

BARRIERS TO ENTRY, PRICE CONTROLS, AND
MONOPOLY POWER IN MALAWIAN MANUFACTURING

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1986



TO MY PARENTS

DECLARATION

I declare that this thesis has been composed by myself and
incorporates my own work.

B.M.KALUWA

ACKNOWLEDGEMENTS

This study has benefited enormously from comments, suggestions and discussions with my supervisors, Dr. Gavin Reid and Dr. Roger Sugden. For this and for being most generous with their time, I express my heartfelt thanks.

While undertaking this study, I have also benefited from helpful suggestions from other people at the University of Edinburgh, including Dr. Colin Roberts Dr. Brian Main and Mr. Jonathan Crook. To these people I wish to express my thanks.

I would like to thank staff at the Malawi National Statistical Office for being most helpful with my requests for data and for their help with the survey which I mounted in 1984. Special thanks are due to individuals there who helped me in their personal capacity. These include Mr. Charles Machinjili, Mr. Walter Mkandawire Mr. Harry Namisengo, and Mr. Mwasalapa.

This study was mainly sponsored by the Association of Commonwealth Universities, while supplementary sponsorship came from the University of Malawi/ Malawi government. I would like to thank these organisations and the people in them who have been very sympathetic and helpful with my numerous requests for additional funds.

Finally, a special big 'Thank You' to Ivy for the typing, and, together with Tumbi for being great company!

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BARRIERS TO ENTRY, PRICE CONTROLS AND MONOPOLY POWER IN
MALAWIAN MANUFACTURING

Ben Meshack Kaluwa

(ABSTRACT)

This study adopts the structure-conduct-performance paradigm to analyse the effects of various elements of industrial structure, including government policies (such as price controls, regulation of entry and international trade) on industrial profitability in Malawian manufacturing.

With the help of an extension to Modigliani's exposition of the limit-pricing approach, a structure-performance model which gives prominence to barriers to entry, is derived and linked to the analysis of the implications of price controls.

The model is estimated using pooled cross-section and time-series data for the period 1969-72. The main result is that price controls appear to have modified the hypothesised positive relationship between profitability and industrial concentration. Other variables are hypothesised to be largely independent of the influence of price controls. Among these, the ones which have been found to influence significantly profitability are demand, import competition, association with diversified enterprises, and variables representing potential problems with scarce inputs namely imported material inputs, and working capital. The results with respect to the input variables suggest that input scarcity tends to facilitate the exploitation of monopoly power. Although barriers to entry have not been found to exert a significant influence on profitability, they are found to be a very important factor in influencing the degree of industrial concentration.

A study of elements of conduct is carried out using a distinct body of data. These primary source data were gathered from Malawian firms in 1984 using a postal questionnaire which was sent to all substantial firms. Since this was nearly a year after the initiation of price deregulation, the analysis of these data has also provided a means of investigating the effects of abandoning price controls.

FOREWORD

Since the 1950s and 1960s governments in many less industrialised countries (LICs) have been almost frantic in their attempts to encourage more rapid industrialisation and hence greater diversity in their economies. Much of the available research on the manufacturing sectors of these countries reflects this and makes much of the creation of industrial capacity, as a function of government policies.

The usual approaches to research, have been much inspired and influenced by international trade theory, and what is being termed the 'new' cost-benefit analysis. Key concepts are therefore comparative advantage and efficiency both at the sectoral, and at the international levels. Government policies have come to be evaluated in terms of the provision of incentives to industry, and according to whether they were 'outward-looking' or 'inward-looking' which can be loosely interpreted in terms of export-orientated and import substituting industrialisation respectively. The impact of existing levels of competition hardly has any explicit role in such analyses.

On the other hand, it can be argued that the creation of new capacity, whether in new or existing industries, is a function of perceived prospects for profitability in those activities. This in turn can be seen as a function of market structures in the respective industries which can include existing and potential competition, as well as government policies. These policies can operate with respect to a wide range of aspects including international trade, firms' pricing behaviour, the entry of new firms, and so forth.

This study responds to problems on two levels. The first and the more general level relates to the general bias of research in LICs mentioned above, while the second level reflects the bias of research in Malawi.

One reason why the first type of bias must be redressed is that the problems besetting LIC's industrialisation programmes can no longer be regarded as solely or mainly those of creation of new capacity in new manufacturing activities. One testimony to this is that following the current debt crises, the

International Monetary Fund, in particular, has been pressing the countries concerned to deregulate their economies. This typically involves large devaluations of their currencies, reduction in public expenditure and the state's involvement in economic activities. A number of countries including several in Africa have since announced liberalisation of their economies. For the manufacturing sectors this has meant reduction in state participation, reduction in the levels of tariff and other protection, and the abandonment of routine price controls. Malawi announced her intention to do the same in November 1983 initiating the dismantling of the system of price controls which had their origins in the 1950s.

As far as research in Malawi is concerned, the bias has reflected the fact that the economy is largely agricultural. As a result, virtually no comprehensive study of the manufacturing sector has been published despite the fact that the desirability of economic diversification is a well-accepted goal, and despite the existence of abundant fairly good quality data.

The following study adopts the structure, conduct, performance paradigm because of its malleability in dealing with a wide range of behavioural assumptions and variables that are directly affected by different policies. In so far as behavioural patterns and government policies are all relevant for firms' long-term performance (eg. in terms of profitability), they are also likely to influence the dynamics of market structures in terms of entry and exit of firms, as well as growth of established ones.

The study is organised into two parts. Part One focusses on the theoretical, conceptual and modelling problems. Part Two deals with the empirical investigation of the Malawian manufacturing sector, with regard to the relationships discussed in Part One.

In Part One, Chapter 1 deals with the origins and definitional aspects of the structure, conduct, performance paradigm (SCP) including its suitability for analysing manufacturing policy problems in less developed countries. Chapter 2 deals with some relevant theoretical issues such as implications for estimated models of certain behavioural assumptions (eg. short-run vs. long-run profit maximisation). Chapter 3 is a review of previous empirical approaches in the SCP tradition. Chapter 4 deals with some special structural elements that are characteristic of manufacturing in some less developed

countries, namely price controls and scarcity of productive inputs. The model to be estimated with Malawian data is also presented in this chapter.

Part Two comprises the rest of the study, from Chapter 5 to Chapter 9. Chapter 5 serves as an introduction to some relevant features of the Malawian manufacturing sector including the institutional framework and several structural and behavioural elements. Chapter 6 considers the problems of derivation of the variables for the structure-performance model suggested in Chapter 4. The main source of data for this was Malawi's National Statistical Office's *Annual Economic Survey*. Chapter 7 approaches the problem of estimation, and reports on the results for the 1969-1972 period. Chapter 8 consists of analyses of data from a survey conducted in November 1984 with the specific aim of providing a basis for studying firms' behaviour. Finally, Chapter 9 offers conclusions including discussions of policy recommendations based mainly on the empirical findings.

Matters of less direct relevance to the main body of the study have been relegated to appendices, which for purposes of easy reference are named after the chapters to which they correspond.

PART ONE

CONCEPTUAL AND THEORETICAL ISSUES, AND

MODEL SPECIFICATION

CHAPTER 1

INDUSTRIAL STRUCTURE AND PERFORMANCE : BASIC CONSIDERATIONS

INTRODUCTION

A central issue in industrial economics is the question of whether the degree of seller competition influences their power over prices, and hence their ability to earn above - 'normal' profits¹ in the long-run. This and related issues have come to be studied under the structure-conduct-performance paradigm (SCP), which hypothesises a link between elements of market structure and conduct on the one hand and performance on the other hand.

Bain (1968) stated this as, "We look initially to the characteristics of market structure and market conduct as primary determinants of the market performance of enterprises, or of groups or industries of business firms". p3

The driving force behind the paradigm is its implications for antitrust legislation, which inevitably involves a mixture of economics, politics and morality. Hence antitrust legislation, where it exists, is often expressed in terms of 'unfair' practices, which include firms' power over prices and the conduct of excluding or elimination of competition.

The possession of 'significant room for manoeuvre in its price or output policies' is what sets a firm or group of firms with monopoly power apart from those without (Evelly and Little, 1966). The latter would be those firms which are constrained by forces beyond their control. It is supposed that the dominant firms with monopoly power in setting prices well above costs misallocate resources and 'redistribute incomes in favour of those in powerful positions'. (Weiss, 1974, p184). If it can also be established that the tendency towards monopoly is widespread or on the increase then the problem assumes greater significance.

Both tendencies are quite commonplace. For instance economies characterised by small markets are said to be also characterised by monopolistic market structures (see end of this chapter). It has also been observed that concentration could rise from a number of factors which are prevalent in many

economies including the large industrialised ones. The factors include increasing diversification of the largest firms (Utton 1979 ppix, 1) product innovation or successful advertising in conjunction with scale economies.

THE ORIGINS OF THE STRUCTURE-PERFORMANCE HYPOTHESIS

Mason (1957) had seen with the books by Chamberlin, Robinson, and Berle and Means some change in direction in microeconomics. His assessment was, "On one side is a re-examination of market models and the theory of the firm; on the other, factual and statistical studies of economic concentration, market structure, and business policies". Heralding a new type of enquiry in the latter direction, Bain (1951) put forward his famous hypothesis:

"The hypothesis in brief is that the average profit rate of firms in oligopolistic industries of a high concentration will tend to be significantly larger than that of firms in less concentrated oligopolies or in industries of atomistic structure".(p294)

This is the hypothesis of the concentration - profits relationship. One significant thing about the hypothesis is that it puts on different sides of a functional relationship, two variables that had previously both been suggested as different approaches to measure the same thing, namely monopoly power (Encaoua and Jacquemin 1980 p 87). Later attempts to develop oligopoly models play around this same idea².

Bain (1951 p 294), and Mann (1966 p 296) saw the basis of the concentration - profits hypothesis as being in 'conventional price theory' and relating to long-run equilibrium. Holding demand, cost and entry conditions constant, monopoly or effectively collusive oligopoly, 'tends to yield higher profit aggregates and prices in long-run equilibrium than competition or imperfectly - or non-collusive oligopoly'. (Bain 1951 p 295)

What does concentration represent?

It is usually assumed that high concentration facilitates collusion even where rivalry would have been a natural tendency, because of the mutual costs of such rivalry. With smaller numbers, the probability is high of detecting and retaliating against behaviour that goes against the joint interests of firms (Stigler 1964). Hence the association between concentration and collusion is

viewed in probabilistic terms. It is supposed that the more effective collusion is the more the joint profits of the group tend towards what would be predicted for a monopolist.

INDUSTRIAL STRUCTURE, MARKET CONDUCT, AND PERFORMANCE

Over the years, the literature has brought up several 'new' variables or new approaches to their measurement in estimated models of the SCP. The majority of these variables can be and are often classified under market structure and are all contained in a paragraph of an old article by Mason (1939). Furthermore, the important ones were systematically taken into account in an early empirical work by Bain³.

Industrial Structure

Mason (1939) suggested the following approach to the identification of elements of market structure:

"The structure of a seller's market, then, includes all those considerations which he takes into account in determining his business policies and practices". (p195 in Readings)

'All those considerations' include;

Type of product

- whether consumer good or producers'
- durable vs non-durable
- degree of standardisation or product differentiation

Nature of Costs

- magnitude of fixed costs in the short-run
- flexibility of costs
- locational factors
- existence of joint costs

Distribution

- number and size distribution of sellers
- entry of new firms

Demand

- trend of sales and cyclical variations

Distribution channels
Government Regulations

According to Mason (1939 p 198-199), it is the degree of similarity of these conditions among firms that is likely to influence similarities in policies and behaviour. But in order to avoid hypotheses that are too inclusive and tending towards irrefutability, attention has largely centred on the few elements considered to exert significant influence on performance. On this point, according to Bain (1970) 'the counsel of wisdom seems to be that we should specify on a priori grounds or from experience a very few independent structural variables ...'p43.

Seller concentration has emerged as the most prominent of these few structural variables, to the extent that it has sometimes been considered legitimate to investigate its influence on performance in isolation from other variables. "Measures of concentration try to express the number and size distribution of competitors in terms of a one-parameter index, which could then be regarded as a direct measure of the degree of oligopoly". (Scitovsky 1955 p 109)

Among the other elements that have been isolated as important are barriers to entry, the degree of product differentiation, integration and diversification, and economies of scale.

Market Conduct

Market conduct also involves wider policies than just pricing. The conduct of firms involves;

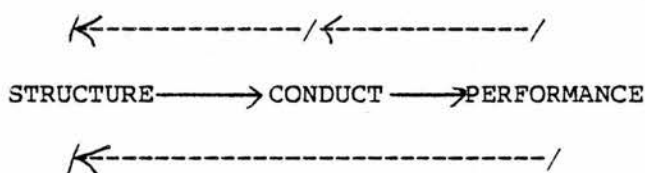
(i) ... the aims they pursue and methods they apply in establishing what prices to charge, what outputs to produce, what product designs to choose, what sales promotion costs to incur, etc.; and

(ii) The process or mechanism of interaction, cross-adaption, and coordination of the policies of competing sellers in any market". (Bain, 1968, p9.)

Performance

Performance too may be regarded in multidimensional terms including the level and growth of output, employment, research and development, profitability, equity and allocative and X-efficiency.

The structure-conduct-performance relationships may be illustrated as



The bold arrows represent the direction of causation (or association) that is usually assumed, while the broken ones indicate the possibilities that now cannot be discounted and which some are insisting ought to be considered (see Phillips, 1970; Jacquemin and Thisse, 1972; Demsetz, 1973; Clarke, Davies and Waterson, 1984).

THE SCP AND THE LESS DEVELOPED COUNTRIES

Empirical work with the SCP in the industrialised Western economies- United States and United Kingdom to start with - has had a long run, spanning more than three decades. The intensity of such work has also been such that the concentration - profits hypothesis, which is central to the SCP, has been described as being one of the most thoroughly tested hypotheses in economics. (Weiss 1974 p193)

Similar work for the less developed countries (LDC's) has had a late start and is still very scant. This is despite the fact that LDCs' manufacturing faces greater problems regarding almost every element of performance than manufacturing in the developed countries. Possible reasons for this neglect may lie in the traditional preoccupations of economic research for those economies.

Much of the orthodox economic development literature with an interest in industrial development in LDCs has been concerned with the analysis of trade policies because of trade's vital necessity (Reynolds 1970). In all there have been some attempts "to distinguish between policies that have a direct bearing on the establishment of industrial capacity (various incentive measures and

investment protection schemes) and policies that work through the channel of international trade (tariffs and quotas, exchange rate policies, etc.)" (Kirkpatrick and Nixon, 1983 p 9)

To the extent that these analyses focus on some elements of performance (e.g. output growth, import substitution, efficiency variously measured, and some elements of industrial structure) they could be said to conform to the general orientation of SCP. Their major limitation is that domestic competition plays no active role in the analyses since it is either implicitly assumed not to exist or that its existence is immaterial⁴. Most of the industries in those economies are thought to be highly concentrated and characterised by market imperfections and distortions. This has led to government policies playing a central role in the analyses. For instance neoclassical trade theory has inspired analyses like the 'new' cost benefit analysis, that stress such efficiency indicators as effective rate of protection and domestic resource costs, all related to international competition.

In contrast, the SCP has proved flexible enough to bear on most of the policy issues handled in these other analyses, within the context of domestic competition and even allows for foreign competition. This comes as no surprise considering the range of elements that constitute 'structure' 'conduct' and 'performance'. Thus in the few studies that are now available of LDCs involving the SCP, a number of hypotheses have been advanced and tested, with much scope for policy recommendations.

Two early and very influential books on oligopoly are those by J.S. Bain (1956) and P. Sylos Labini (1957, trans., 1962). These have been reviewed in a famous paper by Modigliani (1958). On the implications of the two works for policy aimed at fostering competition, Modigliani noted (brackets added):

"On the whole, the outlook (of Bain's analysis) for effective public policy is not too optimistic, although it is by no means as gloomy as that of Sylos. But then, Sylos' gloom is understandable. His inspiration comes from the Italian economy, where markets are naturally small and are made still smaller by tariffs and other artificial restrictions. According to his own model, the tendency to oligopolistic structures, and their power of market exploitation, will tend to be greater the smaller the size of the market". p378⁵

Here then are two books about the same issues but inspired by two widely

different economies in terms of size, policies and characteristics of markets. The features noted about the Italian economy are also typical of most LDCs. The coexistence of oligopolistic structures and market exploitation is ironical for poorer countries. It must make comprehensive studies of industries in these economies even more imperative. If the argument is that some of these economies are so unlike the western economies where the SCP has often been applied, analysis might start with the implications of those differences on predicted results.

Some of these differences, such as those related to the prominence of government regulation and problems of input availability, are discussed in Chapter 4 with a view to identifying features of LDCs that might be important in estimated models and the interpretation of the results. Before this some theoretical models are discussed in the following chapter, after which a review will be made of some estimated models including some that have been applied to LDC's.

NOTES

1. These take into account all costs including imputed interest cost on equity capital.
2. Two such models are discussed in the next chapter against the background of Bain's and Sylos-Labini's earlier insights.
3. Eg. geographical dispersion of markets, import competition and so on. Most of these are given further attention in Chapter 3.
4. In Chenery's(1960) influential model, for instance, growth of industrial output is a function of exogenous demand factors and it makes little difference whether domestic output grows from increased competition via new entry or from the growth of established firms.
5. The page reference is for the reprint in Kamerschen ed.(1969).

CHAPTER 2

SOME RELEVANT MODELS OF OLIGOPOLY

INTRODUCTION

The previous chapter has laid out some of the basic concepts and relationships at the center of empirical studies in industrial economics including the influential concentration - profits hypothesis.

It has been suggested, largely on the basis of empirical results that deny a significant positive concentration - profits relationship, that the theoretical foundations of the hypothesis are weak (Demsetz,1973). Weiss (1974) replied to this with a review of the predictions of the main oligopoly theories and of empirical results. On the theory his conclusions were:

"The common expectation that profits will be higher in concentrated industries is not nonsense - it is worth testing - but it is not unequivocally predicted by theory either". p193

The persistent doubts about this relationship have given rise to some attempts at reformulation of the theoretical models, based on distinctive behavioural assumptions. Before looking at two such models and their implications for empirical investigation, it is instructive to revisit the relatively older Bain-Sylos-Labini limit-price theory which still serves as the main source of empirically testable hypotheses. This theory can also serve as a useful point of reference in the discussion of the two more recent models.

THE LIMIT-PRICE MODEL

Holding demand and cost conditions constant, the degree of concentration may still not be sufficient to determine the average levels of profits. Existing producers may not price their products regardless of the long run consequences. For instance, continued profitability through high rates of growth of sales are likely to depend on current pricing policies which might attract new entrants. Since potential entrants' ability to actually enter depends on the ease of entry, existing firms could also use this fact in their pricing

decisions: the higher the barriers to entry for the potential entrants, the less concerned are the existing firms that current high prices would attract effective entry, and vice versa.

Entry barriers

The main barriers to entry can be discussed under three categories; economies of scale, product differentiation, and absolute cost advantages of existing firms relative to prospective entrants.

a) Economies of scale:

Economies of scale can be a barrier to entry if the minimum optimal scale of plant is large relative to market size, and if entry at sub-optimal scale is faced with high costs. The latter would be the case the steeper is the long run average cost curve below the minimum optimal scale. When the minimum optimal scale is large relative to market size, new entry at that scale could significantly depress post-entry price, making the venture less attractive. The cost-minimising industry size-structure and therefore the one that would tend to be most stable under these conditions, would be where the industry output is produced by plants of minimum optimal size or larger (in the case where the long run average cost curve levels out).

b) Product differentiation:

Entry barriers are said to exist when new entrants incur relatively high selling expenses to overcome brand loyalty for the products of existing producers. This is expected to be the case particularly with inexpensive consumer goods. Here each consumer accounts for a tiny fraction of the market and is less knowledgeable about products than when for instance the consumers are also producers each accounting for a significant fraction of the market.

c) Absolute cost advantages:

New entrants could face high costs relative to established firms because of the latter's superior production techniques, ownership of patent rights to processes or products, and advantaged access to factors of production.

