally traded, even if they are not currently traded. Domestic resources are the immovable domestic factors of production, namely labour, land, and (although this could be disputed in certain cases) capital. The market price of labour and capital is usually directly observable, but, in farming and marketing enterprises where there is some unwaged family labour, cost levels may have to be inferred. (Examples of tradable inputs in marketing include fuel, transport and processing machinery, energy and pesticides.)

The Basic Policy Analysis Matrix

	Revenues	Costs of tradable inputs	Costs of domestic resources	Profits
Private prices (market prices)	R_p	TI_p	DF_p	Π_p
Social prices (opportunity costs)	R_s	TI_s	DF_s	Π_s
Divergences and efficient policy (transfers)	R_t	TI_t	DF_t	Π_t

The second row in the matrix shows the same cost elements expressed at social prices, i.e., social opportunity costs. For tradable products, world prices are normally taken as social prices, applying import or export parity measures as appropriate. The social price of domestic resources is taken as their opportunity cost, in other words, the return at the margin in the best available alternative. For unskilled labour, for example, the preferred indicator, on theoretical grounds, is often the marginal product of labour in small-scale agriculture. In practice, estimates of marginal revenues and costs are not widely available, and thus average prices are often are used as an alternative. In some cases, prices can be observed directly in empirical work, while in other cases inference will be required.

An important general point about the PAM is that the opportunity costs of domestic resources will be a function of current policy. Thus, strictly, these opportunity costs are only relevant under a particular set of policy constraints, i.e., they are constrained second-best equilibrium values. If policy were to change, so would opportunity costs. For this reason, the PAM is not wholly satisfactory in terms of economic theory, being based on a partial equilibrium rather than general equilibrium approach. It is a pragmatic, indicative approach to policy, which recognizes that practitioners of policy analysis will only rarely have the data or the time to construct a fully specified general equilibrium model capable of generating useful estimates of opportunity costs under different policy scenarios.

The third row of the PAM is simply the first row minus the second. It shows the net impact of:

- market failure;
- distorting policies; and
- efficient policies (those which correct market failure).

The signs of the revenue and cost terms in the third row indicate whether the net effects of policy and market imperfections for these categories amount to an implicit subsidy or tax. If, for example, R_t were positive, the net effect of policy and/or market failure is that the market price paid to the system is in excess of the social opportunity cost, i.e. output prices are subsidized. On the other hand, if TI_t were negative, then the market price of tradable inputs would be less than their social opportunity cost (a typical consequence of an overvalued exchange rate). The right-hand entry in the third row, Π_t, summarizes the net effect of policies and/or market failures on the profitability of the system, known as 'net transfers'. If $\Pi_p > \Pi_s$, then the net effect of policy is to subsidize the system. In this case, policy reforms to bring about greater economic efficiency will reduce the gap between Π_p and Π_s, and this will induce adjustments in the system in question, which may involve changes in the proportions in which resources are used, and, at least in the short term, some contraction in the scale of operation.

As an aid to understanding the third row in the basic PAM, it can be disaggregated to three additional rows in an extended PAM, which shows separately the effects of market failure, distorting policy and economically efficient policy.

The extended policy analysis matrix

Indicators in the PAM The basic PAM contains variables which provide the basis for twelve indicators of economic efficiency, six of which are non-ratio indicators (1 – 6 below) and six are ratio-indicators (7 – 12 below). As was noted above, ratio measures are more useful for comparison of systems which are dissimilar in the relative proportions in which they use inputs.

1. Private profits: $\Pi_p = R_p - TI_p - DF_p$
   This is the measure used to compare the effects of changes in price and policy on the private profitability of the same system. However, for comparison of different systems, the Private Cost Ratio is superior.

2. Social profits: $\Pi_s = R_s - TI_s - DF_s$
   This is a measure of economic efficiency or comparative advantage. If social profits are negative, the system can only remain in production with transfers from the government. But economic efficiency objectives would not be served such transfers, as this implies producing at social costs in excess of the costs of importing. As is the case with private profits, a more sophisticated measure is required to handle changes in the relative efficiency of different commodity systems, namely the DRC ratio, which can also be used to calculate the cost of policies aimed at non-economic goals in terms of economic efficiency losses.

	Revenues	Costs of tradable inputs	Costs of domestic resources	Profits
Private prices (market prices)	R_p	TI_p	DF_p	Π_p
Social prices (opportunity costs)	R_s	TI_s	DF_s	Π_s
Divergences and efficient policy (transfers)	R_t	TI_t	DF_t	Π_t
Effects of market failure	R_{mf}	TI_{mf}	DF_{mf}	Π_{mf}
Effects of distorting policy	R_{dp}	TI_{dp}	DF_{dp}	Π_{dp}
Effects of efficient policy	R_{ep}	TI_{ep}	DF_{ep}	Π_{ep}

3. Output Transfers: $R_t = R_p - R_s$
   Transfers resulting from distorting policy and/or market failure in output markets.

4. Input Transfers: $TI_t = TI_p - TI_s$
   Transfers resulting from distorting policy and/or market failure in input markets.

5. Factor transfers: $DF_t = DF_p - DF_s$
   Transfers resulting from distorting policy and/or market failure in factor markets.

6. Net transfers: $\Pi_t = \Pi_p - \Pi_s = R_t - TI_t - DF_t$
   The net effects of output, input and factor transfers.

7. Private Cost Ratio: PCR = $DF_p/(R_p - TI_p)$
   The PCR is a ratio of factor prices to value added at private prices. The comparison of factor prices/costs with value added, uses the latter, to show how variations in the former, affect the private entrepreneurs' profits from operating the system. If the PCR = 1 then the entrepreneur

makes only 'normal profits'. The behavioral point is that business will maximize profits by trying to hold down DFp and Tip. This may be achieved by:

- seeking more efficient ways of managing the system;
- political lobbying activity to obtain policy interventions (transfers) which lower DF_p and TI_p, while raising R_p; and/or
- seeking monopoly control in factor and/or input markets.