The limit pricing approach

The limit price model which relies heavily on the concept of barriers to entry is associated with Bain (1956) and Sylos-Labini (1957) but was given sharper focus by Modigliani (1958). The limit price, P_L is the highest price that existing firms can charge without attracting entry. It is entry preventing in that if entry actually took place, it would not be profitable for the new entrant(s). This approach was the first attempt to give systematic attention in the analysis of oligopoly, to the influence of potential entry on market outcomes.

In perfectly competitive equilibrium, the price P_c equals average cost and therefore profits would be zero, which will be the situation if potential entrants had been perfectly free to enter (ie. zero barriers), so that positive profits are competed away. The difference between the limit price and P_c will directly reflect the condition of entry, which is related to overall barriers. For instance, if barriers are sufficiently high, it would not be necessary for firms to charge low prices to prevent entry, and consequently P_L would be high. The relationships among barriers to entry, entry conditions, limit pricing and profitability can be summarised as in the table below.

Table 2.1

Limit Pricing and Entry Conditions

Barriers to Entry	Entry Conditions	Entry Limiting Price	Relation of Entry limit profits ($\bar{\pi}_L$) to non entry limiting ($\bar{\pi}_0$)*
	Blocked	Very High	$\bar{\pi}_L = \bar{\pi}_0$
Substantial to High Moderate to Low	Effectively Impeded	Moderate	$\bar{\pi}_L \geq \bar{\pi}_0$ (short entry lags)
	Ineffectively Impeded	Low	$\bar{\pi}_L \leq \bar{\pi}_0$ (long entry lags)

Note: * $\bar{\pi}_L$ and $\bar{\pi}_0$ are the present values of the discounted streams of profits associated with entry limiting pricing and non-entry limiting pricing respectively (ie. pursuit of maximum short-run profits)¹

From the table, limit-pricing is only necessary for and consistent with the maximisation of long-run profits (see Note 1.) in situations where the present value of profits associated with entry limitation $\bar{\pi}_L$ is greater than that associated with non-entry limitation, $\bar{\pi}_0$. This would be when barriers to entry are not too high for entry to be blocked nor too low for entry to be ineffectively impeded. Situations where $\bar{\pi}_L = \bar{\pi}_0$ would be where the entry situation is such that firms may as well maximise short-run profits eg. when barriers are very high and entry limiting is not necessary. Taking the case of effectively impeded entry conditions, when entry lags are short, it may be worthwhile to entry limit (ie. $\bar{\pi}_L > \bar{\pi}_0$). But when there are long entry lags, maximising short-run profits during the long period before entry (and eventually making reduced profits after entry), could achieve a better profit position than entry limiting (ie. where entry is prevented) hence $\bar{\pi}_L < \bar{\pi}_0$. In the case of ineffectively impeded entry, barriers are so low that limit price is also very low and consequently the profit situation makes entry limiting not worthwhile.

With this, it is now possible to formally extend the analysis by linking limit pricing behaviour to the degree of monopoly power, for which there is a widely used measure.

INDUSTRY STRUCTURE, LIMIT PRICING AND THE DEGREE OF MONOPOLY

In Bain's formulation of the structure - performance hypothesis, cost, demand and entry conditions were held constant. But in more recent empirical applications researchers have been reluctant to be constrained by these assumptions. In Table 2.1, one can see what is likely to happen to pricing when entry conditions are varied, assuming limit pricing behaviour is relevant.

The following schematic diagram presents a way of looking at the way pricing might be affected by the different factors.

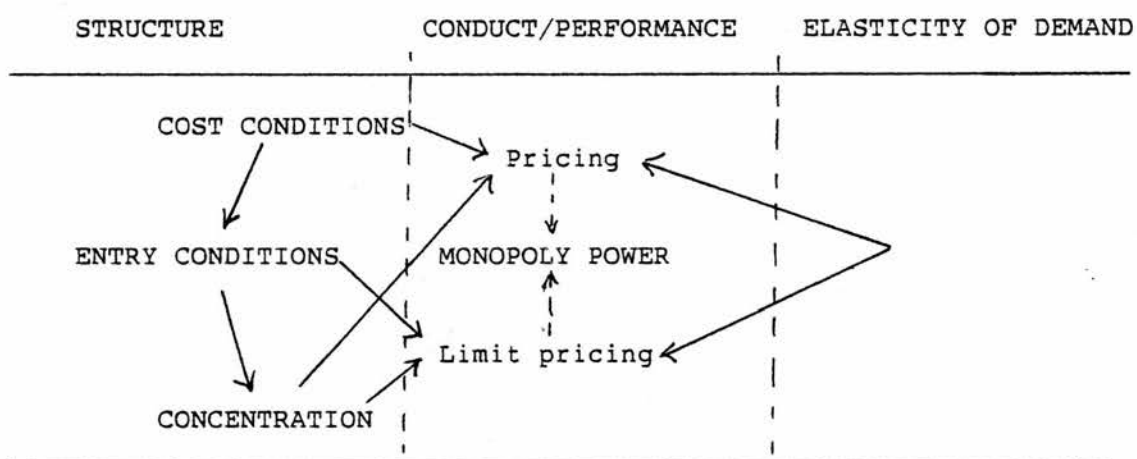


Fig.2.1

In the figure, the elasticity of demand is separated from other 'structure' variables for illustrative purposes only. Also, the broken line arrows linking 'pricing' and 'limit pricing' to monopoly power merely imply that the three are connected, rather than causation. Entry conditions are directly relevant for limit pricing because they determine whether and to what extent entry is likely. Concentration is also not unimportant as it affects the technicalities of implementation of the limit price. For instance, limit pricing behaviour may be influenced by the possibility of collusion among existing firms with regard to entry deterrence. The influence of the elasticity of demand on limit pricing will be explored more fully below.

There are two important observations that can be drawn from Fig 2.1. The first is that cost conditions, entry conditions and concentration can be related in a causal way. The second is that although pricing decisions can be analysed in a way that distinguishes limit pricing as the special case it is from pricing without allowance for entry, both are related to the degree of monopoly power (which we shall take to be defined by the Lerner index, $(P - MC)/P$, where P is price and MC is the marginal cost) in qualitatively the same way. From this we can say that we could use the degree of monopoly power to represent situations where limit pricing is relevant, as well as those where this is not the case, as will be clear from the following discussion. Whereas the structure - performance relationship is usually argued along the 'concentration-monopoly power-pricing' lines, it is also possible to formalise an alternative line of argument, that is 'cost conditions-entry conditions-(concentration)-monopoly power-pricing'.

Assume Sylos' postulate, that existing firms hold their output in the face of entry. Assume further that below the minimum efficient scale \bar{q} the long-run cost curve rises so sharply that entry can only be contemplated at a scale of \bar{q} or larger. Under these conditions, Modigliani (1958) derived an expression for limit price as

$$P_L \approx P_c \left(1 + \frac{1}{\eta Q_c \frac{\bar{q}}{Q_c}} \right) \quad (2.1)$$

where P_L is the limit price, P_c is perfectly competitive price, η is the price elasticity of demand (in the neighbourhood of Q_c), Q_c is the perfectly competitive equilibrium output for the whole industry (an indication of the size of the market), and \bar{q} is the minimum optimal scale.

Osborne (1964) suggested that the 'value' of the entry condition into an industry could be given as the percentage by which firms can maintain price above P_c without attracting entry. Using P_L as the relevant price maintained by existing firms, the condition of entry can be given as

$$E = \frac{(P_L - P_c)}{P_c}$$

E would be high the higher are the barriers to entry (because the P_L required

to limit entry in that case would also be high). In the case of perfectly free entry, with unconstraining barriers, $E = 0$. The expression (2.1) can be written in terms of that for E that is

$$\frac{P_L - P_c}{P_c} \approx \frac{1}{\eta} \cdot \frac{\bar{q}}{Q_c} \quad (2.2)$$

What is required is to obtain from (2.2) an expression for the degree of monopoly as measured by the Lerner index defined above.

Where entry and long run profits are relevant for pricing decisions, the Lerner index can itself be expressed in terms of P_L and P_c thus

$$\frac{P - MC}{P} \rightarrow \frac{P_L - P_c}{P_L}$$

Or

$$\frac{P - MC}{P} \rightarrow 1 - \frac{P_c}{P_L}$$

By manipulating (2.2) to obtain $1 - P_c/P_L$ on the left hand side the following result is obtained

$$1 - \frac{P_c}{P_L} \approx - \frac{1}{\frac{1}{\eta} \frac{\bar{q}}{Q_c} + 1} + 1$$

OR

$$\mu \approx - \frac{1}{\frac{1}{\eta} \frac{\bar{q}}{Q_c} + 1} + 1 \quad (2.3)$$

$$\approx -h + 1 \quad (2.4)$$

where $h = \{1/[(1/\eta) \cdot (\bar{q}/Q_c) + 1]\} < 1$.

From (2.3) and (2.4) assuming a negatively sloped demand curve the more elastic is that demand curve and the larger the absolute value of η , the larger will be the absolute value of h . This lowers the RHS of (2.4) and therefore μ . A high value of \bar{q} relative to Q_c lowers h and results in a high μ . Market size Q_c has an effect on μ similar in direction to that of η . That is a larger or growing market is associated with a lower degree of monopoly. So much for the mechanical relationships between the right hand side variables and the degree of monopoly power in (2.3). We should now be interested in seeing how such a model can be operationalised and related to empirical investigation. Since the distinguishing feature of (2.3) is the term \bar{q}/Q_c , which derives from the assumptions relating to entry, we shall focus on that term.

In the discussion of scale economies barriers above, we indicated that the larger the minimum efficient scale was relative to the market size (call this relative MES), the more any effective new entry would depress the industry price(s) thereby affecting all firms concerned including the new entrant himself. This prospect was said to constitute a barrier to entry in that it discourages effective entry. Coming back to expression (2.3) the term \bar{q}/Q_c represents such barriers to entry in that it is an explicit definition of relative MES. We should also note that the association of (2.3) with the notion of barriers to entry should not be surprising since the derivation of that expression has been based on an entry assumption (that entry can only be worthwhile at MES or larger scales). With this, the relationships traced out above between components of \bar{q}/Q_c and the degree of monopoly power also apply to the scale economy barriers.

We could look at the problem in terms of a cross-section model, where we are interested in investigating the determinants of the degree of monopoly power across industries. What we have here is that firms in industries characterised by high relative MES will have higher scale economy barriers to entry and can afford to charge higher limit prices and consequently enjoy higher profits (by 2.3) than firms in industries with lower relative MES. We might even extend the implications of entry barriers to an historical context by arguing that where relative MES has always been low, the respective industries must have been experiencing low past entry barriers, so that current competition would also be high. Prices are therefore likely to be low from two sources high levels of current competition, and low barriers to entry. The latter means that entry limiting price would also need to be low to discourage entry.

The introduction of dynamics by letting \bar{q} vary (eg. through technological change) or Q_c (through market expansion or contraction) would lower or raise barriers according to the net effects of such changes on \bar{q}/Q_c . The effect on the monopoly power of each industry between two points in time, and subject to such changes would be the same as in the cross-sectional comparison. If relative MES falls because the market is growing faster than the MES is growing, then barriers would be lower and entry would be easier, *unless* prices are lowered to discourage it. Thus a lowering of barriers will be associated with a lowering of the limit price and ultimately a lowering of the degree of monopoly power.

From this, we are able to say that barrier effects are related to limit pricing and ultimately monopoly power in exactly the same way, whether we are dealing with a temporal model or a cross-section model. That is, the expectation in either case is $\{d\mu/d(\bar{q}/Q_c)\} > 0$. In empirical investigation, and following Comanor and Wilson (1967), the relative MES term is now usually proxied by statistical measures as opposed to subjective assessments of the height of barriers, which had been used earlier.

The steeper the average cost curve is to the left of MES, the more difficult it is for potential entrants to enter with plants smaller than MES because average costs rise steeply the smaller the scale. (This is of course the assumption on which we based the discussion centering on relative MES as a barrier.) On the other hand, if the cost curve is shallow at less than MES, then costs do not rise so sharply with smaller scale. From this we can say that at scales smaller than MES, the barriers to entry are higher the higher the average cost relative to those at MES or beyond. This can be described as the cost disadvantage of entry at below \bar{q} .

Caves, Shirazi and Porter (1975) have suggested a statistical measure for this, the cost disadvantage ratio (CDR), proxied by the reciprocal of the ratio of average productivity of labour for plants or firms of less than MES to the average productivity of labour for plants or firms of MES or larger. The rationale for using the productivity ratios is the fact that higher relative productivity represents lower average costs, assuming similar wages. The smaller is the average labour productivity of smaller scale producers compared to those of MES or larger, the more disadvantaged is entry at less than MES.

In the study by Caves *et al*/MES and CDR were initially seen as two interacting variables representing scale economy barriers to entry. For example they hypothesised that the interaction would be such that large relative MES would be a source of barriers only when CDR was significant. The converse to this, that cost disadvantage at less than MES would be a barrier when MES is not, would seem hard to justify because entry could be expected to be effected at the small relative MES. However Caves *et al* established in their empirical results, that CDR and MES could be regarded as independent. In such a case, it might be argued that some potential entrants would be interested in entry at only small scales (ie. less than MES), in which case CDR represents a barrier while relative MES is made redundant. An appropriate expression for (2.3) with CDR can be obtained by substituting CDR for MES. Again $(d\mu/d\text{CDR}) > 0$. Since we now have a situation where for some industries MES represents the scale economy barriers, while for others this is done by CDR, it becomes more appropriate to represent both situations by a general barrier term, B_1 as in

$$\mu \approx - \frac{1}{\frac{1}{\eta} B_1 + 1} + 1 \quad (2.5)$$

where B_1 stands for scale economy barriers, which are a subset of overall barriers, B , representing all possible barrier effects.

It ought to be remembered that in deriving (2.5) cost conditions have been taken into account in the manner indicated in Fig.2.1 by taking into consideration variables relating to the shape of the long-run average cost curve, that is CDR and MES. To the extent that (2.5) implies the degree of concentration (refer to Fig 2.1) that expression represents in a general way the possibilities that can be considered in empirical modelling. This is because it includes all relevant considerations (cost, demand, structural and behavioural) in the determination of the degree of monopoly power. In addition, explicit prominence is given to entry barriers which have become a permanent feature of empirical models. What is perhaps of great importance from the point of view of conduct is the fact that (2.5) is neutral to the specific assumption of limit pricing which lead to its derivation. That is although we have initially assumed that firms are influenced by potential entry in their pricing decisions,

empirical investigation could still be based on the determination of monopoly power, measured by the usual Lerner index. The major difference with formulations which do not consider entry is in the appearance of the barrier term on the right hand side.

From (2.5) it could be argued that although the relationship between margins and the barriers to entry is a non-linear one the expression could be approximated locally by a linear function using a Taylor expansion (and ignoring higher order terms) with a sign preserving property on the derivative. From this we would have $d\mu/dB_1 = 1/\eta(1/\eta.B_1 + 1)^{-2} > 0$ which leaves a positive relationship between margins and barriers.

In the previous chapter and the beginning of this one, it was seen that the degree of concentration has often been considered to be such a prominent structural variable as to make it legitimate to investigate the concentration - profits relationship. This has led to modelling whose results establish an explicit connection between concentration and the degree of monopoly, though not in isolation from other important variables.² Two such models have become well known are due to Saving (1970) and Cowling and Waterson (1976). They are briefly discussed next and their implications for empirical purposes assessed.

A PRICE LEADERSHIP OLIGOPOLY MODEL

Assuming profit maximising behaviour, homogeneous products, and a k - dominant firm cartel, Saving (1970) first established a direct link between the k -firm concentration index CR_k and the Lerner index of the degree of monopoly power, μ . The degree of concentration here represents the likelihood and effectiveness of collusion within the dominant firm model. In addition to this the model establishes that μ is inversely related to η the market elasticity of demand, to ϵ , the elasticity of supply of the remaining $n-k$ smaller firms, which may be jointly called a competitive fringe.

In the Saving model the output decisions of the firms in the cartel are constrained by the output of the fringe. From the possibility of allowing for the inclusion of potential entrants in the fringe the model has lent itself to dynamic considerations. It also allows for the possibility of entry deterring pricing since ϵ is a function of barriers to entry. The model differs qualitatively from (2.5)

only in the explicit place of concentration and the cartel/fringe dichotomisation of the industry.

The model had provided fresh justification for testing the concentration - profits relationship using the more readily available k-firm concentration index. But it did not satisfy everybody. Ornstein (1975) and Phillips (1976) have argued that the number of firms itself is likely to be an important independent influence on behaviour because it facilitates communication and CRk gives a very poor representation of this.³ Secondly, the established relationships are not necessarily causal and do not justify the usually implied concentration - to - profits line of causality. Cowling (1982) has also expressed doubts that dominant firms can allow their behaviour to be constrained by the output of small firms. Would they not simply buy out the smaller firms or adopt aggressive policies to eliminate them? With this line of argument, the industrial structures characterised by dominant firms and a fringe would be unstable and transient.

The first problem, relating to the possible role of the number of firms could be taken care of by a model which has better representation of the number of firms apart from the concentration index.³ The second problem suggests that the concentration-profits link is complex and can empirically be better handled with simultaneity considerations. This is looked into in the section dealing with empirical models, as are Cowling's questions relating to dominant firms/fringe industrial structures.

A CONJECTURAL VARIATIONS APPROACH

In the Saving model collusion is partial in the sense that it involves only part of an industry. Cowling & Waterson (1976) have derived results that extend collusion to cover all firms in an industry. Like Saving, they also assume profit maximising behaviour, a homogeneous product and allow for different cost conditions among firms, reflected in firms' marginal costs. Entry is implicitly assumed to be blockaded so that the number of firms is well defined and firms do not have to worry about potential entrants.

Their model is an extension of Stigler's (1968) which relates the Lerner index of monopoly power to an index of the effectiveness of collusion, and to the price elasticity of demand. Changing notation slightly their model expresses the

profits (Π) to sales (R) ratio as

$$\frac{\Pi}{R} = \frac{H}{\eta} (1 + \delta) \quad (2.6)$$

where $\delta = \sum s_i^2 \lambda_i / \sum s_i^2$, s_i is the i th firm's market share (q_i/Q), where q_i is firm i 's output and Q is the total industrial output. H is $\sum s_i^2$, the Herfindahl index of concentration and $\lambda_i = dQ_i/dq_i$ is the conjectural variations term. Q_i is the total output of the other firms which are firm i 's rivals. In a monopolistic industry $H = 1$ and the price-cost margin would depend on η and δ . At the other extreme is the case of a perfectly competitive industry where collusion is not necessary and $H = 0$, in which case the value of the long-run Lerner index is also expected to be zero.

The absence of recognition of interdependence ($\lambda = 0$) implies a Cournot outcome (which depends on H , and η). Another point to note, concerns the interaction term $H\delta$. It represents the expectation that as H rises (falls) with increasing (falling) concentration, Π/R is also expected to be directly (positively) related to those changes which are influenced by the degree of collusion.

Turning to the question of importance of the number of firms (cf. the criticism at the end of the previous section), it is easy to verify that in (2.6) the conjectural variations term is sensitive to the number of firms.⁵ Suppose that the expected response of each rival is the same. Then for each firm the conjectural variations term is $\lambda_i = (n-1)dq_i'/dq_i$, where $(n-1)$ is the number of rivals and $i' \neq i$. Clearly the number of firms will now directly influence the conjectures.