8. Domestic resource cost ratio: DRC = $DF_s/(R_s - TI_s)$.
This has been discussed extensively above.

9. Nominal protection coefficient:

   (a) on tradable outputs is R_p/R_s;

   (b) for tradable inputs is TI_p/TI_s.

10. Effective protection coefficient: EPC = $(R_p - TI_p)/(R_s - TI_s)$;
This approach to calculating the ERP is more satisfactory than the conventional one described earlier, because it recognizes that interventions to correct market failure can promote economic efficiency, and that what needs assessment is the net effect of market failures, interventions which reduce market failures and interventions which create distortions.

11. The profitability coefficient: PC = Π_p/Π_s

12. The subsidy ratio to producers: SRP = $(\Pi_p - \Pi_s)/R_s = \Pi_t/R_s$

Cross-section and time series uses of the PAM The simplest application of the PAM is to calculate indicators for a single commodity system for a single year. This will give useful insights into the comparative advantage of the system, into the effects of government policy on incentives to operate the system and the scope for reform in government policy towards the system. A more ambitious application of the PAM is to carry out a cross-section comparison (i.e., for the same time period) of a number of commodity systems, along the lines of the example in Box 5:7.

A further possibility is to calculate a time series of PAM indicators for a range of commodity systems, in order to analyse the evolution of the comparative advantage of systems, and of government policy towards systems. This approach is becoming more common as governments set up systems to analyse agricultural policy. It is feasible for agricultural policy units to maintain a series of annually updated PAMs for the major commodity systems in the sector. Normally the prices would be revised annually, and the technical parameters re-estimated once every two to three years.

Operationalizing the PAM – an example The starting point is the collection and analysis of data at private prices on revenues and costs of the system under study. Private costs are subdivided into the two broad categories – traded goods and domestic factors. Domestic factor costs are then subdivided into capital services and labour, because different principles are applied in determining the conversion factors used to modify market prices to express social opportunity costs. The opportunity costs of capital are obtained by assessing its value in alternative investments, rather than in consumption. The opportunity costs of labour are taken as the marginal productivity of labour elsewhere in the economy. (See the discussion above of social costs and prices.)

Table 1 is an example of a spreadsheet-based PAM for a system which markets maize from the 'farm-gate' to the capital city wholesale market. The great advantage of using spreadsheets is that variables can be changed with facility. This allows 'what if' types of analysis in which values of any of the variables can be altered and the differences between results examined. For example, the effects of a fall in the world price, or farm' gate' price, of maize, on private and social profitability, and hence domestic resource costs and EPCs can be estimated.

Table 1 PAM Spreadsheet, The Base Example

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Policy Analysis Matrix of a Uni-Directional Marketing System (Provincial Farmgate to												
2	Capital City Wholesale Market) for maize, in the Republic of Lowinca												
3													
4	(For the 1990 harvest year; currency unit is the Lowincan dollar)												
5													
6													
7			Units	Quantities			Market	Conversion	Social		Market	Social	Transfers
8				A	B		Prices	Factors	Prices		Values	Values	
9							$		$		$	$	$
10	Revenue												
11		wholesale maize at capital city	mt	1	1		342				342.00	375.00	−33.00
12		import parity price (in capital)	mt	1	1		300	1.25	375.0000				
13													
14	Non-Tradable Inputs												
15		assemblers' labour	hrs/mt	20	1		0.2	1.00	0.2000		4.00	4.00	0.00
16		wholesalers' labour	hrs/mt	30	1		0.25	1.00	0.2500		7.50	7.50	0.00
17		assemblers' finance	$/mt/week	179	2		0.016	0.28	0.0045		5.73	1.60	4.12
18		wholesalers' finance	$/mt/week	201	10		0.011	0.37	0.0041		22.11	8.18	13.93
19		licenses, admin taxes & police	$	6	1		1	0.00	0.0000		6.00	0.00	6.00
20													
21	Tradable Inputs												
22		assemblers' farmgate maize purchases	mt	1	1		95	1.00	95.0000		95.00	95.00	0.00
23		assemblers' gunny bags	bags/mt	12	1		0.48	1.25	0.6000		5.76	7.20	−1.44
24		assemblers' transport costs	mt/km	55	1		0.9	1.25	1.1250		49.50	61.88	−12.38
25		wholesalers' transport costs	mt/km	130	1		0.49	1.25	0.6125		63.70	79.63	−15.93
26		wholesalers' chemicals	kgs/mt	2	1		4	1.25	5.0000		8.00	10.00	−2.00
27													
28													
29													
30	Indicators												
31													
32		Private profits ($/mt)	74.70										
33													
34		Social profits ($/mt)	100.02										
35													
36		Private Cost Ratio	0.38										
37													
38		Domestic Resource Cost Ratio	0.18										
39													
40		Nominal Protection Coefficient											
41		(on tradable outputs):	0.91										
42		(on tradable inputs):	0.87										
43													
44		Effective Protection Coefficient	0.99										

Table 2 The Formulae used in the Spreadsheet (Table 1)

	A	B	C	I	K	L	M
1	Policy Analysis Matrix						
2	for maize in Lowinca						
3	The formulae						
7				Social	Market	Social	Transfer
8				Prices	Values	Values	
9				$	$	$	$
10							
11					=D11*E11*G11	=D12*E12*I12	=K11–L11
12				=G12*H12			
13							
14							
15				=G15*H15	=D15*E15*G15	=D15*E15*I15	=K15–L15
16				=G16*H16	=D16*E16*G16	=D16*E16*I16	=K16–L16
17				=G17*H17	=D17*E17*G17	=D17*E17*I17	=K17–L17
18				=G18*H18	=D18*E18*G18	=D18*E18*I18	=K18–L18
19				=G19*H19	=D19*E19*G19	=D19*E19*I19	=K19–L19
20							
21							
22				=G22*H22	=D22*E22*G22	=D22*E22*I22	=K22–L22
23				=G23*H23	=D23*E23*G23	=D23*E23*I23	=K23–L23
24				=G24*H24	=D24*E24*G24	=D24*E24*I24	=K24–L24
25				=G25*H25	=D25*E25*G25	=D25*E25*I25	=L25–L25
26				=G26*H26	=D26*E26*G26	=D26*E26*I26	=K26–L26
27							
31							
32		Private profits ($/mt)	=K11–SUM(K15:K26)				
33							
34		Social profits ($/mt)	=L11–SUM(L15:L26)				
35							
36		Private Cost Ratio	=SUM(K15:K19)/ SUM(K11–K22–K23–K24–K25–K26)				
37							
38		Domestic Resource Cost Ratio	=SUM(L15:L19)/ SUM(L11–L22–L23–L24–L25–L26)				
39							
40		Nominal Protection Coefficient					
41		(on tradable outputs):	K11/L11				
42		(on tradable inputs):	=SUM(K22:K26)/SUM(L22:L26)				
43							
44		Effective Protection Coefficient	=SUM(K11–K22–K23–K24–K25–K26)/ SUM(L11–L22–L23–L24–L25–L26)				

Table 3 A Parastatal System

Policy Analysis Matrix of a Uni-Directional Parastatal Grain Marketing System (Provincial Depot to Capital City Wholesale Market) for maize, in the Republic of Lowinca

(For the 1990 harvest year; currency unit is the Lowincan dollar)

	Units	Quantities A	Quantities B	Market prices $	Conversion Factors	Social Prices $	Market Values $	Social Values $	Transfers $
Revenue									
wholesale maize at capital city	mt	1	1	342			342.00	375.00	–33.00
import parity price (in capital)	mt	1	1	300	1.25	375.0000			
Non-tradable inputs									
hourly labour	h/mt	28	1	0.2	1.00	0.2000	5.60	5.60	0.00
salaries	h/mt	11	1	0.6	1.00	0.6000	6.60	6.60	0.00
building operation costs	$/mt	4	1	1	1.00	1.0000	4.00	4.00	0.00
building depreciation	$/mt	2	1	1	1.00	1.0000	2.00	2.00	0.00
borrowing	$/mt/week	190	10	0.002	2.50	0.0050	3.80	9.50	–5.70
Tradable inputs									
rural depot maize purchases	mt	1	1	130	1.00	130.0000	130.00	130.00	0.00
gunny bags	bags/mt	12	1	0.45	1.25	0.5625	5.40	6.75	–1.35
transport outlays	mt/km	185	1	0.9	1.25	1.250	166.50	208.13	–41.63
machinery depreciation	$/mt	1.9	1	1	1.25	1.2500	1.90	2.38	–0.48
chemicals	kg/mt	3	1	4	1.25	5.0000	12.00	15.00	–3.00

Indicators

Private profits ($/mt)	4.20
Social profits ($/mt)	–14.95
Private Cost Ratio	0.84
Domestic Resource Cost Ratio	2.17
Nominal Protection Coefficient	
(on tradable outputs):	0.91
(on tradable inputs):	0.87
Effective Protection Coefficient	2.05

In this example, the marketing chain comprises sales by farmers to assemblers, who bulk and transport the product to sell on to private wholesalers. The wholesalers transport the produce to the capital city wholesale market. The example is simplified, in the sense that a real case would have more cost elements. A number of assumptions are also embodied to keep the example simple, including

- that the marketing system is uni-directional;
- that imports are banned (but that the potential price of imports is known), and
- that the only storage costs are finance and chemicals and that there are no storage losses.

The conversion factors (in column H) show an assumed foreign exchange premium of 1.25. Assemblers are found to be borrowing at a private rate of 1.6% per week, which is equivalent to a annualized rate of 228%. Following the method for determining the opportunity cost of capital outlined above, it is estimated that the conversion factor is 0.28, (so the social price of finance to

assemblers is 64%). In other words, there is massive market failure in the financial markets to which assemblers have access. The extent of market failure is somewhat less in the case of wholesalers, who are able to obtain funds at better rates, equivalent to an annual rate of 178%. Therefore a higher conversion factor is applied. The costs of payments for licenses, police road-blocks etc., are treated as transfers, having a conversion factor of zero. Farm-gate purchases of maize are given a conversion factor of 1, on the grounds that, for the area of purchase, transport costs make the import parity price irrelevant within the range of prices observed in villages.

Table 2 relates directly to Table 1, and shows the formulae that have been used in constructing the spreadsheet for:

- the intermediate calculations of social prices, market values, social values and transfers, and
- the final indicators – social prices, social profits, the private cost ratio, the domestic resource cost ratio, the nominal protection coefficient and the effective protection coefficient.

The estimates of the values of indicators in Table 1 show a system which is profitable at market prices, and substantially more profitable at social prices. The DRC value of 0.18 indicates that the system has a strong comparative advantage. With an effective protection coefficient of 0.99, the net effect of government policy on the system is nearly neutral. The reason for this is that the only form of protection which exists in this example, is exchange rate overvaluation, which applies equally to output and to traded inputs.

Table 3 shows a contrasting case, this time for a parastatal grain marketing system operating in the same area of business as the private sector example in Table 1. The public agency pays farmers a higher price, mainly because farmers have to bear the costs of delivery to the local depot. As the average transport costs incurred by farmers are not known, the system represented here begins at the 'depot-gate'. Thus, comparison of the two systems, does not involve an exact matching of contrasting systems providing identical services. In real world applications, exact comparisons will be rare. Table 3 shows a system which is profitable in private terms, which in this case means that the parastatal will realize a financial profit on operating this system. However, social profitability is negative, and the DRC of 2.17 shows that the interests of economic efficiency would be favoured if this system were to be abandoned or, at least, substantially reformed.

Chapter 6
Agricultural Market Liberalization in Africa

THE BACKGROUND TO ECONOMIC LIBERALIZATION

At the end of the 1970s, many Sub-Saharan African (SSA) countries entered into a prolonged economic recession. Specifically macro-economic aspects of this crisis were a growing disparity between national income and expenditure. International trade and payments were characterized by increasing deficits, which became progressively more difficult to finance. In the internal economy, the imbalance emerged as increasing fiscal deficits. The financing of fiscal deficits was in many cases inflationary, to which governments often responded by extending price controls.