IMPLICATIONS FOR ESTIMATED MODELS

Cowling's questions regarding the appropriateness of the dominant firms/competitive fringe industrial structures can only ultimately be answered by an assessment of empirical evidence. But the questions also relate to the appropriateness of using CRK as opposed to H in empirical analyses. CRK rather than H is often the measure that is used because of data availability. In order to answer some of Cowling's questions it is suggested here that increasing size inequalities within industries are likely to be characterised by

greater polarisation of the interests of the firms concerned. Also, this is likely to show through as polarisation in their contacts or association according to the similar interests.

Similar interests can result from similar circumstances with respect to technology, levels and types of costs, regulatory constraints and so on. The tendency towards polarisation based on these factors can be more readily visualised by reference to the Lorenz curve, where greater inequality widens the gap between the Lorenz curve and the line of perfect equality and two distinct 'similar-interest' groups of firms become conceivable. The industries would be characterised by one form of price leadership or another according to the composition of the two groups and their relative importance. With this possibility, one might well ask why larger firms should find it desirable for arrangements that always involve all firms in the industry in the manner implied in the H index. Phillips (1972) in investigating what he called the 'homogeneity of values' noted that 'there is evidence that different groups of firms have found that special organizations are more effective in dealing with their own special problems'. Neumann, Bobel and Haid (1985) have argued that membership of a dominant group, and the difference in behaviour between that group and the fringe reflects barriers to entry into the former. As long as such barriers exist, it may therefore be expected that the dominant firms market structures will exist, and it can be argued that the relevant barriers include the usual Bain-type barriers to entry.

Apart from these barrier effects, the Saving type of structure may not only exist but it could also persist for a number of reasons despite the desire by the dominant firms to eliminate the fringe. The first is that even slight product differentiation can afford the fringe firms some degree of insulation from the larger firms' aggressive market policies. The second reason is that with reasonably large numbers involved in the fringe, takeovers *en masse* or even sequentially but done persistently, would easily attract the attention of the authorities or the public, who may see this as undesirable⁶. Even where antitrust legislation is absent (as in most LDCs) it does not mean that the public and the authorities are indifferent to monopoly power and the prospect of its increase with takeovers. After all, systems of price controls such as those existing in most LDCs, are there to counter monopoly power. The third reason is that takeover of fringe producers could be costly. If the takeovers involve subsequent operation of the 'taken-over' plants, this could involve

substantial managerial diseconomies due to spatial separation etc. If the takeover is simply followed by discarding of the 'taken-over' plants, this would represent waste, and in any case, there is no guarantee that following takeovers, the problem of the fringe will not crop up again.

With these considerations one must not discount the Saving type of industrial structure and the appropriateness of CRk. This is especially so because in empirical applications no particular period of time may be considered to represent long-run equilibrium for all industries. Only in such circumstances, might it be claimed that the observed industrial structures are a result of a complete rationalisation process. This leads to the interesting observation that in LDC manufacturing where industries are still characterised by youthfulness, size inequalities are often widespread and marked to the point where the 'modern sector'/'informal sector' duality is well recognised, and where the former is taken to include large-scale firms while the latter corresponds to 'cottage' producers. This is the impression one gets for instance from an analysis of Malawian industrial structures examined in Chapter 5. Even the authorities there recognise this, hence licencing of firms is according to size criteria.

Going back to the Saving and CW models, the application of either is likely to proceed on the basis of availability of data. Thus other variables X and Y might be substituted for η and ϵ in the Saving model on the assumption that $\eta = \eta(X)$ and $\epsilon = \epsilon(Y, \dots)$. In the CW model χ might be given as $\chi = f(CR, Y^{-1}, \dots)$ where CR is the degree of concentration. For instance, entry barriers in Y can be seen as having an inverse effect on expectations (and the need for collusion) with respect to potential entrants. In that case the formulation (2.5) which assumes entry limiting behaviour would also be implied in a Cowling and Waterson-type model but this time with barriers to entry taken into account. If as is rarely done, there is the possibility of inclusion of a separate collusion variable (e.g. Phillips 1972) the resulting model cannot be associated exclusively with the CW since the dominant group models are not incompatible with a separable collusion variable.

Next, given the qualitative similarities between the two models as far as empirical investigation is concerned, it is a simple matter to link them to the formulation (2.5). Let the degree of concentration represent historical and current conditions of entry i.e. $CR = f(B)$ where CR is some appropriate measure

of concentration and B is a set of barriers which need not be confined to scale economy barriers.

With this (2.5) becomes

$$\mu = - \frac{1}{\frac{1}{\eta} \{f(B), B\} + 1} + 1$$

or

$$\mu = - \frac{1}{\frac{1}{\eta} \{CR, B\} + 1} + 1 \quad (2.7)$$

which now gives explicit mention of the degree of seller concentration. It will be noticed in the following chapter that many empirical models have several features deriving from the type of formulation represented by (2.7). Moreover its limit price foundations go some way towards meeting the major requirement of long run profits view that is characteristic of dynamic analyses.

As Jacquemin and Thisse (1972) admitted, it is impossible to come up with a model that simultaneously achieves broad generalisations and at the same time generate sharply focused predictions. At the same time, the generality of (2.7) should not be over-emphasised. Like the Saving and CW models (2.7) ignores the multiple dimensions of conduct and performance. Jacquemin and Thisse's own generalised dynamic model not only allows for these, but also multidirectional causality, strongly suggesting the appropriateness of simultaneity considerations. Unfortunately, it is not easy to incorporate multiple dimensions of conduct and performance in empirically investigated models because the requisite data are generally not available unless these are intentionally generated eg. through surveys.

A structural aspect that has recently been generating a lot of interest and which is associated with CR in (2.7) is conventional import competition as suggested by Bain (1951) and formalised by Esposito and Esposito (1971). Even if it is supposed that this can be allowed for in the measurement of CR, there are theoretical and empirical grounds for considering the possibility of imports

controlled by the domestic manufacturers. For instance the products may be from subsidiaries or associate companies abroad in which case the imports are no longer just a structural dimension but become a conduct one too. Import penetration in this case will not necessarily lead to a fall in the degree of monopoly (Sugden, 1983).

Data availability and sample size usually impose limits on the size of models and the form of the variables that can be included. On the whole, studies that use H are extremely rare for the understandable reason that they require detailed information about individual industries. CR is widely used and implicitly the dominant firm(s) market structure is assumed. However, it is thought that the results of using either H or CR are similar since it has been indicated that the two tend to be highly correlated (Baily and Boyle, 1971; Curry and George, 1983).

On a more general level, empirical models have tended to expand by inclusion of more relevant variables, of which entry barriers and international competitiveness are increasingly popular. But the approach of including additional variables in a seemingly *ad hoc* manner has been criticised by Sawyer (1982). In Chapter 4 a model of performance will be suggested, following a discussion of some of the issues that help to justify it. But before getting to these, the following chapter reviews previous empirical models according to a few important characteristics.

NOTES

1. Note that these definitions are best interpreted in terms of firms' adjustment towards long-run equilibrium, and that at any given point in time the profits from short-run profit maximisation are the maximum attainable.
2. Brief expositions of models based on different assumptions can be found in Sawyer (1979).
3. This criticism can be seen in the same vein as Scitovsky's, quoted in the previous chapter about the fact that the concentration indices try to represent too many structural features.
4. Despite the name, the concept of 'numbers equivalent' does not answer the Ornstein / Phillips criticism either. The numbers equivalent for a concentration index relates the value the index to the number of equal-sized firms which would give the same value of the index as the measured one. For the k-firm concentration ratio this would be given by k divided by the value of the concentration ratio ie. the reciprocal of the average share of industrial output of the k firms. The 'numbers equivalent' is therefore hypothetical while the problem here relates to communication among actually existing firms.
5. In this case, one could incorporate the communication problem into how firms formulate their conjectures but this complicates the analysis considerably. But it could be argued that the smaller the firms the less they matter in the communication network, in which case we resort to the idea behind concentration, where firms' shares are of great importance.
6. In some countries eg. Malawi the relevant 'authorities' might be the government ministry responsible for overseeing industrial development, while in others it might be public watchdogs such as monopolies commissions etc.

CHAPTER 3

A SURVEY OF PREVIOUS ESTIMATED MODELS

TOWARDS EMPIRICAL MODELLING

Bain (1951) went to elaborate lengths to single out the effects that might distort the empirical concentration-profits relationship. In particular he was concerned that the measures of profit and concentration were the ones required by theory and correctly applied.

There are potentially numerous other structural elements that could lead to distorted representation of industrial concentration. In short, Bain's approach could be described as

$$\Pi = F (CR^*, X) \quad (3.1)$$

where

Π = profit rates

CR^* = concentration index, for industries in a closed economy, catering for national markets, where firms have symmetrical diversification or single products.

X = firm size, proportion of overhead costs, importance of capital assets, durability of good, nature of buyers,...

The conditions accompanying CR^*

are usually not satisfied in real life. We might then want to take account of this fact by looking at the factors (discussed below) which represent the divergence of the observed concentration measure, CR , from CR^* ie.

$CR - CR^* = g(Z) = g(\text{cross elasticity of demand among the industry's products, import competition/export intensity, localisation of the markets, degree of diversification})$

where CR is the observed or calculated concentration ratios and the factors listed on the right-hand side account for the divergence of CR from CR^* . We could then write the above function as

$$\Pi = F[(CR - g(Z)), X] \quad (3.2)$$

and assuming separability

$$\Pi = \phi (CR, X) + \psi(Z) \quad (3.3)$$

Bain dealt with the factors $\psi(Z)$ by simply excluding culprit industries from the sample (ie. those which included products with low cross-elasticities of demand, high import competition, localised markets, etc.).

$$\Pi = f(\text{CR}, X) \quad (3.4)$$

The substitutability principle (in defining an industry and hence the measurement of the variables) requires account to be taken of competing imports and geographical extent of the market. In the former case, if imports are not considered, the result would be overstated CRs. In the latter case, taking geographically dispersed producers as if they were supplying the same market and competing, can understate true CRs. This is because distance and transportation costs make products supplied from certain points, more distant substitutes.

The problem which is posed by diversification arises when the nature of available data is such that the industrial groupings used, include products which are not close substitutes and there is imbalanced diversification (or there is specialisation) by firms among the different products. The ideal situation would be where each firm in the industry accounts for the same proportion of output of every product, in which case the concentration index based on the output for the industry would be the same as that for any of the products. This correspondence ceases to hold when there is asymmetrical diversification or when there is specialisation. As an example of the type of problem, suppose an industry has three firms, firm 1 producing 100 percent of product a, firm 2 producing 100 percent of b, and firm 3 producing 100 percent of c. The aggregate 'industry' concentration measure based on the output of the whole industry, would be an underestimate (since for example the one firm concentration ratio would be less than 100 percent for the 'industry', whereas an appropriately weighted measure should be 100 percent, ie. as in the component industries of the different products). Imbalanced diversification in general, poses the problem of misrepresentation of the concentration for one or more of the component products.

The usual procedure for taking account of these problems in many of the recent empirical studies has been to use industries defined at a uniform level

of disaggregation, preferably at 4-digit Standard Industrial Classification (SIC) and to control for the factors Z listed above by using appropriate variables (eg. measures of diversification, localisation of markets, import intensity, and export intensity).

A systematic way of dealing with X is to classify the factors according to the nature of their influence like entry barriers, characteristics of the product and cost conditions. The number of variables that are included to represent these influences usually depends on 'their roles in the SCP paradigm, their use in previous studies and the availability of relevant and usable data' (Intriligator, 1978).

Other equations besides that for π may also be considered according to the interest in them or the perceived simultaneity in the profitability relationship. Most of the variables that have been used in empirical models are discussed next. But since some of the variables discussed here will be redefined and discussed again in the context of Malawian data in Chapter 6, we shall avoid repetition by confining the discussion of this chapter to theoretical issues and some problems which are general, while Chapter 6 will deal with problems specific to Malawian application.

Price-cost margins (M)

As has already been seen in Chapter 2, an appropriate performance index for the effects of competition on pricing behaviour is the Lerner index. In empirical applications the average cost curve and marginal cost curves are assumed to be constant and equal over the relevant range of output. This solves the problem of estimating marginal cost.

The majority of the concentration-profits studies have been carried out for the USA and most of these since Bain's study have used rates of return on equity after tax (Weiss, 1974). It appears that the readily available data for this measure may have led to some confusion about the profitability variable with users trying to justify the formulations they use.

Mann (1966, p296) probably contributed to this when he restated the

predictions of 'conventional price theory' as that firms in more highly concentrated industries earn higher rates of return on the owner's investment than the opportunity cost of the equity capital. This is despite the fact that his study was intended to verify Bain's earlier results and that Bain's concentration - profits hypothesis had been in terms of profit rates on sales:

"As the hypothesis is developed to this point, the predicted profit-rate differences are explicitly differences in ratios of excess profit to sales". (Bain 1951 p 296)

Bain's use of the rate of return on equity was on the grounds of availability of data and that the hypothesis should roughly hold, with a source of distortion being differences among industries, in sales to equity ratios. For Bain the rate of return on equity was proxying for the rate of return on sales which was the more acceptable variable, rather than the other way round.

The rate of return on sales that has come to be widely used is the price-cost margin, $M = [(S - RM - W)/S]$ where S is the value of sales, RM , the cost of materials and W the payroll. Its advantage over rate of return on equity is in that 'oligopoly theory really predicts high prices and not necessarily high profits' since profits could be affected by excess capacity after resources have responded to high prices. (Weiss, 1974 p199). This and the relative reliability of margins data as well as some inherent biases introduced in the return on assets measure have persuaded some of the former advocates of the latter about the superiority of price-cost margins (cf Weiss, 1971 and Weiss 1974; also Ornstein, 1975, and Hay and Morris, 1979, p210 n.20).

Usually the numerator of M is measured as profits plus various costs such as 'advertising, central office expenses including research and development, depreciation expenses and taxes' (Weiss, 1974). To the extent that most of these other costs represent elements of fixed costs empirical results could be affected by differences in these costs, which might be related to concentration. Ornstein (1975) argued that for instance a firm with zero such fixed costs could register the same M as one with zero profits but positive fixed costs. The implied procedure is therefore exclusion of all such costs from the numerator of M (see also Phillips, 1976).

Concentration (CR)

Concentration is taken to represent the influence of the number and size distribution of firms in an industry on the behaviour of those firms. This is usually done by using a measure of concentration as a summary statistic to represent these features.

There have been several measures of concentration which have been proposed and used. A few of the measures¹ are now rarely used for measuring the degree of concentration as they can best be described as measures of size inequality rather than concentration as such, and the two are not always closely related. For example measures of inequality are very sensitive to the number of firms and will therefore give importance to say the entry of very small firms (which would lead to increased inequality) whereas measures of concentration would attach little significance to such entry.

The two most referred to measures of concentration are the k-firm concentration ratio, CR_k and the Herfindahl index (H) defined in the previous chapter. We also discussed in that chapter how different theoretical models, based on different behavioural assumptions, can lead to the use of a particular concentration index. In practice however, there is no guarantee that any particular measure adopted will represent the relevant structural aspects adequately, and we have already examined some of the criticisms that could be levelled against certain behavioural assumptions. Against such an uncertain background about the appropriate measure to adopt, and going back to oligopoly theory, the basic requirement is that the measure adopted should describe industrial structure in such a way as to indicate the extent to which a few firms dominate a market, and to distinguish atomistically competitive from oligopolistic structures.

Hannah and Kay (1977) suggested a set of properties which a measure of concentration should possess in order for it to correctly represent the behavioural tendencies. Curry and George (1983) have investigated the behaviour of a number of indices with respect to some of the theoretically desirable properties. H satisfies all the properties suggested by Hannah and Kay but CR_k has the potential of violating the principle of transfer since it is not sensitive to changes among the smaller firms or changes within the

k-dominant firms. This deficiency of the CR_k means that the measure could remain constant when a change should be indicated eg. when the shares of some firms within the dominant group rise at the expense of those of other firms within the group. Hannah and Kay have given an illustration of how an inequality measure can have an even worse property, where the indication is that concentration might have declined, when it has actually increased. The weaknesses of CR_k are usually considered to be quite minor considering its advantages which apart from doing the basic job, include its use of readily available information such as information on firms' size distributions. The H in contrast, requires information on individual firms and the gains are not regarded as drastic. As Curry & George (1983) put it, 'it is, however, mildly reassuring to know that if one's chosen ideal measure cannot be computed because of data limitations the use of simpler measures such as concentration ratio may well yield similar results'. (p211) But before leaving this discussion it is worth pointing out that there still are problems associated with the measurement of CR_k and these specifically relate to the choice of k, the accuracy of representation when small producers are cut-off from the data set, and the economic variable which should be used to measure CR_k.

The k used in research often depends on published information. Sometimes (especially in Western industrialised economies) CR_k are actually published and usually k takes the value of 3 or 4 and the criterion of choice is usually the preservation of confidentiality. But just because the value of k seems arbitrary from an economic point of view, does not mean that any particular value of k can be criticised on the grounds of arbitrariness. This is because oligopoly theory itself is silent on the question of how many firms constitute oligopoly. But it might well be worthwhile, where circumstances permit, to experiment with a number of alternative values of k. Some studies have done this, but they are in the minority.

As indicated above CR_k like other true measures of concentration (as opposed to measures of inequality) gives less weight to smaller firms. For CR_k the effect of smaller firms outside the k-dominant group is picked by the denominator (total industrial output). The smaller the firms, the smaller will their impact on the magnitude of total industrial output. This property of CR_k reduces considerably the problem associated with most industrial data, that they relate to larger firms, where the smaller ones are cut-off by some minimum size criterion. But of course the crucial consideration is the size of

the cut-off tail of the excluded producers in terms of their output contribution, which in empirical work should be given some mention.

Finally, it should be clear that the relevant economic variable for measurement of concentration should be output. In economies where labour is heterogeneous according to the nature of the employer (eg. large scale vs. small scale producer) the suggestion that the economic variable used makes little difference (Aaronovitch and Sawyer, 1975, p66) , will no longer apply. If for example the smaller scale producers are associated with lower quality labour in terms of educational or skill attainment, than the larger producers, then the use of employment figures rather than output ones would tend to understate true concentration levels. This is likely to be more of a problem in LDCs where there is considerable labour heterogeneity because of educational inequalities, and where small producers account for significant proportions of manufacturing output.

Import intensity (IMPS) and export intensity (EXPS)

Esposito & Esposito (1971) formalised the influence of imports in moderating that of concentration on domestic pricing by considering the former as a type of entry or potential entry.

Assuming that import quotas are not used, it is suggested that imports are also subject to conventional barriers to entry but that the overall barriers tend to be lower for foreign entrants than domestic ones. Foreign entrants come from a wide range of environments, some of which are likely to be characterised by much lower factor prices, superior technologies, management skills and so on. They are therefore in a position to exert the most immediate threat of entry, the antitrust implication being that less restrictive trade policies encourage more competitive pricing.

Import competition is often represented by import intensity (IMPS) measured as the ratio of the level of imports to domestic supply and $dM/dIMPS < 0$. Sometimes this is taken into account in the calculation of the concentration indices (e.g. Shepherd, 1972; House, 1973), where the total industrial output used in the calculation of the indices includes imports. The use of IMPS rather than some other variable in the price-cost margin equation has some problems of interpretation which usually do not receive attention.

Esposito and Esposito's prediction that $dM/dIMPS < 0$, was based on the import ratio being a representation of price competitiveness of foreign imports and the overall barriers facing the foreign imports, which include all the conventional barriers but applied to an international context, as well as international trade restrictions on imports (ie. physical, transportation costs as well as tariff based restrictions). But what is one to make of the possibility that low domestic prices and high levels of imports could coexist as a result of failure of the low prices of domestic firms to restrict imports?