Initially, governments tended to deal with their balance of payments deficits by increased borrowing, taxing imports and rationing of foreign exchange. By the early 1980s, many countries were running out of options. Creditworthiness had deteriorated to an extent which made further international borrowing difficult, and restrictions on foreign exchange were already undermining economic performance. It was necessary to approach the international finance and development agencies for balance of payments support. This support was made available by the IMF, the World Bank and certain bilateral agencies, conditional on governments adopting economic recovery programs, designed to restore macro-economic stability and to address structural imbalances.

In countries which have embarked on structural adjustment programmes the breadth of policy reforms, the pace of their implementation and the lack of data has been such that the possibilities for detailed analysis of policy options has been very limited. Furthermore, econometrics is least useful in predicting producer and consumer responses where major discontinuities in the economic environment are anticipated. Under these circumstances, a more useful starting point for policy analysts is to examine earlier experience of policy reform, which will provide insights into what are likely to be the salient issues in their current task. Therefore, this chapter provides a summary of the issues which have emerged for agricultural marketing policy from the 1980's experience of economic policy reform in Sub-Saharan Africa. It draws heavily on Kydd and Scarborough (1989) and Kydd and Spooner (1989).

Structural Adjustment and Macro-economic Stabilization

Macro-economic stabilization

Stabilization measures aim to:

- restore equilibrium in the balance of payments,
- reduce the fiscal deficit to a manageable size, and
- bring down inflation.

Typically, this is done through policies which act mainly on the demand-side, reducing expenditure and also switching expenditure towards domestically produced goods. Stabilization is achieved through three instruments:

- exchange rate policy,
- fiscal policy, and
- monetary policy.

These measures also act as catalysts on the supply-side, shifting the structure of production. Examples are the stimulus to the supply of traded goods provided by a real devaluation or the

increased investor confidence which will follow success in reducing the rate of inflation to sustainable levels. Nevertheless, stabilization programs are conventionally thought of as policies to reduce short-term expenditure.

The defining characteristics of stabilization measures are thus, that they:

- act on demand,
- aim to restore macro-economic balance quickly, and
- generally do not involve much concessional finance.

In summary, stabilization measures reduce a country's level of expenditure to its existing means. While they are not designed explicitly to increase the rate of growth, they do, however, create the economic stability which is the precondition for longer term growth.

Structural adjustment

The term structural adjustment has come into wide use in development policy since the World Bank used it to describe the policy-based lending which has been an increasingly important aspect of its activities since the beginning of the 1980s. Structural adjustment measures are more explicitly growth-orientated, aiming to increase output, in order to allow macro-economic balance to be achieved at higher levels of living. Structural adjustment programs are targeted at a broader set of objectives than simply the restoration of macro-economic balance. For example they may include the maintenance of higher real levels of public spending than could otherwise be sustained, in order to reduce non-price constraints on the expansion of output; the continuation or introduction of various subsidies to assist groups in society suffering acutely from the effects of poor economic performance and subsequent stabilization measures. It is argued that reliance on a single instrument (demand management) is incompatible with broader development objectives, since this may achieve macro-economic balance at unacceptably low levels of income.

Structural adjustment programmes attempt to achieve these objectives of stimulating growth and avoiding an unacceptable squeeze in expenditure in two ways. Firstly, by attracting additional concessional balance of payments support and, secondly, by policy reforms designed to allocate and manage resources more profitably. Policies which have been conducive to structural problems require to be changed, by reforms which improve resource allocation and economic efficiency and which, thereby, stimulate growth on the supply-side. An additional objective is to make the domestic economy more flexible and thus better able to cope with changes in the international economy.

Structural adjustment programmes pose extremely challenging tasks for policy analysts including:

- the identification of an agenda of reforms in policies and institutions;
- the design of a sequence of measures which is technically consistent and politically sustainable; and
- the negotiation of these between governments and the lending agencies.

Furthermore, the process can have unanticipated consequences, and the strategy needs to be regularly reviewed and modified. Initially, the World Bank believed that structural adjustment would amount to a temporary deviation from its main business of lending for projects: phases of about three to five years were mentioned. However, adjustment lending for SSA was intensifying up to 1988 (World Bank, 1988) and financial flows in support of adjustment were competing, at least implicitly, with flows to support public sector spending. In its Long Term Perspective Study (LTPS), released at the end of 1989, the World Bank concludes that, in fact, structural adjustment is 'not a one-shot effort ... but reflects the need for macro-economic and sector policies to be continuously appraised and modified' (World Bank, 1989b, p.181).

In the early years of adjustment, a division of labour existed between the IMF, which dealt with demand management measures, and the World Bank which worked on the supply-side agenda. This distinction has become increasingly blurred since the introduction, in 1988 of the IMF's Structural Adjustment Facility and Enhanced Structural Adjustment Facility (SAF and ESAF). These are longer term concessional lending instruments closer in character to the policy-based lending facilities which have been offered by the World Bank. For countries for which SAFs and ESAFs are planned, a Policy Framework Paper, covering the short and medium-term, has to be developed, and then agreed jointly by the government, World Bank and the IMF.

Of the 51 countries which had received World Bank adjustment finance by the end of 1987, 23 were in SSA (World Bank, 1988). These are listed below according to whether the World Bank, at the beginning of 1989, classified their internal policy reforms as strong or weak (World Bank and UNDP, 1989). As of 1985, only twelve countries, worldwide, had received three or more adjustment loans, and of these, five were in SSA (asterisked below)

STRONG REFORMERS	WEAK REFORMERS
Burundi	Burkina Faso
Central African Republic	Sierra Leone
Ivory Coast*	Somalia
Ghana*	Sudan
Guinea	Uganda
Gambia	Zambia*
Guinea-Bissau	Zimbabwe
Kenya*	
Madagascar	
Malawi*	
Mauritius	
Mauritania	
Niger	
Nigeria	
Senegal	
Tanzania	

An Overview of the Policy Reform Strategy

One of the main objectives of structural adjustment has been to reduce distortions through reductions in government intervention, a process referred to as market liberalization. A subsidiary goal has been to improve the management of those activities which remain with the state. Figure I illustrates, firstly, the relationship of structural adjustment to stabilization. Secondly, it shows how structural adjustment can be conceived of as having three major components as follows:

- public sector management and resource allocation,
- market liberalization, and
- the reform of supporting institutions (those involved in economic planning, banking etc).

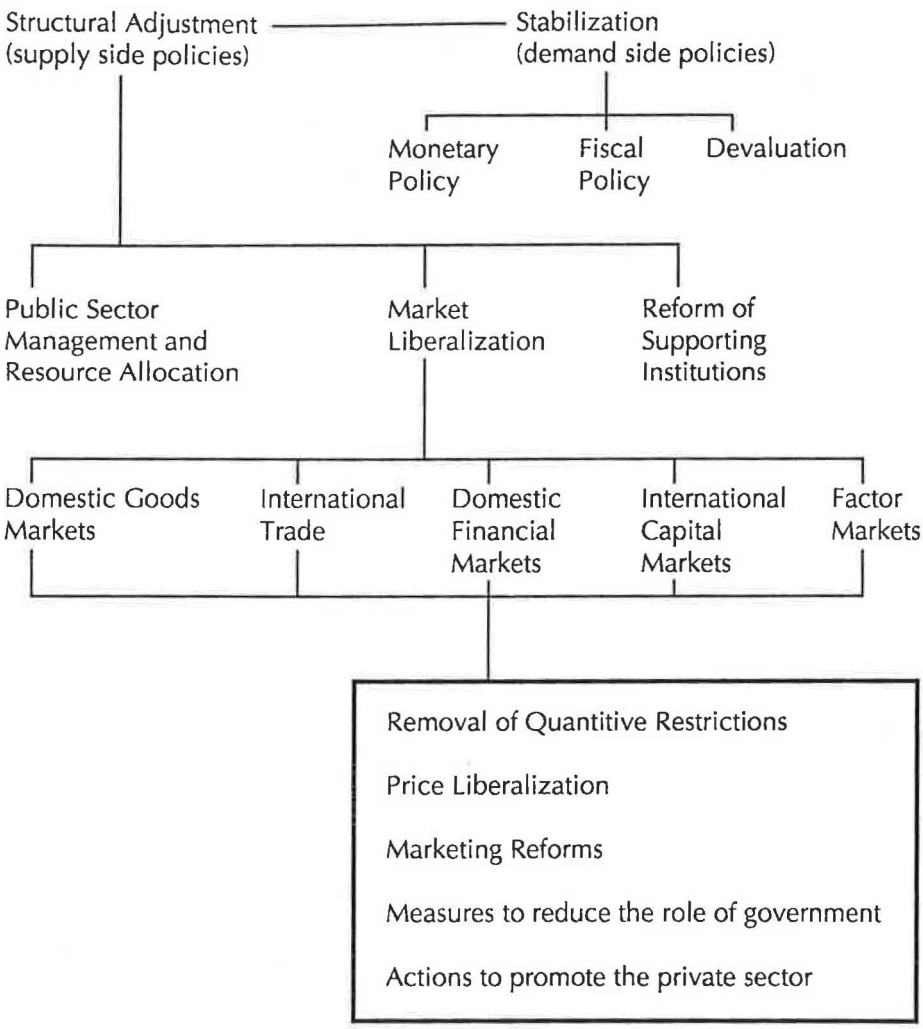
Market liberalization will apply to the five markets shown below. Liberalization of any of these markets will require a series of actions as set out in the box. To take the action of price reform as an example:

- in domestic goods markets it implies either new price setting methods, or the complete abolition of price interventions;
- in international trade it involves correction of exchange rate over-valuation;

- in domestic financial markets it implies allowing markets to determine interest rates;
- in factor markets it could refer to changes in government regulation of wages and land rents.

Measures which may be adopted to liberalize any one of the markets shown in Figure 3 are categorized below, with examples of specific policy areas in which changes may be brought about.

Figure 3 Schematic Representation of Economic Recovery Policies in Africa



Price liberalization, for example:

- agricultural producer prices increased where these were previously controlled by government; methods for price policy formulation improved; price relativities changed to reflect comparative advantage, (in agriculture, this implies the removal of price controls and pan-territorial prices);
- interest rates raised to market clearing levels;
- exchange rate adjustment; and
- removal of subsidies.

Promotion of the private sector, for example through:

- improving the access to finance for commodity trade and agricultural marketeers;

- training and the provision of market information;
- revisions of industrial investment policy and incentive development; and
- improvement of transport and storage for marketeers.

Reduction of the role of government, for example in:

- privatization;
- contracting out;
- closure of public enterprise judged to have limited commercial or social benefit; and
- provision of guidelines on the justification for the creation of new parastatals.

Measures to raise the efficiency of state-owned operations: including for example:

- performance contracts for state enterprises;
- development of improved systems for budgetary allocations;
- improved project appraisal and investment co-ordination; and
- training.

Removal of quantitative and administrative controls on trade, for example through the:

- removal of quotas on crop purchase and movement;
- abolition of licensing arrangements; and the
- removal of restriction on internal and international movement of produce.

Finally, it should be noted that market liberalization is not only a supply-side or 'structural' policy, it has the potential to assist macro-economic stabilization, because, if it succeeds in raising efficiency, it will be possible to reduce requirements for subsidies, without necessarily diminishing the welfare of the subsidy recipients.