The answer to this question must lie in the reasons why the domestic firms would continue to maintain low prices if they were ineffective in stemming imports in the first place. The persistence of low domestic prices and high import ratio must indicate that the low prices are worthwhile to the domestic firms, and one reason why this might be the case is that the domestic firms might not be interested in reducing imports as such, but merely to maintain their market shares in the face of competition from privileged competitors. Given the diversity of potential sources of imports and their potentially highly elastic supply, this might be a sensible strategy than attempting to deter entry altogether. Thus the import restriction failure argument easily gives way to that of entry regulation (or what ultimately amounts to the same thing, own market share maintenance) so that high imports will still be associated with low prices for domestic firms for the same reason as before, that imports are a threat to domestic firms' long-run profitability.

In the same vein of considering the import ratio as representing barriers to entry, it could also be argued that where domestic prices and import ratio are both high, the situation could be similar to that of ineffectively impeded entry (in the analysis of barriers with respect to domestic competition). In such a situation, barriers would be so low that domestic firms may as well get the highest margins they can get, without bothering with entry and its effects on their future market shares. A similar domestic prices/imports relationship might also arise where domestic demand is growing fast, or where there is considerable product differentiation between the domestic and imported products, or a combination of these factors. [This implies that if we were to have variables representing these factors in a domestic pricing equation, we might expect some interactions between the variables and the import ratio.]

Like in the Bain-Sylos-Labini entry limiting model discussed in Chapter 2,

situations where entry is ineffectively impeded present special problems when it comes to empirical analyses. This is because the situation might mean that the price/imports relationship is non-linear unless the industries with ineffectively impeded entry can be identified and excluded from the sample. An alternative approach would be to include this possibility in the modelling. Neither of these considerations are usually made. But there could yet be another solution. Might all these problems not be better resolved by using a variable better suited to capturing the relationship between domestic pricing and import prices, which is how the threat of imports arises? Such variables could for example take the form of measures of rates of protection (such as nominal or effective rates of tariff protection) which are based on the relative levels of domestic prices and import prices, and the levels of tariff barriers.

But on closer examination, the question relating to the use of a domestic/import pricing variable as opposed to the import ratio, is the same as that for using potential post-entry prices rather than barriers to entry variables, where the latter indirectly represent potential post-entry price via potential output. The problem with such price variables is that they are more difficult to derive and require too much information some of it involving hypothetical situations. Such variables are therefore liable to serious measurement errors while , in some cases, presenting no improvement on the implicit pricing variables based on an assessment of barriers to entry. Moreover the direct price related variables do not reflect some potentially important barriers such as physical import restrictions, foreign exchange restrictions, etc.. In situations where these exist and are prominent, the difference between domestic prices and the prices of imports will itself be irrelevant in influencing domestic prices.

Take the Fig 3.1 below. Suppose that because of favourable production conditions abroad relative to domestic ones (hence low market determined barriers to entry for imports) the 'cost, insurance, and freight' import prices could be as low as P_1 where all domestic requirements, Q_1 could be supplied from imports. If there are import restrictions such that only Q_2 can be supplied from imports and the remainder of the domestic market is to be supplied by domestic firms this could be represented by the rising portion of the

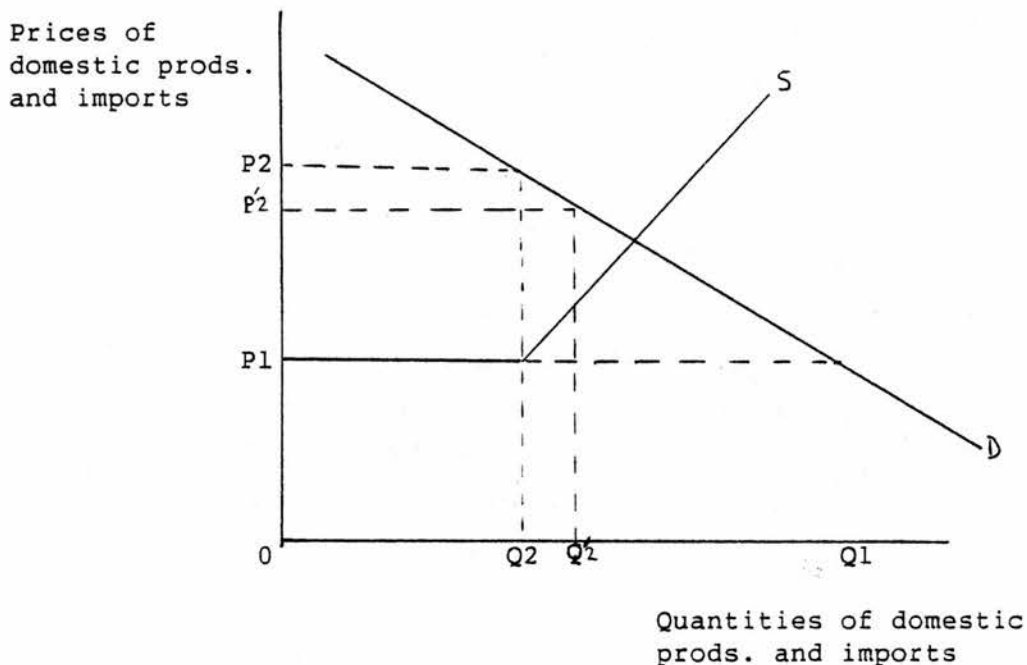


Fig. 3.1

supply curve. [Note that in the case of tariff protection the same level of import restriction could be achieved by an import tariff of $P_2 - P_1$ per unit of imports.] The further to the right Q_2 is (that is the higher the import volume allowed relative to the domestic market) the lower are the maximum prices the domestic firms can hope to obtain because of the downward sloping demand curve. Here it is the direct import volume restrictions rather than their relative prices which influences the potential profitability of domestic firms. That is the level of tariffs may well be zero and yet domestic firms could still be protected by other forms of import restrictions. Such situations are characteristic of LDCs where trade regulation has a higher profile but the current protectionist wars among Western economies indicate that the phenomenon is not confined to LDCs. The use of import ratio rather than measures of pricing differentials would be a general way of dealing with these problems.

Export Intensity

Industries the larger proportion of whose output is exported, are expected to be operating under stiffly competitive conditions and their pricing to be appropriately competitive. Such considerations may be very important where domestic markets are small and minimum efficient scales are large relative to

that market, so that some or all producers are compelled to sell on the international market. For the industrialised economies where such market considerations are not necessary, it has been suggested that if export activities were not highly profitable, then firms would not bother to surmount the problems associated with exporting, namely risk, marketing problems, tariff and transport cost barriers (Shirazi, 1974). The influence of export intensity (export-sales ratio) on performance is therefore likely to be subject to opposite interpretations.

Growth rate of sales (G)

Like export intensity, the influence of G on price-cost margins is not unambiguous. On the one hand it might be expected that fast growing sales imply less pressure that might lead to a breakdown of collusive discipline. G would in this case be positively related to M. On the other hand the desire for larger market shares in the growing market might make firms resist increases in prices. The net result of these two effects might be a positive though weak coefficient for the G variable in a profitability equation. But because of the first reason it is usually assumed to have a coefficient with a positive sign.

G is usually measured as the percentage change in sales and this raises some serious problems if there were supply-side problems that constrain production. Suppose we have a year when production was seriously disrupted by say, strikes, followed by a year of normal production. What would the rate of change of sales between the two years be actually measuring? Is it as the models presume, strength of demand or growth in the rate of production? This problem is generalisable to other situations where there are likely to be production constraints which make production lag behind demand. But of course one might insist that the variable can still measure the right effects since G is usually measured in terms of value of sales rather than quantity, in which case with freedom of pricing, this would respond to the gap between demand and production. But then the input problems would mean that firms' output decisions are restricted and it might no longer be possible to talk about profit-maximising behaviour if this were possible under normal conditions. This is a situation which might call for the inclusion in a profitability equation or in some other equation within the system, of variables which account for constraints on production due to input problems.

Minimum efficient scale (MES) and cost disadvantage at less than MES (CDR)

As indicated in Chapter 2, both these variables have to do with scale economies barriers to entry. Approximations to MES are often based on the average size of the largest plants in use, in terms of output. When this is expressed as a percentage of market size, it is assumed to give an indication of the size of plant (relative to the market) required for efficient entry. CDR on the other hand indicates the cost disadvantage of operating below the minimum efficient size. This is expressed as the ratio of average costs of operating below MES to those of operating at estimated MES or over. MES and CDR therefore describe the shape of an 'industry's' long-run average cost curve, at minimum optimal size, and at below this. Suboptimal entry is less disadvantaged with respect to efficiency, if this curve is shallow below MES.

Not all studies can afford to include both of these variables and sometimes neither is included because of data problems. Several 'new' measures have been suggested for MES and CDR to take advantage of whatever data may be available. Fuss and Gupta (1981) have suggested a statistical cost curve approach that only makes use of supposedly readily available plant variable costs and output data. The statistical cost curve approach basically tries to estimate the average cost curve using information on costs and rates of production supplied by the firms. But the use of money value of output as a convenient way of avoiding the problems of product heterogeneity, introduces the problem that the money value of output may well pick up monopoly power (through the use of prices). The other problem is that the requirement is that the cost curve represents the full technical efficiency while the use of the usual regression techniques would only give 'best-fit' curves, where 'frontier' type estimates would be called for ie. so that the observed points are enveloped from below. But a potentially more serious problem with this approach, (to the extent that it makes all the above considerations irrelevant) is that large numbers of observations are required so that each industry must have a large number of firms/plants already in existence. Thus the problem with the Fuss and Gupta approach is that it still requires large numbers of observations despite their insistence that this problem is alleviated by the possible use of pooled cross-section and time-series observations. For example, the fewer the cross-section units the longer we would need the time

series to be, and the shorter the time-series observations, the more cross-section units we would require.

Lyons (1980) has suggested an MES measure based on the probability of multiplant operations and their actual occurrence. The basic argument in Lyon's measure is the association of MES with the point at which multiplants are contemplated, the reasoning being that firms operating plants below MES do not need more than one plant. Caves, Shirazi, Porter (1975) suggested a measure of CDR that could be used with data from the same size-distributions used for CR estimates. CDR is proxied by the average labour productivity in smaller firms producing the bottom 50% of industry output as a proportion of the average labour productivity in larger firms.

Advertising intensity (AS)

This is usually measured as the ratio of advertising expenditure to sales. One widely held view is that advertising expenditures can be regarded as both a symptom and a source of product differentiation in the industry (Comanor and Wilson 1967). To the extent that established firms enjoy economies of scale in advertising and that new firms are required to more than match current advertising by established firms to overcome brand loyalty, advertising is said to constitute an entry barrier. This view is however increasingly being questioned. Take Stigler's (1968) definition of entry barriers as a cost which must be borne by a potential entrant but not by established firms. It has been argued that just as new firms might be expected to incur penetration costs now, established ones must also have incurred them at an earlier time. Cost differentials are therefore questionable on this aspect (Reekie and Bhojrab, 1981). Bloch (1980) has cited a number of studies whose findings could be interpreted as weakening if not negating the advertising barrier view. This is especially the case when proper account is taken of current advertising as creating an intangible asset which is not necessarily short-lived.

These and other issues in the use of AS and the interpretation of results have been aired in a debate in a recent Journal of Economic Literature (1980). What emerges from this debate is that the data used for AS generally do not relate to sufficiently homogeneous products nor take into account other relevant expenditures for sales promotion. Furthermore, it may be necessary to consider capitalisation of advertising expenditures (depending on the presumed

lives of the effects)². The task of taking these issues into account has hardly begun and is not likely to be an easy one given the data limitations including the difficulty of determining the 'lives' of the intangible assets and the rate of depreciation. The questions that have been raised must be seen as urging caution in interpreting results based on AS and drawing generalisations from them.

Consumer demand (CD)

The exercise of monopoly power depends on the buyers' power as will the need for and intensity of sales promotion. Final consumers being many, and generally less knowledgeable than say intermediate consumers (other producers), the price elasticity of demand in the former market is likely to be greater than in the latter. The possibilities and returns from product differentiation are also likely to be greater. These distinctions are usually achieved by using a dummy variable for the two types of market. Sometimes e.g. Martin (1979) and Geroski (1982) the proportion of industry output going to final consumers is used but such information is rarely available unless there are inter-industry flows figures.

Industry diversification (DV)

This is a relatively new variable as far as explicit inclusion in empirical econometric models is concerned. Diversification is the extent to which enterprises are engaged in secondary activities apart from their primary ones. Firms can use it as a strategy to improve the return-risk trade-off or avoid gambler's ruin situations. The latter is the situation where, 'while the average return of the entity may be satisfactory, fluctuations in the average return may give rise to a series of losses or negative cash-flow causing bankruptcy for the operating entity' (Weston, 1970 n1).

Improvements in the return-risk trade-off are partly achieved by lowering demand-side and supply-side risks. The former is achieved via multiproduct production while the latter is achieved by having many firms supply inputs for the many products thus lowering high inter-firm dependence (Beattie, 1980).

The implications of diversification to market structure is that competition can be reduced or prevented from increasing by cross- subsidisation of predatory

rivalry. This can be done via price-cutting, high sales promotion expenditures etc. of prolonged duration (Berry, 1970). It is in that case expected to have a positive effect on long-run monopoly power. Since this is a concept associated with enterprises one requires suitable measurement for using it at the industry level. One suggestion is

“... for enterprises with establishments classified in more than one industry group, their diversification may be measured by comparing their non-primary with their total output... (the composite industry measure) can be derived as weighted averages for the component industry groups of the secondary share in total output ...” (Utton, 1979,p83, brackets added)

Diversification into an industry, is a special type of entry into those industries since it tends to nullify the entry barriers there (Hines, 1957; Yip, 1982). Outside specialised studies on diversification, this aspect has not influenced many empirical SCP models.

The problem with the diversification variable is that it is subject to an alternative interpretation, that of controlling for the measurement problems associated with concentration (discussed above in connection with Bain's work). Although the role of this variable in studies which include it in the price-cost margins equation is not usually indicated (cf. Shirazi, 1974; Geroski, 1982) we suggest here that it is used as a control variable for the measurement of concentration, while in studies which are interested in diversification as an aspect of structure or conduct (Utton, 1979; Berry, 1970), the cross-subsidisation aspect is directly relevant and is given prominence.

Geographical extent of market (REG)

Bain (1951) suggested that a homogeneous product by different producers located in geographically dispersed areas may not be readily substitutable for each other because of transportation costs. Concentration indices that do not take this into account would be implicitly assuming that all markets are equally accessible to all producers and tend to understate the proper degree of concentration. Weiss (1972) has systematically looked at the problem of measurement, identifying the two main approaches as distance shipped and geographical dispersion of output:

"In many cases, dispersion and distance shipped give consistent evidence about market size. If plants producing a given commodity are widely dispersed and the commodity is seldom shipped long distances, geographical markets are clearly small. Similarly, centralized output plus long shipments clearly indicate geographically broad markets". p246

Few studies can resort to censuses of transportation for indices of transportation costs and so dummy variables are sometimes used for regional/national classifications. On other occasions, output dispersion indices such as the number of states (in the USA) required to account for some percentage of output have been used (Weiss, 1972 p 245)

SOME EMPIRICAL STUDIES

The concentration - profits relationship

Bain's test of the concentration - profits hypothesis on US manufacturing took the specific form of investigating whether the relationship was continuous.

Tests were on a sample of 42 industries, for the relationship between CR8 and 1936-40 industry average profit rates after income tax (i.e. net profit after tax as a percentage of net worth). The results gave no indication of a linear relationship but showed a marked difference in profit rates above and below a critical concentration of 70%.

Subsequent to Bain other studies have generally reported a continuous relationship and all but a handful of studies for the US and other countries found the relationship to be positive and significant, though weak. Most of the earlier studies have been extensively reviewed by Weiss (1974) and others including Rhoades and Cleaver (1973) and Meeham and Duchesneau (1973). At the end of his review, Weiss(1974,p231) stated that the concentration-profits relationship held up for various Western economies including Japan, despite data problems which biased the relationship towards zero.

Most of the studies for the US used a return on capital as the dependent variable. But other studies produced similar results with price-cost margins (Collins and Preston, 1968; Qualls, 1972). However, in a reconstruction of Bain's (1951) and Stigler's (1964) earlier works with the same samples but for later periods, Brozen (1970) found rather mixed results. The sample which Bain had

applied to the 1936–1940 period yielded a weaker and non-significant relation for 1953–1957 but a stronger and more significant one for 1962–1966. In the Stigler case, the later period, (1962–1966) yielded a weaker and non significant relation than Stigler had found for 1953–1957. Brozen found the diminished effects of concentration on profits even in the industries whose concentration remained high in the latter period. He suggested that the relationship might have been stronger in the earlier periods because industries were out of equilibrium then, implying that the relationship predicted by theory might not hold in equilibrium after all. But others have expressed doubts as to which periods related to equilibrium for all industries (Shaw and Sutton, 1976). Weiss (1974) has suggested other possible reasons, including increasing diversification which reduces the correlation between firms profits and CR in the industries in which they are classified.

Demsetz (1973) and others, including Collins and Preston (1969), Shepherd (1972) have found that the concentration – profits relation is strongest for largest or leading firms and that for smaller firms it may be weak or even negative. Demsetz (1974) has interpreted this to be an indication of the superior efficiency and products of the larger firms relative to smaller ones.

-There is also the possibility that the leading firms might seek prices that maximise their own profits whatever the consequences would be for the smaller firms (Weiss, 1974). This interpretation suggests that collusion might be effected along the lines suggested in the previous chapter i.e. where it could only involve the dominant firms.

Barrier effects

Simple regressions of price-cost margins on concentration seem to typically find a significant concentration coefficient but the significance is lessened or disappears when other variables are introduced, particularly entry barrier variables. Barring the cases where entry barriers are very high, when entry is most likely to be blockaded, price would be positively associated with the level of barriers.

Bain (1956) and later Mann (1966) tested this hypothesis on industries classified according to barriers that were very high, substantial to moderate, and moderate to low. Bain's results for 1936–1940 and 1947–1951 revealed an

independent significant influence of barriers on profit rates. A distinct difference was found between those industries in the 'substantial' and 'moderate to low' categories.

Mann, with a larger sample, extended Bain's analysis to 1950-1960 to see whether Bain's results were influenced by the Great Depression or rapid post-war inflation. His results corroborated Bain's in that highly concentrated industries with very high barriers performed better than highly concentrated industries with lower barriers.

The simultaneity problem

Many early studies as well as recent ones have been carried out on the implicit assumption of a unidirectional relationship in which performance is a static function of industry structure and conduct, which are themselves assumed to be exogenous (Phillips, 1972). Even when it is realised that the resulting single equations are part of a bigger system with numerous feedback effects, these are either ignored or it is assumed that long lags permit the analysis of specific relationships in isolation (Cowling, 1976; Geroski, 1982).

Bain (1951 p 311, 1956 p191) had recognised that while concentration and conditions of entry can influence performance, concentration itself is endogenous, being influenced by entry which would itself be influenced by performance and by the barriers to entry. The argument has been extended to other aspects of the performance equation. This has led to the common three-equation specification with performance, advertising and concentration as the endogenous variables (Comanor & Wilson, 1974; Strickland & Weiss, 1976; Martin 1979).

Martin (1979) has improved on the earlier simultaneous model by Strickland & Weiss (1976). The choice of the traditional variables was based on theoretical considerations such as those relating to the elasticity of demand, barriers to entry, and imports. The model was specified in such a way that identification requirements were fulfilled. The equation system (rearranged, with dotted spaces denoting non-relevant variables) is given as follows;

$$M = f(\dots, CR4, \dots, CD, G, BCR, \dots, IMPS, REG, AS, MES, CDR, KS)$$

$$CR4 = g(\dots, M_1, \dots, CR4_1, \dots, CD, G, \dots, REG, AS, MES, CDR, \dots)$$

$$AS = h(M, \dots, CR4, \dots, CR^2_4, CD, G, BCR, DUR, IMPS, \dots)$$

where BCR is buyer concentration, DUR is a durable goods dummy and the rest of the variables are as defined in the previous section. The commonness of the variables among the equations illustrates a likely source of identification problems in similar specifications. Martin overcame these partly through the use of lagged variables specified with the subscript i .

The model was estimated using the Three Stage Least Squares method (3SLS) on 209 4 - digit US industries classified according to the consumer/ producer goods distinction. The main results briefly were as follows. His results for the M equation were similar to the Strickland & Weiss ones. The latter reported 2SLS results with barely significant AS, MES, coefficients but significant for G, KS, REG. The concentration coefficient was suspected to have been influenced by collinearity with the scale economy variables. In the CR4 equation $CR4_1$ was the most significant with a coefficient of less than unity which was taken to indicate stable adjustment towards long-run levels. MES and CDR were also significant but M_1 was negative and not significant. For the AS equation M and CR were the most significant. None of the demand characteristics variables were significant for the consumer goods sample but CD, IMPS and BCR were significant in the producer goods sample.

Some consequences of endogeneity specification

There are clearly explanatory variables that are now considered standard for inclusion in the margins equation. A number of studies that have dealt with simultaneous equations specifications have noted the sensitivity of regression results to endogeneity assumptions for a number of the explanatory variables.

For instance, Geroski (1982) using UK data has estimated the model

$$M = f(CR, AS, KS, DV, G, IMPS, EXPS)$$

Firstly Ordinary Least Squares (OLS) was used and then 2SLS. The signs of the coefficients for DV and EXPS were reversed, while several t-statistics were either drastically reduced or increased in the 2SLS estimates. Specific tests for the OLS estimates revealed that not all of the six explanatory variables were exogenous. The results showed sensitivity to endogeneity assumptions particularly for the trade variables. In the preferred non-linear specifications, CR had a negative coefficient, and although AS appeared to play a significant role in the M equation, it was not endogenous. The latter casts a shadow on earlier preoccupation with the endogeneity of AS (e.g. previously cited studies by Strickland & Weiss, Comanor & Wilson, Martin). It also suggests that the attention could have been better employed, focusing instead on trade variables - at least for the UK where trade variables have been found to be important.

In their large six-equation simultaneous equations model for the US., Intriligator, Weston and de Angelo (1975) [reviewed in Intriligator (1978)] similar switches as in the Geroski study were also recorded in moving from OLS to 2LS. Moreover, they were not confined to the margins equation. Their results question the central role accorded to concentration in SCP and the influence of advertising on concentration.

Generally, if simultaneity considerations are desirable, the previous studies indicate that there is some choice of approach to the problem. The alternatives are either structural equations models e.g. Comanor & Wilson (1967), Strickland & Weiss, (1976) and Martin (1979) or a one equation model with simultaneity considerations (Geroski, 1982). The difference is in that the former is explicit, allowing for interest in relationships surrounding more than one endogenous variable. The price to pay for this is of course that more attention is required for the specification and identification of the extra equations (cf Martin, 1979). The consoling aspect in either approach is that neither requires to be exhaustive (see Geroski, 1982 p198; Intriligator, 1978 pp477-78; Judge *et al*, 1981, pp531-33).

STUDIES FOR LESS DEVELOPED COUNTRIES

Unlike many empirical studies for the industrialised western economies, the few that exist for LDCs have been reviewed less often, making researchers less

familiar with them. It is for this reason and that they are of special interest to the present study that they are reviewed in greater detail here.

Although numerous studies have been done on general problems of industrialisation in LDCs very few have adopted the structure-conduct-performance paradigm. The countries for which such studies have been published are diverse in terms of sizes of the economies and their levels of industrialisation. They include India (Gupta, 1968), Kenya (House, 1973; 1976), Korea (Nam, 1975), Malaysia (Gan and Tham, 1977; Gan, 1978), Pakistan (White, 1974).³

Some published studies, e.g. Gupta's do not strictly investigate the SCP but are nevertheless influenced by the ideas and literature relating to it. The following review includes those studies that at least investigated the concentration-profits relationship.

KENYA

House (1973, 1976) has investigated the structure-performance relationship for Kenya at two points in time, 1963 and 1973. In addition to investigating the distinct break hypothesis he also estimated the price-cost margin equation,

$$M = f(CR^3, KS, EXPS)$$

where M was alternately measured gross and net of depreciation, KS was used as a proxy for capital requirements and CR³ was CR3 adjusted for competing imports.

The 1963 sample comprised 31 3-digit SIC industries and data for KS related to 1961. Tests for the distinct break hypothesis established a critical CR³ of 40%. The difference between net margins of industries with concentration levels above and below this level was found to be significant.

For the hypothesis specifying a continuous relationship he obtained (t-statistics in brackets),

$$M = 3.858 + 0.221CR^3 + 14.738KS - 0.063EXPS \quad R^2 = 0.387$$

(1.09)
(2.56)
(2.91)
(1.03)

All the signs of the coefficients are as expected. The F-test for the three explanatory variables showed that they were jointly significant at the 1 percent level. CR³ and KS were significant at 2 percent and 1 percent levels respectively while EXPS was not significant. A comparison of regressions with CR³ adjusted and not adjusted for imports showed that the adjustment resulted in the significance of that variable, yielding greater explanatory power. Comparing the equation above with that for net margins suggested that the significance of KS in the former may have been because of its explanation of depreciation, which is part of the 'normal' profits in M.

The study using 1976 data yielded results similar to those for 1963 implying structural stability although the critical level of concentration was this time higher at 50%.

KOREA

Nam (1975) was motivated by the possibility that while concentration could be associated with resource misallocation, an increase in concentration may be a result of realisation of economies of scale which could be viewed positively. This could mean that firms are bigger and could be more disposed towards greater activity in R & D and innovations generally.

A cross-section study sought to identify the major determinants of CR for 234 4-digit industries using data for 1968. The hypothesised relationship was

$$CR8 = F(MES, AS, KS, G, GT, RMS, IMPS, EXPS)$$

MES was proxied by average size of firms measured as real gross output in an industry divided by number of firms. GT was intended to represent government's role in financing and was measured as

$$\frac{(\text{Total long-term bank loans} + \text{Foreign Loans}) \%}{\text{Total Liability}}$$

RMS (The intensity of use of imported raw materials), IMPS, EXPS were all measured as dummies for critical values of 30% and reflected trade policies and their effects on different industries. MES was the most significant variable, followed by G and the dummies of an industry's characteristics.

Using Bain's 70% critical value for concentration, Nam also found like Bain, that the average profit rates for the above 70% category was consistently higher than those for below. This was for 1968 and 1969, and for CR4 and CR8. A similar approach applied to capital utilisation found it to be lower in the highly concentrated industries than in those with lower degrees of concentration.

From a welfare point of view, the coexistence of excess capacity and monopoly power in the highly concentrated industries could be an indication that the burden of excess capacity could well be passed on to consumers. It certainly would not support Demsetz's view about the efficiency of larger firms in terms of realisation of economies of scale.

Unfortunately, the reasons for the excess capacity were not explored. Could it for instance have been related to rationing of foreign exchange for industries with high RMS? The existence of monopoly power implies that the reasons for the excess capacity could not have been demand problems.

MALAYSIA

Using a sample of 42 4-digit industries for data relating largely to 1970-1971 Gan and Tham (1977) estimated a more comprehensive model. The following is their estimated equation (1a) for gross margins (t-statistics in brackets)

$$\begin{aligned}
 M = & 0.109 + 0.817CR + 0.241KS + 0.649MES + 0.005ACR + \\
 & (0.570) \quad (8.873)** \quad (6.289)** \quad (93.109)** \\
 & + 1.369AS - 0.006EXPS + 0.0003ERP + 0.042FDI \\
 & (5.065)** \quad (2.308)* \quad (1.851)* \quad (1.288) \\
 & + 0.023G + 0.070GT \\
 & (2.112)* \quad (2.504)** \quad R^2 = 0.793
 \end{aligned}$$

where ERP is effective tariff protection, FDI is proportion of industry output produced by foreign firms, GT is a dummy separating 'closed' industries from the rest. Double asteriks represent significance at the 1 percent level, while a single one is for the 5 percent level. CR8 only became significant at 10 percent level after excluding FDI and ACR suggesting colinearity with one of them.

The influence of buyer characteristics was investigated by estimating the relationship for subsets of industries according to the consumer/ producer goods distinction. Fewer variables were significant. AS however emerged as the most significant determinant of M in the consumer goods industries but was not significant for producer goods. A probable explanation for this is that product differentiation is more important in the former, as expected. But the F-test could not lead to the rejection of the null hypothesis that the two subsets of parameters were from the same structure.

Finally the influence of barriers on CR was investigated in the relationship;

$$CR8 = f (MES, ACR, AS)$$

where ACR is absolute capital requirements for entry at optimal scale (=MES x KS). They found the barriers to be jointly significant at the 5% level.

Gan (1978) tested the concentration-profits hypothesis for 1971 using the same sample as the 1977 study. CR4 was used and M was calculated as averages for the 1968-1971 period. KS was also included to control for effects of capital intensity. The results support the concentration-performance hypothesis, with a critical concentration level of 85%, which is higher than that found by Bain for the US (70%) and far much higher than the 40-50% levels for Kenya.

PAKISTAN

To derive estimated equations for Pakistan, White (1974) took into account factors that may be summarised as;

-government controlled firms were under as much pressure as other firms to achieve high profitability. The fact that they were as vocal as others in demanding protection from imports



was revealing in this respect.

-collusion, which was not prohibited, must have been highly probable even for low levels of concentration. This was because of interlocking directorates and trade associations. Another reason was the dependence on imported material inputs which were controlled by few firms which were therefore in a position to exert enormous power.

-imported inputs were subject to rationing so that games of price competition (backed by threat of output expansion) would not be practical.

-imported goods were subject to licencing implying that they were less restraining on the exercise of market power.

The performance model that was investigated was

$$M = f(CR4, LCM, LIM)$$

where LCM and LIM are the stringency of licences for competing imports and imported material inputs respectively. DM, the percentage by which domestic prices exceeded CIF import prices, was used as a proxy for LCM. LIM was proxied by capacity utilisation, CU whose relationship with m was hypothesised to correspond to the inverted parabola shape. The dependent variable was weighted averages for firms' net profit before taxes as a percentage of net worth. CR was entered as a dummy variable for concentration levels above a critical ratio of 33.3%, which is lower than the 40% suggested as the threshold of oligopoly in the US by Scherer (1970 p3).

The following estimates were obtained:

$$1. M = -0.37 + 0.16CR + 0.08DM + 1.19CU - 0.81CU^2 \quad R^2 = 0.42$$

(0.68) (1.74) (2.25) (0.73) (0.70)

$$2. M = -0.55 + 0.15CR \text{ DUMMY} + 0.07DM + 1.80CU - 1.27CU^2$$

(1.91) (2.09) (2.19) (1.08) (1.07)

$$R^2 = 0.47$$

All the coefficients had expected signs though the results were not wholly satisfactory. They however indicate that at least the basic tendencies were there. The coefficients for CU and CU² indicate that maximum profit rates were reached at capacity utilisation levels of 70%-75%.

SUMMARY AND CONCLUSION

The theoretical models described in Chapter 2 and the empirical studies reviewed in this chapter reveal that some advances have been made in both directions since Bain's earlier work. But Bain's concentration - performance hypothesis as well as concepts from the Bain - Labini limit price theory are still central to empirical models applied to industrialised western economies as well as the less developed economies.

The mixed results of LDCs studies on critical levels of concentration suggest that typification of these according to level of industrialisation should be based on a larger sample of LDC studies than is currently available. But White's hypothesis of lower oligopoly thresholds for LDCs seems to hold more than intuitive appeal. Some of the studies reviewed here cast some doubt on the importance of concentration ratios for profitability and the barrier effects of advertising intensity. A possible statistical reason for the former is collinearity with other variables. But one might well ask why the observed effects should always be to reduce the influence of CR rather than the other way round.

A major limiting factor in the empirical studies has been poor data or worse still their non-availability. One result of this has been that of the very few studies that have been carried out for the less developed countries only one published one has attempted to take into account other relevant features of those economies apart from trade variables. Another consequence of data problems may have been the avoidance of dealing with the simultaneity problem especially since it has long been suspected to be relevant. The reason for avoidance in this case could be the number of variables required for identification of the system. With a few exceptions the derivation of estimated models has usually been left unexplained, leaving unanswered questions relating to the underlying theoretical models(Sawyer,1982). In the following chapter some attention is given to problems of specification before a performance model is suggested for estimation with Malawian data.

NOTES

1. Some of these are discussed in Aaronovitch and Sawyer (1975), Curry and George (1983), and Hannah and Kay (1977).
2. See for example Ayanian's (1975) paper on this issue.
3. Others in the form of unpublished Ph.D. theses include Alawin (1978), Mooney (1982), de Guimaras (1982).

CHAPTER 4

FURTHER ISSUES RELEVANT TO THE SPECIFICATION OF A PERFORMANCE MODEL

INTRODUCTION

This chapter aims to do four things, namely;

- to explore the implications of input constraints on firms' pricing behaviour.
- to briefly look at whether it is necessary to introduce separate cost considerations into estimated models.
- address the problem of government intervention in pricing decisions and its likely effect on the results of estimated SCP models.
- suggest a performance model to be estimated with Malawian data.

Generally speaking, structure-performance models have been silent on the implications of input supply conditions on firms' behaviour and therefore their possible influence on performance. In his study of Pakistan manufacturing, White (1974) suggested that problems of input availability would make unpractical, price competition backed by threats of output expansion. That is, whereas in normal circumstances firms could sustain price-cuts by expanded output, where there are input problems the prospects of increased output would be constrained, and in severe cases would not even be possible. Price-cuts as in price wars could not be sustained over long periods of time, and therefore bringing into question the use of price wars in inter-firm rivalry.

Although in the case of Pakistan, White saw the problem mainly in terms of the constraints imposed by imported material inputs which were affected by foreign exchange rationing, the problem could be generalisable to situations where other inputs are rationed, or are in restricted supply for other reasons, eg. be materials, finance, or labour supplied under monopolistic conditions.

The section below attempts to explore some of the consequences of such problems, where collusive tendencies is an important possibility thus making these problems an input in structure-conduct-performance relationships.

The second problem of this chapter, concerns the reconciliation between what seem to be two parallel traditions, one investigating the structure-performance relationship and the other investigating the responsiveness of pricing to cost changes. A number of econometric studies in the latter tradition are reviewed in Hay and Morris(1979,pp126-135).These lay emphasis on the influence of cost changes on pricing,and relatively much less emphasis or none at all on the influences of structural variables . The interest in this stems first from evidence such as that reported by Hall and Hitch's(1939) study, that large firms tend to add a fairly constant percentage markup over average cost to determine price. Secondly, and probably resulting from the previous point is the fact that whenever there is government intervention over pricing, it seems to be guided implicitly or explicitly by the same markup rules. For instance a widely applied rule for nationalised industries is a maximum markup of around 10 percent. The question is whether such rules lead to fundamental changes in the specification of SCP models.

The third problem relates to what ought to be expected of institutional interference in pricing. Bain(1949) for instance suggested that this problem would be analytically similar to that of threatened entry. Again one would like to know exactly what this means and whether it would lead to fundamental changes in the the basic structure-performance predictions.

In what follows,these three problems are discussed and some rules suggested for taking care of them in model specification. As a follow-up to the discussion of these problems and in view of what has already been discussed in earlier chapters, a performance model is suggested for application to Malawi.

1. PROBLEMS OF SPECIFICATION WHEN INPUT SUPPLY IS INELASTIC

The problem of production-related variables can be analysed by starting from the case where market imperfections in the input markets are represented by the influence of the buying firms, that is oligopsony. Assume profit maximising behaviour with one product and one factor input. The profit equation for an

oligopolist/oligopsonist firm could be given as

$$\pi_i = P(Q)q_i - w(W_i)W_i \quad (4.1)$$

where π_i = profit, P = industry price of product, Q = is industry output, q_i = the output of the i th firm, W_i = is the input say labour, and w = the price of the input.

Let W_i^* be the level of input utilisation corresponding to profit maximising output, q_i^* . When there are problems with input availability such that desired levels of production eg. $q_i^*(W_i^*)$ are not feasible ie. $q_i(W_i) < q_i^*(W_i^*)$, the firm could be said to be faced with two choice variables, output, q_i and the input quantities (via the production function with output determined by input or vice versa) and where the latter is subject to availability constraints. For instance it could be envisaged that below optimal levels of output the firm might be compelled to produce what the available inputs will allow, in which case output as such would not really be a choice variable. When such problems do not arise, however output would be a legitimate choice variable determining the levels of inputs. These different patterns could apply to different industries or the same industry in different time periods. This is why it has been decided here to use the assumption of two choice variables (unlike for instance in the Cowling and Waterson formulation where output is the only choice variable). With this we take the partial derivative of the profit function with respect to the factor input to obtain,

$$\frac{\partial \pi_i}{\partial W_i} = P \cdot \frac{\partial q_i}{\partial W_i} + q_i \cdot \frac{\partial P}{\partial W_i} - (w + W_i \frac{\partial w}{\partial W_i}) = 0$$

$$\frac{\partial q_i}{\partial W_i} + \frac{q_i}{P} \cdot \frac{\partial P}{\partial W_i} - \frac{w}{P} - \frac{W_i}{P} \cdot \frac{\partial w}{\partial W_i} = 0$$

Multiplying the second term by $\partial q_i / \partial q_i$ and the fourth term by w/w and rearranging

$$\frac{\partial \pi_i}{\partial W_i} = \frac{\partial q_i}{\partial W_i} + \frac{q_i}{P} \frac{\partial P}{\partial q_i} \frac{\partial q_i}{\partial W_i} - \frac{w}{P} - \frac{W_i}{w} \frac{\partial w}{\partial W_i} \frac{w}{P} = 0$$

or

$$\frac{\partial \pi_i}{\partial W_i} = \frac{\partial q_i}{\partial W_i} \left(1 + \frac{1}{\eta}\right) - \frac{w}{P} \left(1 + \frac{1}{\omega}\right) = 0$$

where $\eta = (dq_i/dP).(P/q_i)$ and $\omega = (dW_i/dw).(w/W_i)$ are partial elasticities. The potential constraints of input availability on output (and ultimately on marginal profitability since $d\pi_i/dq_i$ can be given as $[(d\pi_i/dq_i)(W_i)]$) would be represented by the elasticity of supply of input, ω in

$$\frac{\partial q_i}{\partial W_i} = \frac{w}{P} \frac{\left(1 + \frac{1}{\omega}\right)}{\left(1 + \frac{1}{\eta}\right)} \quad (4.2)$$

or

$$\frac{\partial q_i}{\partial W_i} = \frac{w}{P} \cdot \frac{\beta}{\alpha} \quad (4.3)$$

where $\alpha = 1 + 1/\eta$ and $\beta = 1 + 1/\omega$

When $\eta = \omega = \infty$, $\alpha = \beta = 1$ and

$$\frac{\partial q_i}{\partial W_i} = \frac{w}{P} \quad (4.4)$$

which is a first order condition for a price-taking firm in both the product and input markets.

Usually, models of the SCP implicitly assume perfect competition to rule in all input markets, so that no account is taken of the elasticity term ω (or the composite term β). The question is that if oligopolistic structures are so well accepted in the product markets, why are market imperfections for both the factor and the non-factor inputs (such as other manufactures) not taken into

account?

Equation (4.3) in the above model, which can be regarded as a slight generalisation of the usual result (cf. Waterson, 1980) represents the situation which would obtain if the input supply curve is continuous for all firms in an industry. That is there is no complete constraint on input availability. A case can be made for the direct inclusion of all input variables in the performance equation. This is when it is hypothesised that input availability influences pricing behaviour. For instance problems with inputs could mean that after a certain level the input supply curve becomes perfectly inelastic, in which case the output decisions of some or all firms could be affected. Here we argue that this situation would tend to influence the recognition of interdependence among firms, and ultimately the way they behave towards each other.