Sequencing and the Evolution of Marketing Policy Reforms

Recent debates on adjustment policy have focused on the sequencing of reform measures (Spooner and Smith, 1989). Discussion of sequencing has revolved around the appropriate ordering for implementing structural measures vis stabilization; liberalization of domestic vis international markets; and, finally, the measures required for the liberalization of a specific market. With regard to the sequencing of liberalization in domestic and international markets, it is widely believed that priority should be given to the liberalization of domestic markets, especially in the agricultural sector (Spooner and Smith, 1989). This would create the preconditions for effective liberalization in international trade, since it would create a more flexible and resilient economy, able to earn more foreign exchange.

Marketing reform under structural adjustment has evolved through a number of stages. Initially reform concentrated on raising the efficiency of parastatals. More recently, the emphasis has been on liberalization and privatization, as the World Bank has become less convinced of the possibilities inherent in parastatal reform. Examining the sequencing of marketing reforms, a first step has tended to be the removal of restrictions on traders, followed by the removal of price controls. Then

marketing subsidies and parastatal subventions are reduced. The final element is the lifting of controls on international trade in food.

Marketing parastatals will continue to have an important role in liberalized economies in the importation of food aid, management of strategic stocks and price stabilization. It will be necessary to ensure that parastatals perform these functions efficiently, and that their cost levels are wound down to reflect the reduced level of their operations. Careful consideration will have to be given to conflicts which may emerge in parastatals' performance of these 'social' functions, bearing in mind the need to encourage traders to invest in marketing and stock holding.

ARGUMENTS FOR STATE PARTICIPATION IN MARKETING

As the thrust of economic liberalization is to reduce the role of the state, it is useful briefly to review the arguments which have been advanced over the years to justify the previous situation, one of very substantial state participation in agricultural marketing. These arguments point to issues of efficiency, equity and social cohesion that will still have to be addressed in the post-liberalization era.

The agricultural marketing systems of many developing countries have been characterized by state-administered prices and a major role for state marketing boards (parastatals) although not in every country and not for every crop. Generally, SSA governments have intervened less in food marketing relative to export crop marketing. Nevertheless, SSA has a number of examples of major intervention in food marketing (e.g. Mali, Zambia, Tanzania and Mozambique). Even Kenya, with its generally 'free market' reputation, has maintained restrictions on inter-district movement of maize.

The justifications advanced for the maintenance of a leading role for the state in agricultural marketing can be reduced to two basic lines of argument. First, that the private sector is weak, and incapable of supporting the rate of agricultural growth which is planned. Second, that the social consequences of unconstrained private sector marketing conflict with social objectives by inducing unbalanced regional development, and socio-economic differentiation. In more detail, arguments advanced to support state participation in agricultural marketing have included:

- The observation that adequate finance is not available to the private sector. Commodity trading requires seasonal finance for crop purchases, and capital for investment in transport and infrastructure. Banks are often reluctant to lend to traders (who have few bankable securities) and are rarely attuned to the loan and rescheduling requirements of the trading sector. Thus, a major (if not often cited) reason for the creation of the parastatals has been their ability to manage the large seasonal borrowing which is required to finance crop purchases: the government and/or the banking system have been willing to advance funds to parastatals that they would have been reluctant to lend to smaller-scale private traders.

- The perception that traditional traders tend not to be active contributors to the co-ordination of the system. It is argued that traders live in a world of uncertainty and limited resources, and behave passively, accepting the marketed surplus rather than identifying potential markets and promoting production to supply them. Because of this background, they lack the spirit, skills and knowledge to be active co-ordinators.

- The belief that, because private agricultural marketing is presently highly underdeveloped, a *laissez-faire* approach by government would result in market domination by the few entrepreneurs with access to finance, knowledge and skills. These entrepreneurs would then be in a position to exploit their market position.

- A fear that the private sector, unaided, is incapable of achieving necessary quality standards.

- Doubts about the ability of private sector marketing to provide services in remote areas, because of the low profitability of such operations.

- The apparent inability of the private sector to offer guaranteed producer prices, which are believed to reduce risk and thereby to represent an incentive to producers.

- The attendant fear that the private sector would not offer stable consumer prices, and would exploit consumers in times of shortage, sometimes with serious consequences.

- The possibility that the private sector would not be able or willing to maintain sufficient reserve stocks, and therefore that there is a need for state control over the marketing of strategic food crops. Under a system dominated by private enterprise it is more difficult for the government to monitor food production and supplies, and to make appropriate arrangements to import.

- The problem of achieving minimum viable scale. The marketing and processing of export crops may require large investments in transport, processing and communications infrastructure. Further, the presence of scale economies in many areas of agro-processing necessitates vertical integration with marketing, and frequently with production.

Finally, there are a cluster of political economy arguments explaining the attraction to governments of intervention in agricultural markets (Bates, 1981). Control over marketing gives control over prices and prices determine income and the inter-sectoral terms of trade. An aspect of this is the potential for extracting a financial surplus from export agriculture through the pricing policy of state marketing boards.

The Performance of Marketing Parastatals

The marketing parastatals which were set up or expanded by African governments on the basis of these arguments have performed very poorly, many were so inefficient that their performance constituted a key constraint on agricultural progress. Typical weaknesses included:

- inadequate and untimely supplies of production inputs,

- unreliable access to produce marketing facilities,

- late payments to farmers (typically in situations of high inflation, which rapidly erodes the value of payments), and

- poor quality control.

Marketing parastatals obtained few of the benefits of being government departments, while suffering many of the disadvantages. Control by governments has often been detailed and obtrusive, while at the same time ignoring major issues of policy and strategy. Governments have lacked effective mechanisms to make parastatal marketing boards accountable for their performance. Together with salary controls which aimed to keep remuneration at the same level as in government, this meant that there were weak incentives to operate efficiently, or to actively work to co-ordinate the market. Additionally, parastatals have been subject to political control to an greater extent than the private sector, by virtue of their location within the public sector. Parastatals have been part of the system of political patronage, and this has been conducive to over-manning at all levels.

Continuing Roles For Parastatals

Marketing parastatals will continue to have an important role in the liberalized economy. Four areas where there is likely to be need for public sector involvement (on grounds of 'public interest' or 'lack of private sector capacity') are:

- the importation of food aid;

- the closely linked activity of importing food on commercial terms;

- the management of strategic stocks;
- price stabilization, through acting as the buyer/seller of last resort.