In order to discuss the impact of such problems, there are a number of situations which could arise. These are

1. no input constraints for all firms
2. input problems affect one or more firms but not all firms
3. input problems affect all firms

The model described above corresponds to situation 1). Situations 2) and 3) can be seen to be directly relevant to the formation of firms' conjectural variations. This can be illustrated by writing each firm's profits function as

$$\pi_i = P(q_i + Q_i)q_i - c(q_i) \quad (4.5)$$

where Q_i is the output of all other firms except i . For firm i we would then have the first-order condition

$$\frac{d\pi_i}{dq_i} = P(q_i + Q_i) + q_i \left(\frac{\partial P}{\partial q_i} + \frac{\partial P}{\partial Q_i} \cdot \frac{\partial Q_i}{\partial q_i} \right) - \frac{dc}{dq_i} = 0 \quad (4.6)$$

where $\partial Q_i / \partial q_i$ represents the reaction of other firms to firm i 's output decisions, and this would of course depend on how the other firms are affected

by the input constraints.

Taking the situation 2) and supposing firm i 's output is unconstrained while the rest of the firms' total output is constrained, then $dQ_i/dq_i = 0$ for reactions involving output expansion. We would have a Cournot situation where there is only one reaction function, corresponding to firm i , which would then maximise its profits given the fixed outputs of its rivals. Industry price would be affected according to dP/dq_i . The picture regarding action and reaction gets rather mixed when we have more than one firm with unconstrained output. But we might expect that for different industries different situations might arise according to how the constraints affect different firms and the number and size distribution of the constrained and unconstrained firms, which will for example influence dP/dq_i .

The important point here is that both of the situations 2) and 3) are conducive to more ready recognition of interdependence due to the effect dP/dQ_i and this could well lead to collusive agreements. Both the collusive tendency and the output constraints could then be taken into account to illustrate constrained optimisation under collusion. Let each firm's output be subject to the constraint that $\bar{q}_i \geq q_i$. Then, the profits function for the colluding firms would be

$$\Pi = R(\sum q_i) - \sum c_i(q_i) + \delta_i(\bar{q}_i - q_i) \quad (4.7)$$

where R is the industry revenue, and δ is the Lagrangean multiplier. From the first-order condition we would have

$$R'(\sum q_i) = c_i'(q_i) + \delta_i \quad (4.8)$$

which would be the same as that for a constrained multiplant monopolist. If the input constraint does not bind for all firms then $\delta_i = 0$ and the outcome would be the same as that for the usual collusion model. If the constraint is binding for some but not all firms, we have collusion under situation 2) and if all firms are constrained, we have collusion under 3). Collusion results in a smaller output at a higher price for a larger total profit than independent behaviour eg. under Cournot, where $dQ_i/dq_i = 0$. (This point is illustrated in Henderson and Quandt (1971) pp226, 228.)

Given that firms are bound to learn from experience and can base their actions on forecasts about the future, it is also possible that potential problems with inputs (where this is based on past experience or an assessment of current and future conditions) can also influence firms' behaviour in the manner suggested here. Dealing with variables representing existing or potential input problems would be an easy way of incorporating conjectural variations and therefore the collusive tendencies associated with them in a profitability model.

2.COST CHANGES AND PRICING

The view that cost changes can influence pricing decisions can be easily reconciled with the mainstream SCP approaches. In order to do this, one need only ask whether cost-plus pricing makes a difference to these models. Assuming that marginal cost is constant over relevant ranges of output, the method of percentage mark-up may be equivalent to profit maximization since under profit maximisation $P = MC/(1+1/\eta) = AC/(1+1/\eta)$ or $(P-MC)/P = -1/\eta$. The percentage margin over cost can be directly derived from this as $[1/(1+1/\eta)-1]100$.

As η gets larger, the margin over cost will be closer to zero, which is again a qualitatively similar result to that of profit maximisation. The assumption that prices might respond to cost changes will therefore leave unaffected, the role of price elasticity of demand in conventional SCP models as well as the predictions of those models.

A number of remarks can now be made by way of concluding this section:

a) The use of production related variables is valid in the estimation of the performance relationship provided appropriate considerations are made and relevant distance in terms of their direct involvement in that equation is maintained. Two rules are suggested;

i) if the production variables (such as those implied by input constraints) are hypothesised to modify pricing behaviour (e.g. White, 1974) then they should be accounted for directly in the performance equation.

ii) if the production variables are hypothesised to merely constrain output (and they are not considered to significantly influence pricing behaviour) they can

only play an indirect role e.g. as a possible source of extra exogenous variables in an incompletely specified simultaneous equations model (from an explicit or implicit production function)(eg. Geroski, 1982).

b) Depending on what factors are thought to influence the 'plus', cost-plus pricing behaviour does not necessarily lead to changes in SCP specifications. In effect, factors which are thought to influence the 'plus' on cost (eg. concentration) are usually included.

3.PRICE CONTROLS AND THE STRUCTURE-PERFORMANCE RELATIONSHIP

Price controls over manufacturers in one form or another is not as insignificant as is often supposed even in the Western economies if one takes into account the value of gross output of the industries concerned as a proportion of total manufacturing output. The most significant way this manifests itself is in the form of countervailing power where the public sector is the major buyer e.g. in the armament industries and, for the U.K. the pharmaceuticals industries.

In the industrialised western economies price controls over manufacturers are often ignored in economic analyses because they are confined to a very small range of goods relative to the manufacturing sectors as a whole. In LDCs, with lower incomes and higher degrees of income inequalities, more comprehensive price controls are often considered necessary. This is because the industries there have a tendency towards high levels of concentration. Sometimes, the monopolistic market structures are sanctioned by the governments from the need to induce foreign direct investment by giving guarantees of monopoly status for limited periods of time. In some cases the firms concerned are expected to agree to consultations with the authorities in their pricing decisions especially price increases.

Accountability over pricing and the fear of intervention may actually force firms to behave as they would in the case of threatened entry. Bain (1949 pp 449 n3) suggested that the analysis of threatened government interference could be handled in the same manner as entry. The implication is that with such intervention, high industrial concentration may not lead to much higher prices over costs than in less concentrated industries if the concentrated industries are the target of intervention. This seemingly straightforward prediction is

made on the presumption that the government interference is constraining or thought to be constraining. This is less straightforward to demonstrate. For instance could the firms affected by intervention still maximise profits or achieve levels of performance they would in the absence of that intervention? In other words, is it possible to have non-constraining intervention as far as the firms are concerned, inspite of what the authorities may believe? Hadar (1971) analysed this question by setting it up as a nonlinear programming problem. The procedure of his analysis is summarised in the Appendix to this chapter.

It is assumed that there is a monopolist who in the absence of a price ceiling would set his (profit maximising) price P^* greater than the ceiling price, P_0 . Secondly, an interior solution is also assumed so that both price and output are positive. Under these conditions, there are only four possibilities:

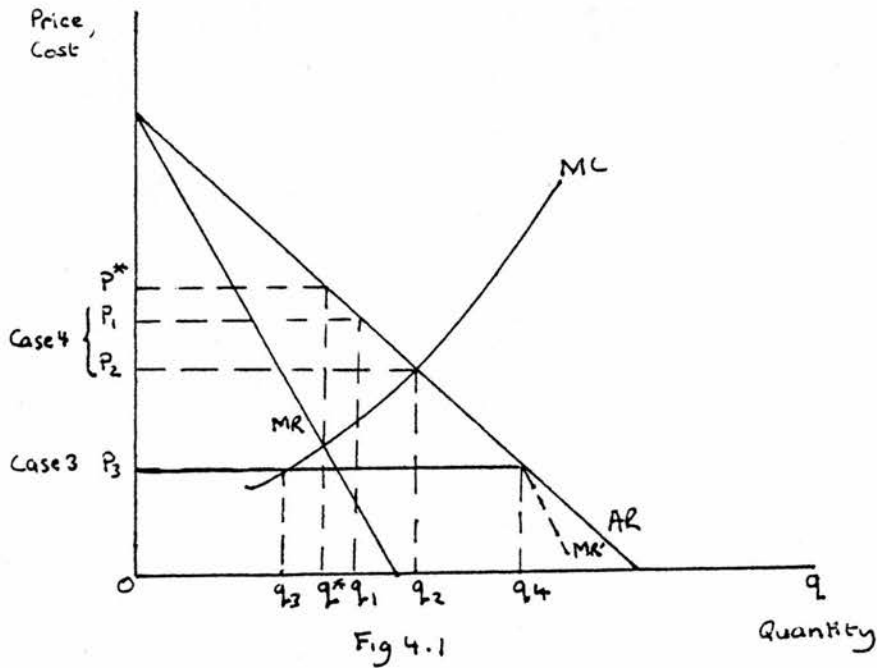
- 1) excess demand and excess price ceiling;
- 2) zero excess demand with excess price ceiling;
- 3) excess demand and zero excess price ceiling;
- 4) zero excess demand and zero excess price ceiling.

The situation of excess demand for the monopolist would be where he is forced to adopt a price below where marginal cost equals average revenue ie. below P_2 in Fig. 4.1, in which case his 'preferred' output would be where price equals marginal cost, which output would be less than the quantity demanded at that price. Excess price ceiling is the situation where the ceiling price is greater than the price charged by the monopolist, ie. $P_0 > P$ while zero excess price ceiling would be when the monopolist sets his price, P (not the profit maximising price if the price ceiling is binding) equal to P_0 ie. $P = P_0$. The demand curve facing the monopolist would effectively be truncated at P_0 . For example in Fig. 4.1 at $P = P_3$, the demand curve would be P_3AR and the corresponding marginal revenue curve would be P_3MR' .

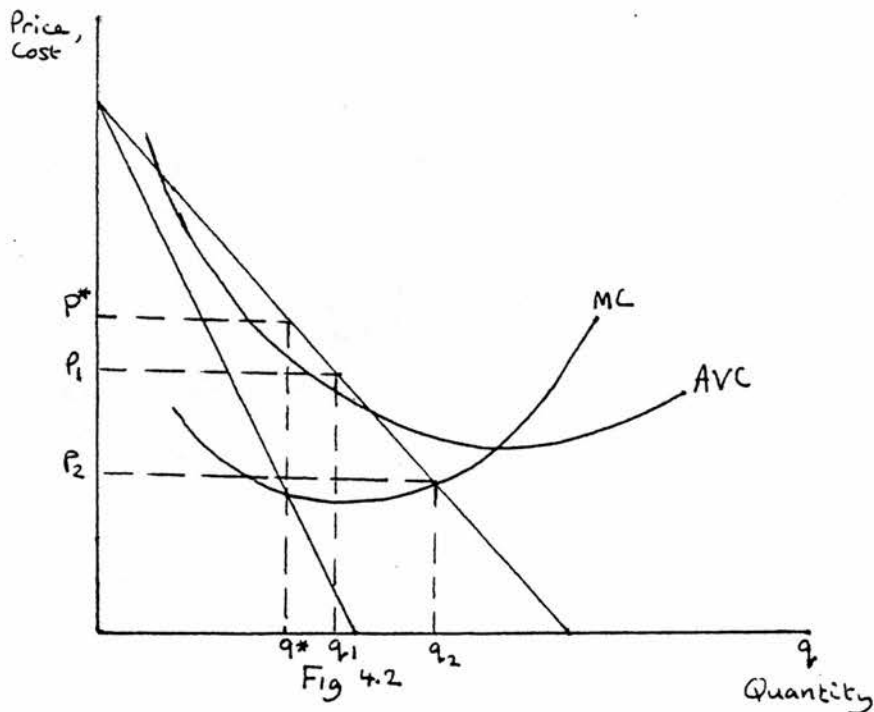
Of these only 3) and 4) do not violate the prior assumptions which are desirable for meaningful price controls (ie. an interior solution and $P^* > P_0$).

In the case 3), the monopolist sets price equal to marginal cost, making this

correspond to the purely competitive firm. But the existence of excess demand means that there is upward pressure on price which would involve by some form of rationing. In the case 4) the monopolist sets price equal to the ceiling price and the output chosen is equal to quantity demanded at the chosen price. Case 4) includes the optimum solution that is where $P^* = P_0$ and $q^* = q$, where the price controls may be described as just redundant. These two cases are illustrated in Fig 4.1.



Since if the price controls are to be meaningful $P^* > P_0$ then P^* should be the upper limit for P_0 . What Fig 4.1 indicates is that lower price ceilings (case 3) can be achieved at the price of rationing while higher ceilings (case 4) face the possibility of being non-binding (ie. where $P_0 = P^*$). A significant point about the two different cases is as Hader points out, that one cannot tell in advance which of the two applies i.e. one with a solution that achieves the purely competitive solution and one that tends towards the monopolistic market solution.



Under the cost conditions indicated by the average variable cost curve AVC , in Fig.4.2 all solutions fall under case 4 with the lower bound set by shut-down conditions (price too low eg. P_2). A consequence of lower bounds such as P_2 is the possibility that price controls can kill off the industry altogether. An extension of the argument is that P_2 is analogous to a limit price. In fact, given that the conditions described by AVC are those that face a potential entrant and given that the government desires the ceiling P_2 , that ceiling could well be self enforced by the monopolist since it would also be entry limiting.

What emerges from the foregoing discussion is that normal profit maximisation solution can still be achieved with price controls, but in very special circumstances. In general, then, the intuitive prediction that price controls lower the monopolist's profits must be accepted. The tendency towards non-significance of a concentration variable in the performance equation is to be expected if the stringency of the price controls is positively related to the degree of concentration. But there are two moderating factors against ceilings that are too low. These are, the burdens of rationing in the case of excess demand, and the fear of killing off the industry, where cost conditions relative to price ceiling, are adverse.

Assuming that price controls are effective and that they are meant to counter monopoly power, they might be expected to be related to the degree of

concentration. We would then expect that in a price-cost margin equation the effects of concentration would be weakened. In addition, the effects of the controls in constraining pricing behaviour could also affect the influence of other variables on pricing, depending on how extensive the controls are over the manufacturing sector and how they are related the degree of concentration. But to the extent that the stringency of the controls is directly related to the degree of concentration and to the extent that other variables are independent of both of the controls and concentration, then the influence of the other variables would also be independent of the two.

In regression analysis, the significance of the concentration coefficient in a structure-performance model could be taken as an indication of the empirical validity of the concentration-profits relationship just as in any other situation without price controls. But it is possible to argue that if conditions are such that a significant concentration coefficient would be expected, then the significance or non-significance of the coefficient could be taken as a test of the effects of the price controls, given that the controls are related to concentration in the manner suggested above. In Chapter 5 and Chapter 7 we indicate that the conditions in Malawi would be ideal for a strong concentration-profitability relationship. These are the monopolistic nature of concentrated industries, and the absence of anti-monopoly legislation, which would mean that for concentrated industries, pricing collusion would be easy.

4. AN EMPIRICAL MODEL OF PERFORMANCE

The major point of focus in the estimation of Chapter 7 will be the performance equation. Going by theoretical models referred to in Chapter 2, the number of relevant variables is quite small, whether long-run or short-run profit maximisation is assumed. The variables include a measure of concentration, price elasticity of demand, and perhaps a measure of overall barriers to entry and a conjectural variations term.

As far as empirical investigation is concerned, the problems of including only 'relevant' variables is compounded by those of measurement of those variables. For instance, the price elasticity term could be replaced in an estimated model by variables representing factors that affect that elasticity (Sawyer, 1982). Bain recognised these measurement problems so well that much of his 1951 paper

on the concentration–profits relationship was taken up with controlling for measurement and definitional problems, the most vexing of which was defining what constitutes an ‘industry’ and then finding data to correspond to it.

In the model that is to be used on Malawian data the above problems have been translated into the need to achieve some theoretical coherence and at the same time making some concessions for measurement problems. The latter is tackled by including some control variables. It may be noted in this context, that Bain(1970) advised (against his earlier convictions) against controlling for everything possible as this would make nonsense of the whole exercise of empirical testing even of basic hypotheses such as the concentration–profits one.

It is assumed here that firms are aware of potential entry and seek to influence the dynamics of the structures of their industries. That is, it is assumed that firms are concerned about the prospects of long–run profit maximisation. The theoretical model would therefore correspond to that represented in equation (2.6) in Chapter 2 or, in a dynamic context the models by Jacquemin and Thisse(1972) and the Encaoua and Jacquemin(1980). In addition, factors that may influence conjectural variations, which in turn can influence collusive behaviour along the lines discussed earlier in this chapter, are also allowed for. These are explained bellow.

Let the theoretical relationship be derivable from a priori assumptions such as those that lead to the Cowling and Waterson model with entry considerations in the manner suggested in Chapter 2. The relationship might be represented by,

$$\mu^* = F[CR^*, \eta^*, \lambda^*, B^*]$$

where

- μ^* = Lerner index of monopoly power
- CR^* = concentration ratio
- λ^* = conjectural variations term
- η^* = price–elasticity of demand
- B^* = measure of overall height of barriers to entry.

The asteriks represent 'ideal' variables, measured according to accepted definitions of those variables and corresponding to industries that also conform to an accepted definition eg. as discussed by Bain(1951).

As indicated above, when it comes to implementation, all these ideally measured variables are untenable. It may therefore be appropriate to talk about 'blocks' or 'vectors' of measurable variables to represent the ideal ones.

As before let

M = price cost margins
 CR = three firm concentration ratios
 IMPS = import intensity
 EXPS = export intensity
 MES = minimum efficient scale
 CDR = cost disadvantage at less than MES
 AS = advertising intensity
 G = growth of industry sales
 KS = capital intensity
 DV = index of diversification for firms in an industry
 RMS = reliance on imported materials inputs
 SKLL = skilled labour intensity
 FIN = working capital ratio (ie. short-term assets short-term liabilities)

The representative vectors of variables are as follows;

$\mu = \{M\}$
 $CR = \{CR3, IMPS, EXPS\}$
 $\lambda = \{RMS, SKLL, FIN\}$
 $\eta = \{G\}$
 $B = \{MES, CDR, AS\}$

The control variables for M and CR are

-KS, controlling for capital intensity
 -DV, controlling for enterprise diversification, which affects the measurement of concentration.

The 'empirical' model may therefore be given as

$M = f[CR3, IMPS, EXPS; RMS, SKLL, FIN; G; MES, CDR, AS; KS, DV]$
 + - - + + + + + + + +

The expected signs of the coefficients (discussed in Chapter 2 and Chapter 3) are given below the variables. As indicated above, KS and DV control for measurement of M and CR respectively.

Ideally M should be measured as 'net return on sales' ie. after accounting for return on capital (to cover depreciation, interest and a risk premium). KS is supposed to account for differences in the usually available gross measure for M, due to differences in capital intensity. But this is not the only interpretation. For instance KS has been used as a capital requirements (barrier effect) variable (House, 1973) largely because of data problems.

As was seen in the previous chapter, DV has been interpreted in terms cross-subsidisation of predatory behaviour (eg. Berry, 1975; Utton, 1979). Berry and Utton's argument is that firms associated with diversified enterprises could have recourse to resources enabling them to survive prolonged periods of loss making due to predatory strategies. Their independent competitors on the other hand may not find it easy to raise such funds and may be competed out of business as a result. Outside the context of dynamics (where firms can be seen to be trying to influence their market structures by competing for dominance) DV could account for the possibility that measured concentration for industries defined in the data sources, are affected by imbalanced diversification by firms among products with low cross-elasticity of demand. This was discussed in the context of Bain's preoccupation with theoretical definition of industry vs those permitted by statistical sources.

As far as the sign of the coefficient for concentration is concerned, the traditional view is the one that is said to be reinforced by the Saving and Cowling and Waterson models. This is that higher concentration might be expected to be associated with easier recognition of interdependence by firms and greater effectiveness of collusion. This leads to a positive relationship between CR and M. The analysis presented here dealt with the situation where price controls are exercised in such a way that they may be considered to be filling in the role of antitrust legislation. That is price controls are most likely to be related to concentration and has an effect on pricing opposite in direction to that of concentration. But the net effect is unlikely to be negative but merely tend towards zero.

The implementation of price controls in the Malawian context is discussed in

Chapters 5 and 7. What is important to bear in mind here is that although no variables have been assigned the task of explicitly accounting for price controls, their effects should be deducible from the empirical results, given the relationship that is supposed to exist between the controls and the structural variables. Explicit treatment of these controls in empirical models is left until Chapter 8, when a measurable variable is devised and used in regression analyses.

The second variable which might have an ambiguous sign is EXPS. Assuming inability to practice international price discrimination, higher export dependence makes it less important to recognise interdependence on the domestic market (Caves, 1974). Lower profitability might therefore be expected in those industries. Allowing for price discrimination could lead to opposite predictions (Pagoulatos and Sorensen, 1981).

The expectation of a negative coefficient for Malawi derives from an argument developed in the following chapters, that export activity is largely confined to a few industries and that the firms are price-takers on the international market. Since domestic sales are only a small proportion of the total sales of these industries, international price discrimination is not an important consideration. This leaves the argument that given higher price elasticity of demand on the international market, higher export dependence will be associated with lower price-cost margins.

Before embarking on the estimation of the model, conditions prevailing in the Malawian economy and features of the manufacturing sector are described in the following chapter.

PART TWO

EMPIRICAL INVESTIGATION

CHAPTER 5

A BACKGROUND TO MALAWIAN MANUFACTURING

INTRODUCTION

According to Mason, reviewed in Chapter 1, virtually anything that could be expected to influence firms' behaviour can be regarded as an element of the firms' market structures. This chapter discusses factual evidence with respect to a few important structural elements in the Malawian manufacturing sector. These include government regulation on pricing and entry of new competitors, the level of existing and potential competition, the characteristics of product differentiation, and the potential constraints on levels of production. But before embarking on this task, a general economic background of the Malawian economy is presented in the following section.

MALAWI: A GENERAL ECONOMIC BACKGROUND

Malawi is a landlocked country with a population of about 6 million people in 1983, about 90% of whom are rural-based. The economy is primarily agricultural, with a large subsistence sector, accounting for a quarter of GDP. Having no mineral wealth in commercial quantities has contributed to making Malawi have a per capita income of only about 200 US dollars in 1979.

Despite these features the country has achieved remarkable performance during the 1970s, based on an agriculture-oriented development strategy. GDP grew at an average rate of over 6 per cent per annum between 1964 and 1970 in real terms, while fixed investment grew from 16 to 23 per cent of GDP and domestic savings from 4 to 12 per cent. Exports (90 per cent of which are agricultural) rose at an average annual rate of 9.5 per cent. In fact much of the economy's performance is said to have derived from the relatively favourable position of the exports, whose value in absolute terms almost doubled between 1964 and 1970, from MK 23.0 million to MK 40.6 million.¹

The manufacturing sector had a share of just 12 per cent in GDP in 1980. The sector also enjoyed high growth rates of 6.5 per cent between 1970 and 1979. As a policy overview for the industrial sector consider the following assessment from a recent World Bank report;

"The approach to industry has been far from laissez-faire - the Government has provided protection for infant industries and has actively promoted industry through parastatal investment - but strict limits have been set on industrial promotion. There is a moderate tariff, which ranges from 7.5 to 40 per cent... quantitative restrictions have not been used to restrict imports nor to protect industry, and the exchange rate has been kept at a level that not only encourages exports growth but also maintains external balance."(IBRD, 1981, p92)

Between 1968 and 1977 total industrial value added grew at a faster rate than agriculture (6.5% vs 4.5%) and this has been attributed to the policies listed above, as well as the kind of industries that have developed and a wage policy that has held down urban wages. One result of this has been growth of manufacturing employment at a rate of 6.5% per cent per annum between 1968 and 1977, which few African countries surpassed (IBRD, 1981, p92).

Despite these earlier successes, however, by 1979 things had begun to sour as a result of a host of factors including export and import prices, disruptions in the transportation route to the sea as well as bad policies and poor management. GDP registered a barely positive rate of 0.2 per cent between 1979 and 1980, while many sectors actually had negative growth. Although the manufacturing sector still enjoyed a healthy rate of growth of 3.9 per cent during that period, the general economic picture was considered to be bad enough to warrant major policy overhauling.

The new policies were drawn up for an 'international conference of partners in economic development' in a two-volume document of the same title. The conference was held in 1984 under the auspices of the United Nations Development Programme. The main thrust of the policy changes affecting manufacturing, concerned the removal of "rigidities in the system of administered prices, wages and salaries." (Ministry of Finance and Economic Planning Division, 1983, p21)

Price liberalisation for manufactures was first announced in 1983 with a list of

products which would be immediately affected. The above documents indicated that the process of liberalisation would be gradually extended to other products.

Other reforms affecting the manufacturing sector involved the activities of the Malawi Development Corporation (MDC) and Press Holding Ltd. which between them had extensive interests in the manufacturing sector. The former is a parastatal charged with fostering industrial development by providing finance through equity participation or through the provision of loans for industrial projects. Press Holdings Ltd. is a private holding company which began as Malawi Press in 1960 to publish Malawi News as a publicity instrument of the Malawi Congress Party (UNIDO, 1981, p36). By the early 1980s Press had 17 subsidiaries and 30 associate companies in many sectors. Considering its origins it is not surprising that it developed interests almost rivalling those of MDC.

The new measures directed at these two were basically that both should keep a lower profile and limit their activities to viable ventures and for the Press group, this meant some major restructuring of its assets.

SOME PERFORMANCE INDICATORS: IMPORT SUBSTITUTION AND EXPORT PERFORMANCE

It has been suggested that one major motivation for investment in LDCs appears to be the threat to former exporters to the LDCs if their competitors set up local production capacity (Rweyemamu, 1979 p3). Many LDCs are thought to have used protectionist import tariffs as a barrier against imports, to act as an incentive for the former exporters to establish local capacity or risk the loss of that market.

The implications are that if the policies are effective they should be followed by a rapid rate of industrialisation based on import substitution. As far as such economies are concerned rapid import substitution would be a desirable dimension of performance. The other effect is that the absolute volume of the corresponding imports would be reduced because of the price effects of the tariffs even if domestic production fails to fill in the gap. This effect on imports denies local producers the pricing and efficiency discipline that would otherwise be imposed by import competition. Without good data on changes

in tariff structures, it is difficult to investigate their effects on imports.² It was however not too difficult to get data that indicates trends in import substitution.

The method of analysis is derived from Chenery's (1960) model of growth of manufacturing industries and caters for the analysis of export performance.³ Basically the model says that although industrial output can grow from changes in the composition of demand as income rises, changes in supply factors can lead to growth based on import substitution which is itself based on improved comparative advantage.

According to the figures in Table 5.1 the growth of many of Malawi's industries between 1964 and 1975 was mainly due to the growth of domestic demand and import substitution. One group of exceptions (grain, tea and tobacco) are Malawi's traditional export industries which owed a substantial proportion of their growth to exports. Noteworthy in Table 5.1 is the fact that apart from these industries, export activity in the rest of the manufacturing sector is minor. It may therefore be quite sensible to assume as we do in Chapter 7, that the levels of export activity may not be particularly responsive to competition or profitability in the domestic market. Import substitution has been significant in textiles, clothing and footwear and metal products which are nearly all the industries whose shares bear some close resemblance to Nigeria's for the earlier period.

The industry groups that show negative contribution of import substitution are among the long established ones. This could therefore mean greater proportions of imports than before. In this context, it is necessary to remember that the calculations have been based on two years rather than averages over a number of years, and can therefore be affected by the peculiarities of those years. This is especially true for the structural clay industry group which is dominated by the cement industry whose production experienced disruptions around 1975.

Table 5.1

Percentage Contribution of Three

Sources of Growth in

Manufacturing by Industry Group 1964-1975

Malawi Compared to Nigeria⁴

	Domestic Demand	Export Demand	Import Substitution
Grain millg.	75.4	31.1	-6.5
Bakery prods.	100.0	0.0	0.0
Tea	60.8	42.0	-2.8
Meat, dairy, fish sugar, beverages	26.7	12.0	61.3
Tobacco	55.6	64.3	19.9
Textiles	12.7(4.5)	0.3(0.0)	87.0(95.5)
Clothing & footwear	44.5 (1.3)	6.9(0.0)	48.6(99.0)
Sawmill prods. & furniture	108.2(77.3)	0.9(5.8)	-9.1(16.9)
Paper & printg. & pub.	108.2(0.1)	0.3(0.0)	-8.5(99.9)
Chemical & allied prods.	77.7(63.5)	0.5(0.0)	21.8(36.5)
Structural clay cement etc.	175.2(9.0)	0.0(0.0)	-75.2(91.0)
Metal prods.	34.5(8.4)	1.8(0.1)	63.7(91.5)

Notes. The equation for the calculations (from
Chenery, 1960) is $DP = \frac{DP_0}{TS_0} \Delta DD + \frac{DP_0}{TS_0} \Delta ED + \left[\frac{DP_1}{TS_1} - \frac{DP_0}{TS_0} \right] TS_1$

Where DP is domestic production; TS is total supply;
DD is domestic demand; ED is export demand and
 $\left[\frac{DP_1}{TS_1} - \frac{DP_0}{TS_0} \right] TS_1$ is import substitution. The subscripts 0 and 1 stand
for base and terminal years respectively.

b) The figures for Nigeria are for the 1957-1967 period.
Sources: Malawi figures calculated from AES and ASET (see
Chapter 6). Nigerian figures are from (Oyejide, 1975).

ELEMENTS OF MARKET STRUCTURE AND THEIR IMPLICATIONS

1) THE REGULATORY FRAMEWORK

a) Price Controls

Between the late 1960s and late 1983 when price liberalisation was announced, domestic manufactures in Malawi were subject to a system of price controls. An important question to ask is what prices were affected and to what extent they were subjected to these controls. Also, were the controls in such a way as to neutralise some commercial considerations in pricing decisions? In other words can the usually assumed structure-performance relationships be still observable?

The Malawian price control legislation is contained in the Control of Goods Act, 1968, Ch. 18.08. It was established as a limited price control system with maximum retail prices prescribed for eight essential consumer goods. These were sugar, meat, matches, petrol, medicines, hoes, milk and infant foods and bottled beer. Cement and fertilizers were later added to the list. As a means of monitoring the performance of the industrial sector an informal control system evolved to cover most of the other local manufactures. Prices for these were simply recommended by the Ministry of Trade and Industry, and although not legally binding were generally observed.

All these prices whether prescribed or recommended were subject to a review process (in the case of proposed price increases) which took into account changes in costs. The prices were set at a cost plus 12 to 18 percent with the lower mark-up for those industries deemed to be enjoying relatively secure markets (Ministry of Finance & Economic Planning Division, 1983).

To approach the problem of the implications of Malawian price controls on the structure-performance relationship, a number of assumptions are made. These are that costs are an important consideration in pricing regardless of the type of industrial structure. For instance, even if the industry is characterised by price leadership, the relevant costs can be those of the price leader, who may be both output and technologically dominant (Reid, 1979). Next assume that

price revisions are generally infrequent even in the absence of controls.

With these, the fact that the price controls were carried out through infrequent review processes which took costs into consideration, makes it possible that the control system was simply fulfilling a normal pricing role as if it was internal to the industries. That is normal pricing behaviour was indifferent to price controls or, what amounts to the same thing, that price controls had a neutral effect on prices. This raises the chance that the usually predicted structure-performance relationships might still hold inspite of the controls since, as suggested in Chapter 4, cost considerations in pricing need not affect the predictions.

Under the criterion for Malawian price controls the industries that can be thought to have 'secure markets' would most likely be those having little domestic competition and strong demand, resulting in good prospects for profit rates. The institution of price controls implies that profitability (actual or potential) would be the basis for judging performance. Here we shall take this to be represented by price-cost margins. Going by the evidence of actual performance (see Appendix), and excluding the export industries, the most secure industries would be those which experience high average price-cost margins. In addition, security of market would imply the low variability of the price-cost margins, in which case we would have industries such as food (including beverages) and textiles being described as having secure markets. These also tend to have the highest concentration ratios and together they account for much parastatal involvement and granted monopoly status. Significantly they also accounted for nearly all formally controlled prices. At the same time comparing their high average price-cost margins with those of other industries one wonders whether the controls could have narrowed the performance range, if this were a desirable goal. On the other hand the poorer performance of industries without formal controls implies that the maximum recommended prices for them were probably redundant.

Moderate price-cost margins and their low variability are observed in the competitive industries such as bakery products and furniture. The moderate profitability represents the influence of competition while that competition may be a result of entry in response to the lower risk in those industries plus lower barriers since they are characterised by sizeable fringes.

This discussion suggests that SCP relationships can still be observed inspite of price controls, because the control system allows for them implicitly or because demand factors nullify the effect of the controls. But in general, the existence of the controls is likely to add to Bain's (1951) and Weiss' (1974) lists of factors that bias the concentration-profits relationship towards zero.

b) Institutional Barriers to Entry

If potential entrants were free to respond to economic stimuli whenever they liked then the usual economic barriers to entry could be relied upon to regulate actual entry. But for some reasons governments may exercise the ultimate control over entry. Typically this is done through licencing of manufacturing activities. This is viewed as a way a government can keep track of and exert influence over the pattern of industrialisation.

Malawi manufacturing licences are required for all establishments employing ten or more persons or using power of twenty-five horsepower or more. The general working rule is said to be that all licence applications are granted unless there are good reasons for not doing so. The possible reasons for refusal have been given as follows:-

"a) if the capital, technical skill or raw materials are, in the opinion of the Minister, inadequate to secure the successful establishment and operation of the particular enterprise in which the applicant proposes to engage; and if the failure of the applicant's enterprise would likely prejudice the successful development of the industry concerned.

b) if the place at which the applicant proposes to establish a manufacturing establishment is not a suitable situation for the industry concerned;

c) if the granting of such a licence would not, in the opinion of the Minister, be in the best interest of the economy or public weal of Malawi or of the particular industry concerned". (Ministry of Trade, Industry and Tourism, 1973 pp5-6)

In short the rule seeks to protect not only the industry concerned but also the potential entrants where they may possess over-optimistic impressions about conditions in their chosen industries. The latter is an informative role which the government fulfils by keeping abreast with developments in the industries through the process of price controls and the rules of entry , both of which

require firms to supply information about themselves and about their industries.

The entry process involves rules set out under the industrial Development Act (1966). These require the prospective entrant to publish some of the information that is required in the licence application namely the exact nature of the product(s), location and proposed trade name. Existing firms which feel threatened by new entry in a way they consider to be unreasonable, are then invited to make representations against the new licence applications.

In exceptional circumstances the government has granted monopolies for a period of up to five years in the first instance, and reviewed after that period. According to the Malawi Economic Planning Division (1971) its use "is reserved as an additional incentive for major enterprises, whose initial investment is large in relation to the existing size of the market". Again the granting of a monopoly could be seen as playing an informative role to potential competitors about the possibility or the current existence of excess capacity.

The question that remains is whether evidence can be gathered to show or at least hint that government licencing is frequently more than merely informative. That is have institutional barriers been set up when economic conditions say otherwise? In other words are there instances where licencing can be said to be simply protecting established firms?

In attempting to answer these questions an examination was made of some recent quarterly reports by the Ministry of Trade and Industry on licencing. The information examined was for the period 1978 to 1981 and included a number of licence applications that were rejected. These were the ones that were scrutinised. During that period, a total of 78 applications were approved while only 9 were rejected. The reasons for rejection of two of them (meat processing) and (wooden musical instruments) was inadequate raw materials. The latter could have meant the establishment of an industry that would have been completely new to the country. The former industry has a giant parastatal, Cold Storage Commission of Malawi, with a large number of small competing firms which confine their business to basic meat products. As for the remaining 7 rejections it is possible to speculate about the possible reasons.

The only rejection in 1980 involved products across seven 4-digit SIC industries ranging from SIC 3560 (PVC products) to 3829 (metal products).

Since it involved foreign funding a likely reason for the rejection must be the existence of many other producers of the same products in the location chosen, Blantyre. The rest of the rejections were made in 1981 and involved blanket manufacturing, bakery products, furniture manufacturing, paints, and nuts and bolts. The rejections for bakery products and furniture were almost certainly related to the localised nature of the industries and the fact that the chosen location (Lilongwe) was considered to be adequately served. The paint, blanket and metal products industries, all of which are well established might also be considered to be adequately served. A 1967 survey of capacity utilisation by the National Statistical Office suggested that these industries were among those experiencing much excess capacity. But for all we know, rather than arising from demand deficiency, the excess capacity could have been through deliberate investment in fixed assets for reasons of pre-empting a growing market and exclusion of potential rivals.

Rejections of licence applications have been very few relative to total applications and there seems to be some ready economic reasons for the rejections. It could therefore be said that entry is not unduly subject to high institutional barriers which are unwarranted by economic conditions. The following quotation of a letter to the Malawi Daily Times 6 January, 1984, serves as an interesting statement about one existing firms' view of the "open door" policy:

"We refer to the article on page 3 of the 'Daily Times' on February 1 headed 'Hand Knitting Yarn to be made in Malawi.

We wish to point out that this company has held an industrial licence No 21/82 since August 1982 and we have the equipment already in Malawi to manufacture knitting yarn locally, and this yarn is now being marketed under the name of 'Kalulu'. We have spent a considerable amount of money through the medium of your newspaper promoting this product.

At the moment our machine is standing idle due to lack of raw materials, and we have objected to Consolidated Textiles (Malawi) Limited's application as we have the capacity to satisfy the Malawi market and also a surplus for export.

It, therefore, seems a waste of foreign exchange to us to allow another manufacturer to come into the market when we are being frustrated through lack of materials."

Excess capacity, in this case due to lack of imported raw materials, seems to

be a major theme of the letter. It suggests that installed excess capacity might be used as an entry deterrent by referring to its existence when representations are made against new licence applicants. In the above example installed capacity— whether or not it reflected the minimum efficient scale – was larger than the domestic market. But this example and the small number of rejections of licence applications examined earlier indicate that representations are not usually successful. This does not mean that they cannot be used as a means of gaining time for other strategies.

A likely consequence of failure to influence rejection of a licence application could be that existing firms resort to economic strategies such as advertising as in the above example, or some pricing strategies.

These can be reasonable courses of action especially since the granting of a licence (or failure to prevent it) does not necessarily lead to immediate entry. In fact entry could be deferred indefinitely and the licencing lists contain many such cases. There would therefore be little reason for existing firms not adopting appropriate strategies if they can. Economic strategies are therefore still a possible avenue for exploitation despite the granting of a licence.

In general what can be said is that the Malawi entry regulations act as an early warning system for existing firms about intended entry and they could start implementing appropriate strategies. It can also be said that where economic conditions are ideal for entry, the onus of entry deterrence lies with the incumbent firms. Conventional strategies would be used where entry is 'effectively impeded' in the Bain terminology, that is where barriers are not high enough for entry to be 'blockaded' nor too low for any strategy to be ineffective.

2) EXISTING AND POTENTIAL COMPETITION

a) The number of firms and fringe competition

The numbers of firms in different 4-digit SIC industries in Malawi (Table 5.2) strongly suggest that most industries are highly concentrated. In fact the numbers are often so small as to make collusive pricing arrangements seem

easy to arrange and maintain, given the absence of anti-monopoly legislation. There is even a high proportion of monopolistic industries which might be characterised by monopolistic pricing. Assuming that the number of large firms in the industries represents trends of both concentration and the tightness of collusive arrangements, then we might expect the concentration–profits relationship to be strong. But this will of course be conditional on whether or not price controls effectively hinder the achievement of higher prices and whether or not the stringency of the application of the controls is related to the degree of concentration.