Governments are likely to wish to retain a role in guaranteeing to buy crops at a minimum price. This has an economic cost (it encourages an inefficient structure of production) but it may have economic justification in terms of risk reduction. If public sector marketing is successful in reducing risk, then this will enhance farmers' willingness to innovate. Probably, the most effective form of risk reduction which the public sector can undertake is to make available a floor price for produce, acting as buyer of last resort. However, it will not be until at least the end of this decade that there will be sufficient data to test this hypothesis with respect to Africa.

A further important reason for governments' continuing involvement in food marketing is that, in the short term, it will be difficult to supply the finance necessary for food trading and stocking, except via the existing larger scale organizations (such as parastatals and co-operative unions). Policies for privatization to date have tended to focus on the smaller scale local trade. Such traders do not have the capacity to borrow the finance necessary to purchase and store more than a small proportion of the national marketed food crop. On the other hand, large-scale private organizations, able to undertake the necessary levels of borrowing may be slow to enter the foodstuffs trade on an adequate scale. For example, they may regard food trading as risky, subject to unpredictable government intervention and providing a lower return on capital than other available activities).

Managing the Parastatals' Transition to a Liberalized Economy

If parastatals are to play a continuing role, this will be as agencies which seek to intervene to influence and supplement market outcomes, rather than to replace them. With food aid imports as a possibility, and parastatals responsible for holding strategic food stocks and for acting as a buyer of last resort, a level of uncertainty could be introduced into the system which discourages traders from investing in marketing and stockholding. Continual liaison between the government, the parastatal and the private sector will be required, in order that traders are able to formulate expectations on future scarcities which are rationally based, and which induce socially beneficial actions by traders.

Measures will be needed to ensure that parastatals are technically and operationally efficient in performing the reduced agenda of tasks. There should be an emphasis on efficiency, even when carrying out social functions. This will involve the development of:

- improved management within the parastatals;
- measures to prevent their continued use as mechanisms of political patronage;
- improved systems of operational and financial performance targeting and monitoring, and
- the linking of management remuneration to performance.

In this way, the pressures of a competitive market may be partially reproduced for the parastatal. There will be a need for clear policy statements regarding future activities. The aim must be to avoid imprecision which leads to parastatals continuing more or less unchanged, despite public announcements to the contrary. Failure to do this will result in a lack of confidence in the reform by the private sector and unwillingness to invest in infrastructure and transport and to hold stocks.

A related danger is what Reusse (1987) has called institutional resilience. Because of the failure to define clearly the new role of the parastatal in the liberalized economy, parastatals have, in some cases, continued to operate as before, only with a much reduced throughput which has raised unit marketing costs and increased the operating deficits. These deficits continue to be funded by government amidst confusion over the future role of the parastatal, and disappointing progress in reducing the parastatals' contribution to the fiscal deficit. Solutions probably lie in governments

pressing for tight management of overhead costs and for rapid transfer to the private sector of operations which have low profitability under parastatal management. An important exception to this being the activity of holding food security stocks. This is a loss-making function for which the parastatal should negotiate a government subsidy.

Governments have in the past used parastatals to perform commercial functions and to achieve social objectives. The costs of social objectives have often been hidden, through cross-subsidies from commercial activity. In an economy undergoing structural adjustment and liberalization, the scope for such cross-subsidies is much reduced because:

- price reforms in the early stages of structural adjustment have involved paying higher farm-gate prices, notably for export crops, thus reducing the margins available to parastatals;
- liberalization has meant exposing parastatal marketing to competition, and this has been another mechanism for squeezing margins; and
- privatization has stripped parastatals completely of some of their commercial functions.

As structural adjustment proceeds, the costs which parastatals incur to achieve social objectives will become more transparent. To the extent that transparency stimulates a debate about the efficiency of current policy instruments for achieving social objectives, it is much to be welcomed. An explicit line in the national budget will be required, to pay for the loss-making activities to achieve social objectives. Both governments and the World Bank may find the necessity for some additional government spending unpalatable in the environment of stabilization and structural adjustment. Yet failure to take the necessary action may lead to highly undesirable outcomes (e.g. continued unplanned deficits by the marketing parastatals, thus compromising fiscal objectives; or a collapse in the parastatals' ability to meet social objectives (such as holding sufficient stocks in a season of shortages, or being able to buy from farmers in a glut).

Finally, the government's commitment to liberalization must be clear or traders' response may be weak, particularly as regards investment in fixed assets (storage) and transport. Monitoring of the implementation and adjustment process is crucial. Delays, obstacles, sabotage and planning errors can thus be detected and remedial measures applied. Because privatization is so sensitive and potentially in conflict with social goals, the early indications of failure may result in governments' losing their nerve, and reverting to a state-controlled marketing system.

Promotion of an Efficient Private Sector

Once restrictions on the private trade have been relaxed, activities to support the development of an active and competitive private sector become of central importance. In general, it seems that government agencies will have a role in:

- encouraging and policing competition,
- promoting wider availability of information,
- maintaining appropriate quality standards,
- strengthening the legal system to ensure enforceability of contracts,
- providing an adequate infrastructure transport infrastructure,
- undertaking spatial planning to allow appropriate access by marketeers and consumers to central places,
- supporting the development of credit,

- research into the technological problems in storage and processing experienced by the private sector (which will be likely to be operating on a smaller scale, and facing different relative factor prices than parastatals), and

- training in technical and managerial aspects of marketing, processing and storage.

Inadequate availability of finance for private traders has been recognized as a particular difficulty post-liberalization. In the pre-liberalization era, parastatals obtained relatively generous borrowing facilities, while the private sector was starved of funds (and therefore operated with very high interest costs). The challenge is to bring about a convergence in the terms on which the private and public sectors are able to borrow.

Experience has shown that governments' commitment must be clear and close monitoring of the consequences of policy change is crucial. Finally, an issue of considerable developmental and social significance is inter-regional equity, which governments have attempted to promote through pan-territorial provision of marketing services and prices. Liberalization implies a withdrawal of the subsidies to disadvantaged areas, and thus the search is on for alternative policies to promote development in these areas.

Financial Liberalization and Agricultural Marketing

An aspect of structural adjustment which has received increased emphasis in very recent years is liberalization of internal financial markets. It is believed that this will achieve a number of objectives:

- improving allocational efficiency by ensuring that finance is priced at its true scarcity cost (the implication is that interest rates may rise considerably);

- allowing financial institutions to play a more effective role in mobilizing savings, by offering more attractive deposit rates;

- reversing a pattern of preferential allocation of credit to the public sector, freeing up more funds for the private sector, and especially for the traded goods sector, the growth of which will have been stimulated by devaluation and other price policies. (This works by making borrowing much more expensive, and thereby, so it is hoped, stiffening the government's resolve to cut the fiscal deficit);

- turning financial sector personnel (e.g. bank managers) into active and competitive business intermediaries, rather than passive, resource-rationing bureaucrats. It is hoped that they will actively seek out good business opportunities in the sectors of the economy where there are firms which are able to make an acceptable return on the expensive funds which they have available to lend.

For agricultural marketing, financial liberalization is likely to result in some convergence in the terms on which the parastatal and private sectors are able to borrow. Typically, the pre-liberalization situation was that the parastatals obtained relatively generous borrowing facilities at controlled interest rates, while the private sector had difficulty in getting access to bank funds. Under this fragmentation of financial markets, the opportunity cost of funds to the private sector was often much higher than was the case for the parastatals, and this severely constrained the scale and quality of marketing services which the private sector could offer.

The potential efficiency gains from financial liberalization will not be fully realized unless government and private institutions act to seize the opportunities, and also to deal with the problems. In the short term, the major problem will be the additional costs of parastatal operations stemming from higher finance charges. In particular, the costs of stockholding will rise, representing a further unwelcome addition to the transparent costs of marketing interventions to achieve social objectives. On the opportunity side, it will be necessary for financial institutions to be innovative in seeking to support private traders, especially smaller traders. Major changes in lending procedures,

and requirements for security will be required. A promising approach (following the Grameen Bank of Bangladesh) would be to start lending very small sums to clients, with minimal investigation of their business plans and assets. The volume of lending to clients would then be built up on the basis of their past repayment performance. Banks may seek government subsidization of their lending to small traders. It may be justifiable for government to offer some subsidy, but only on a risk-sharing basis.

Transport Costs and Inter-Regional Equity

In the 1970s, quite a number African governments introduced pan-territorial pricing for certain agricultural outputs, on the grounds that this would promote balanced regional development. This amounted to a transport subsidy to producers in areas remote from the main centres of demand, (the locationally disadvantaged areas). Structural adjustment policies have entailed the winding down of these transport subsidies, through mechanisms which range from complete price decontrol to making 'floor prices' applicable only for deliveries to depots in major centres. The phasing out of transport subsidies has been lent additional urgency in cases where there have been large currency devaluations and where, prior to the devaluation, rationed foreign exchange had been preferentially allocated to agricultural marketing (for vehicles, parts and fuel). This has increased the real cost of transport to parastatal operators (and, probably, also to the private sector).

The effects of the abandonment of pan-territorial pricing on the locationally disadvantaged areas may, in the short term, prove to be disastrous. For example, in Tanzania, Zambia and Malawi, integrated rural development projects, commenced in the later 1970s, had the objective of raising farmer incomes and household nutrition by promoting increased production of staple food (mainly maize). The plan was that, in normal years, the maize surplus would be exported from the region to towns and to food-deficient rural areas, providing an important source of cash income to farmers. Furthermore, it was argued that, even in bad years, local food availability would be higher than would have otherwise been the case. Such projects depended on farmers receiving attractive prices for food crops, and this required transport subsidies. In the early years of these projects, the supply response was often substantial, with large numbers of farmers becoming dependent on maize sales as their principal income source. Withdrawal of transport subsidies leaves these farmers in a difficult position. The response must include:

- agricultural research support to develop less 'transport-intensive' export crops;
- encouragement and support to the private sector to seek out new opportunities in these areas (e.g., they may have a comparative advantage in pulse production, but the public sector may not have been seriously interested in marketing this);
- studies to define the impact on the poor, and the implications for growth.

Liberalization and Consumer Welfare

To the extent that liberalization, and associated policies to support the private sector, promote more efficient marketing, it would be expected that, in general, consumers would benefit, as a consequence of a narrowing of marketing margins. However, some groups may be worse off, experiencing higher prices and/or substantially greater variability in consumer prices. Adversely affected groups could include:

- urban residents who had previously had access to food supplies from parastatals, where these supplies had been subsidized;
- rural residents in food-deficient areas subject to high transport costs;
- food-deficient households in those rural areas with an overall food surplus and low access to the main centres of demand. Food prices are likely to rise in these areas as private sector marketing activity intensifies as a consequence of the areas' comparative advantage as a food supplier;

- if satisfactory arrangements are not made for the maintenance of food security stocks, and there is marked production variability over seasons, then there may be more generally damaging effects on consumers.

Monitoring Requirements

It will be important to monitor effects of liberalization, to identify progress and problems, and to provide the basis for reviewing policies. Key phenomena to be monitored are:

- flows of goods;
- volumes of produce in storage (at different times of the year);
- geographical coverage of markets;
- the size and structure of the marketing industry (shares of flows at different points of the year accounted for by parastatals, co-operatives and categories of private trader);
- marketeers' access to finance, storage facilities, market places;
- the regulatory environment affecting marketeers, at the national and local level;
- the costs of marketing and marketing margins;
- technical problems encountered in the marketing system;
- consumer access to food and consumer prices over the year, disaggregated by region, rural/urban and income level;
- budgetary costs of publicly supported marketing functions;
- indicators of activity levels in government programmes to support the private sector.

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