In LDCs at a low level of industrialisation, observed oligopolistic structures at any point in time are more likely to be a transitory stage towards greater competition from monopoly than in industrialised countries. This is because LDCs have relatively large proportions of newly establishing *industries*. The tendency towards oligopoly is therefore not unidirectional and in a dynamic context knowing the direction helps to indicate either increasing or decreasing concentration, which means that conduct is being modified accordingly. Also, in a situation where government intervention is more likely for one direction of change as opposed to the other, the direction can indicate the existing or potential government position. For instance the constant number of firms in certain industries such as the beverages industry is due to monopolies granted. On the other hand the declining numbers in grain milling is due to the government's sanctioning of a near monopoly in an old and previously highly atomistic industry.

While Table 5.2 gives us a fairly good picture about the relative representation of numbers of firms in different industries, the fact that the numbers relate only to the larger firms means that the picture is not a complete one. Table 5.3 indicates that for some industrial groups, particularly 'wood products and furniture', 'clothing' and 'metal products', competition from small firms is likely to be intense. Except for 'metal products', these industries are characterised by low average minimum efficient scales relative to market sizes, and low skill requirement. These two characteristics would explain the existence of small producers in the industries concerned.

Tables 5.2 and 5.3 in conjunction would lead us to the observation that while the number of large firms (Table 5.2) tend to be small, Table 5.3 indicates that generally they tend to contribute large proportions of industrial output in most

Table 5.2

Structure of Malawian Manu.Inds.

Number of Firms

SIC.	Products	Year (19')								
		67	68	69	70	71	72	73	74	75
3111	Meat prods.	1	1	1	1	1	1	1	1	1
3112	Dairy	5	5	5	5	5	5	-	-	-
3113	Fruit	0	0	1	1	1	1	1	1	1
3116	Grain millg. prods.	6	5	6	6	5	7	3	2	2
3117	Bakery prods.	6	6	6	9	9	9	9	8	8
3118	Sugar	2	2	2	2	1	1	2	1	1
3121	Tea	21	21	21	18	18	18	18	19	19
3131	Potable spirits	1	1	1	1	1	1	1	1	1
3133	Malt liquors	-	2	2	2	2	2	2	2	2
3134	Soft drinks	1	1	1	1	1	1	1	1	1
3140	Tobacco	7	7	7	8	8	8	7	6	5
3211	Ginning, spinning etc.	6	6	6	6	8	4	4	2	2
3212	Blankets	-	-	-	-	-	2	3	2	2
3213	Knitting prods.	-	-	-	-	-	3	3	2	2
3215	Rope & netting	2	2	2	3	2	2	2	2	2
3220	Clothing	11	12	13	11	14	16	14	14	15
3233	Leather	-	-	1	1	1	1	1		
3240	Footwear	1	1	1	1	1	1	1	3	3
3311	Sawmill	3	3	3	3	3	4	4	4	4
3320	Furniture	6	6	6	6	8	6	9	3	3
3312										
3419	Paper	-	-	-	-	-	3	3	3	3
3420	Printing & pub.	10	11	10	12	12	9	9	5	5
3512	Fertilizers	-	-	-	1	1	1	1	2	2
3521	Paints & varnishes	1	2	2	2	2	2	2	2	2
3522	Drugs & medicines	-	-	-	-	-	1	1	1	1
3523	Soaps, polishes etc.	2	2	3	3	3	2	3	3	3
3529	Other chem. prods.	3	-	-	-	-	1	-	-	-
3529	Match	-	-	1	1	1	1	1	1	1
3551	Tyre retreading	2	2	2	2	2	2	2	2	2
3560	Rubber & plastic	-	-	-	1	2	1	1	3	3
3691	Bricks & structrl clay	3	3	3	4	7	5	1	2	2
3692	Cement	1	1	1	1	1	1	1	1	1
3699	Concrete prods.	2	1	1	1	2	1	3	2	2
3812	Furniture(metal)	-	-	-	-	-	1	1	1	1
3813	Metal(structural)	5	9	9	9	9	4	2	1	1
3819	Metal(other non-machine)	-	-	-	-	-	3	4	4	4
3822	Farm implements	1	1	1	1	1	1	1	1	1
3824	Industrial products	-	-	-	-	-	2	-	-	-
3829	Other machinery	-	-	-	2	2	1	2	2	2
3832	Radio assembly	1	1	1	1	1	1	1	1	1
3843	Motor vehicle ass.	-	-	1	1	1	1	1	1	1
Total		110	117	120	127	134	139	130	115	115

Note. Large firms are those that qualify for the Annual Economic Survey, and employ 20 or more people.

Sources. Compiled from AES(1967-1975).

Table 5.3

Relative Importance of Small Firms

(by Number and Share of Employment)

	All Firms (Census)	Large ^{a/}		Small & self emplyd. ^{b/}	
	No.	No.	%	No.	%
1. Food & tobacco	36,600	17,900	(49)	18,700	(51)
2. Textiles, clothg., footwear	19,200	5,500	(29)	13,700	(71)
3. Wood prods. & furniture	14,700	1,500	(10)	13,200	(90)
4. Paper & paper prods.					
5. Printg. & Pub.	1,300	1,000	(77)	300	(23)
6. Chemicals etc. incl. Plastic prods.	1,700	1,500	(88)	200	(12)
7. Non-metallic min. prods.	4,300	1,900	(44)	2,400	(56)
8. Fabricated metal prods. machinery & equip.	4,400	1,800	(41)	2,600	(59)
9. Other ^{c/}	200	200	(100)	-	
Total	82,400	31,300	(38) ^{d/}	51,100	(62)

Notes. a) Employing 20 or more people

b) Residual estimate

c) Adjusted to exclude 'mining and quarrying'

d) Quarterly Employment Enquiry (Old Series) = 31,400

ie. for larger firms only.

Source: Kaluwa (1984)

of the industries. This plus the fact that small producers in Malawi tend to be really small, makes it highly probable that the dominant firms/competitive fringe type of market structure is common among Malawian industries. Consider the following.

In LDC manufacturing, enterprises are generally categorised as follows:

- 1) Large scale enterprises which use modern technology and are usually located in urban areas where there are agglomeration economies (due to highly developed infrastructure, services, existence of pools of labour whether skilled or unskilled, and so on);
- 2) Modern small-to medium-scale enterprises which use intermediate levels of technology and are located mainly in urban areas;
- 3) Small enterprises and artisan workshops which use traditional or slightly more sophisticated technologies, and which are located in both rural and urban areas.

The third category is often comprised of household-based producers where production is labour-intensive and relies on local raw materials. This is the category that is often termed the 'informal sector' because of the lower levels of organisational requirements. This sector usually dominates the whole manufacturing sector at lower levels of economic development, both in terms of total number of production units and the total number of people engaged. But because of the sector's low levels of labour productivity it is still dominated by the larger enterprises in terms of their relative contribution to total manufacturing value added. For example, in a comparison of 12 countries in Asia, Africa, and Latin America, Allal and Chuta (1982) reported employment contribution of the informal sector as ranging between 50 to 98% while its share in manufacturing value added only ranged from 6 to 59%. With economic development there is a general shift in emphasis of size, from the small scale to larger and larger scale production.

In the case of Malawi the second category has been almost non-existent until recently when efforts have been made to more actively encourage its development. For example, estimates of GDP by scale of production by the NSO in *National Accounts Report, 1973-1978*, indicate that while large scale producers contributed 69% of total manufacturing output on average between

1975 and 1978, medium scale producers (corresponding to category 2)) only contributed 4% and the ones corresponding to category 3) contributed 27%. This suggests that there are large size disparities between large firms and the small producers, which are bound to affect their behaviour towards each other or their reactions to each others' actions. In fact the typical size of a small producer in Malawi is said to be one employing less than three persons, and in the majority of cases these can hardly even warrant the term 'firm'. The following quotation (brackets added) suggests that the pattern of interdependence might be characterised by price leadership relationships whereby the larger firm(s) lead and the informal sector producers follow with lower prices (suggestive of high cross-elasticities of demand);

"Competition is acute for SSEs (small scale enterprises) who are the losers in their struggle with the larger enterprises. 60% of the interviewed SSEs sell at prices lower than their larger competitors, cutting profit margins to a minimum."(IBRD, Sept., 1978)

b) Geographical Dispersion of Firms

Measuring industrial concentration by reference to national figures can grossly understate the true concentration if an industry is characterised by markets that are dispersed and served by localised firms.

Figures presented in the appendix show that Malawian industrial location for the most part follows the urban hierarchy with by far the largest number of firms located in Blantyre, the primate city. Many of these firms do not have competitors located or locating anywhere else, implying that their markets are national as opposed to regional. According to the geographical distribution of firms, it should suffice to analyse the issue of geographical markets in terms of relative location of firms among Blantyre, Lilongwe and Thyolo/ Mulanje because they represent the largest concentrations.

Thyolo/Mulanje provides location mainly for supply-based industries particularly tea, which accounts for the majority of firms there. Virtually all of these firms represent vertical integration by the tea growers and most of the industry's output is for the export market. Although the latter can also be said to distort the representativeness of concentration ratios, it does so in a way that is not

of concern here. It can and is explicitly taken care of in the estimated models.

This leaves Lilongwe as a possible source of distortion for concentration figures. But about fifty percent of the few firms with licences for Lilongwe are branches of firms already established in Blantyre thereby reducing further the danger of distortion. The industries that might still present a problem are tobacco, clothing and furniture. The first involves export processing while in the second, production is for the national market. Some distortion is likely to occur in the furniture industry but it may be reduced by the fact that one large producer, Press Furniture, sells in both cities thereby neutralising some of the effects of the localised market.

Overall, the foregoing analysis suggests that the geographic size of markets is not likely to be an important structural element in the analysis of Malawian manufacturing. But doubtlessly its effects will be present in a few industries though to a much smaller extent than would have been suggested by the shape of the country, which hints at geographically spread markets.

c) Entry and Entry Lags

In Malawi, for the whole manufacturing sector, effective net entry is negligible. In view of the relatively large number of new licences granted, this deficiency of effective entry might be explained in terms of entry lags.

Entry lags among the larger firms can be used as a barometer for those applying to the whole industry. A method was devised to obtain rough estimates of the average lengths of these lags in different industries. It involved matching the dates when a manufacturing licence was first granted and the date when a return was first completed for National Statistical Office's Annual Economic Survey which is indicative of earliest "operational" status. In the cases where licences were first granted before 1967 only "greater than" estimates could be made because no licencing information was available for earlier dates. These figures are shown in the Appendix. Instances of immediate entry (which are few) are associated with already established enterprises that is entry by diversification. In most cases entry lags averaging three or more years are common.

There is probably no easy answer as to the reason for the lags and different reasons may apply to different industries. It is possible that among the reasons

would be the deliberate strategies of existing firms to frustrate effective new entry. Some of these strategies will be analysed in Chapter 8, and include product quality improvements, and product promotion. From what we have seen, deliberate investment in excess capacity also seems to be a possible reason.

d) Takeovers, Mergers and Exit

In Malawi exit that completely withdraws production capacity is very rare. What happens in most cases is that companies that are in the process of winding up are bought out or are offered a lifeline in the form mergers or equity participation. The industry that has been active in terms of takeovers and mergers is the clothing industry.

Takeover, merger and exit are as likely to occur in concentrated as in unconcentrated industries. The motive of takeovers and mergers seems to be diversification and the desire to invest in activities where capital assets already exist.

The Press group, whose activities we have discussed above, has been quite active in mergers and take-overs. Recently, these activities have taken their toll and threatened the conglomerates' very existence after finding itself over-investing and over-borrowing. Moves since 1984 to sell off some of the ventures are a direct result of this.

3) LEVELS OF ADVERTISING AND PRODUCT DIFFERENTIATION

The level of advertising has been seen both as a source of barriers to entry as well as a symptom of the differentiability of a product. The former influences the structure of a market while the latter describes it. The aim here is to try to find out the characteristic of the industries with high advertising levels. The advertising figures that were available are those for radio advertising, which are by detailed product.

These data were obtained from the Malawi Broadcasting Corporation which is the national radio station and the only one. The data consist of percentages of the Corporation's advertising revenues attributed to clients and broken down by

product. It was however only possible to obtain data covering the first quarters 1977 to the first quarter 1982, excluding the second quarter 1980 and the first and second quarters 1981.

In analysing these data and drawing inferences from them about general advertising behaviour, there are two main underlying assumptions. The first is that radio advertising is used by all industries that have heavily differentiated products and are also heavy advertisers generally. The second is that the intensity of radio advertising reflects the intensity of all other product promotional activities. These are not unreasonable assumptions for a country where radio is the most important and probably the most effective - mass medium.

The questions for which answers are being sought are what industries have heavily advertised products and whether the implied product differentiation involves locally produced products.

Table 5.4 presents an analysis of the data. Column 2 indicates the number of radio advertising clients for each type of product, according to whether the clients were local manufacturers themselves. That is it indicates the extent to which local manufacturers handle their own advertising. Column 3 indicates the number of radio advertising clients other than the local manufacturers. That is these are either foreign manufacturers representing their own products, or 'middlemen' representing either foreign manufacturers or the local ones. This column gives a rough indication of industries in which we might expect foreign competition which is characterised by intensive sales promotion. The obvious exceptions are the industries which do not register anything under this column, namely soft drinks, textiles, knitwear, clothing, furniture, and metal products. On the other hand advertising for foreign products may be expected to be heavy among dairy products, tobacco, insecticides, medicines, soaps, and tyres.

The rest of the table to the right of column 4 shows the extent to which the SIC industries are represented by the largest advertising clients ranked by size of expenditure. For instance, the largest advertising agent (Column 5) represented products in 6 SIC categories; dairy, edible oils, beer, insecticides, medicines and soaps. Among the six largest advertisers, the smallest two were local manufacturers, representing their own specialised products. As a group, these largest six advertisers accounted for 60% of the radio station's total

Table 5.4

An Analysis of Radio Advertising

SIC	1 Products	Number & Nature of Radio Advertising Clients			Representation of Products among the Top Six Advertisers					
		2 Local manu	3 Other	4 Tot.	5 I	6 II	7 III	8 IV	9 V	10 VI
3112	Dairy	-	3	3	*					
3115	Edible oils	-	2	2	*					
3121	Tea	1	1	2						
3131	Spirits	-	1	1				*		
3133	Beer	2	1	3	*					
3134	Soft drinks	1	-	1						*
3140	Tobacco	1	3	4			*			
3211	Textiles	1	-	1						
3213	Knitwear	1	-	1						
3220	Clothing	3	-	3						
3240	Footwear	2	2	4			*			
3320	Furniture	3	-	3						
3512	Insecticide	1	6	7	*		*			
3521	Paints	-	1	1						
3522	Medicines	1	9	10	*	*		*		
3523	Soaps etc.	3	8	11	*	*	*	*		
3529	Match	-	3	3			*			
3551	Tyres	-	3	3						
3819	Metal prods.	1	-	1						
3824	Industrial prods.	1	2	3						
3839	Batteries	2	7	9			*	*	*	
3909	Razor blades	1	2	3						
Totals		25	54	79	6	2	6	4	1	1

Notes: The top radio advertising clients are ranked from I to VI according to advertising expenditures. The names of the top advertisers are;

- I) Lintas Ad.Ltd.; II) International Ad.Ltd.; III) Graphic Ad. Ltd.
IV) Marketing Services; V) Union Carbide VI) Southern Bottlers

revenue from advertising in the relevant period.

The most differentiated industries (according to their representation among the top six advertisers) are toiletries (SIC 3523), pharmaceuticals (3522), batteries (3839) and pesticides (3512). It is not entirely unexpected that the first two have been among the most dynamic in recent years in terms of entry or potential entry according to licencing information. All four industries are characterised by numerous brands of products and heavy import presence. Both these observations tend to be supported by figures of Column 3 and their representation among the top advertisers. What can be inferred from this is that product differentiation might be closely related to import competition. This could mean that some industries which are competitive locally are also subject to international competition as a further moderating influence on pricing.⁵ Another important observation relates to the high incidence of diversification involving three of these industries SICs 3512, 3522, 3523, with the addition of 3529. This is likely to be a result of a common base in the processes and material inputs so that the diversification arises out of the possibilities of joint production.

Among the wholly local industries with a prominent advertising presence are soft drinks and beers (3131 and 3133), clothing (3220), shoes (3240) and furniture (3320). Except for SIC 3240, large firms in these industries face considerable domestic competition and their industries involve sizeable fringes producing differentiated but competing products.

The other remaining prominent advertisers, milk powders (3112), cigarettes (3140), tyres (3551), razor blades (3909) have a large import presence, providing stiff competition.

4) EXCESS CAPACITY

Following Spence (1977) Cowling (1982) has made further considerations about the possible uses of excess capacity as an entry deterring strategy. In the Spence sense existing firms could deliberately invest in excess capacity to meet future needs. For instance with threatened entry where existing firms have excess capacity, the latter could simply increase their output and thereby force prices down. Cowling has argued that excess capacity can be and often is a fact of life and may be unrelated to strategy. But its very existence could still facilitate entry deterrence. In Malawi, the problem of relative 'visibility' between deterrence based on pricing compared to that based on excess capacity is resolved by the fact that existing firms could just inform the government and the latter would inform prospective entrants.

In a survey on excess capacity involving 40 firms in neighbouring Tanzania, Wangwe (1979) found that 58% of the firms did not use more than 70% of optimal levels of capacity utilisation, and all firms did not use more than 90%. Supply factors particularly shortage of raw materials emerged as more dominant factors than demand factors.

Though the Malawian figures on capacity utilisation are now dated, they can still be of some use. Actual output as a percentage of potential output (when machines are worked at 100% capacity) was about 80%. Actual output was estimated to be 90% of what would have been achieved without problems with availability of skilled labour. Unfortunately, apart from implying that skilled labour could have contributed to the underutilisation of machinery, these figures do not tell us anything about the factors which give rise to excess capacity and yet this may be an important aspect in the influence excess capacity might have on pricing behaviour. From the discussion of Chapter 4 one could argue that whether excess capacity results from demand deficiency or whether it results from shortages of inputs makes a lot of difference. In the former case it would mean that firms have less power over raising of pricing, since they could do so at the cost of increased excess capacity. In this case collusive agreements to raise prices would tend to be irrelevant. In the case of input shortages rather than demand deficiency, we have suggested in Chapter 4, that this could lead to collusive pricing. In Chapter 8 we shall examine data which will allow us to say not only whether excess capacity is common in Malawi, and what the likely causes are, but also to indicate the effect on

pricing.

NON STRATEGY CAUSES OF EXCESS CAPACITY

Supply factors that lead to excess capacity do so by imposing constraints on production. Working capital ratio, imported raw materials intensity and skilled labour intensity are variables that have been included in the Malawian model as a concession to their possible effects on pricing behaviour. Here we describe briefly the Malawian conditions with respect to these variables.

a) Working Capital

An analysis of ratios of end-of-year stocks of finished products to net output in Annual Survey of Economic Activity (AES), 1967 lead to the conclusion that short-term investment in inventories constitute a major type of investment in most sectors except agriculture. The overall average ratio was 91% mainly accounted for by the distribution sector with 305% and manufacturing with 85%.

An analysis of short-term assets and liabilities over 1974 and 1975 reveals that 'stocks' and 'trade debtors' constitute very high proportions of current assets while 'cash' and 'intercompany debts' amount to only a small fraction. On the liabilities side there is a more even spread across the three categories, 'suppliers' credit', 'intercompany debts' and 'advances or overdrafts' implying that all sources of finance for working capital are important. The ratio of current assets to current liabilities which is sometimes known in financial analysis as the working capital ratio can be taken as an indication of the extent to which the firms operate under pressure of liquidity. The corresponding ratio for the two years is 143%, implying that liquidity is not constraining generally. But industry differences in this variable may be more interesting and worth considering in an econometric model. This is done in Chapter 7.

b) Imported Raw Materials

It has been suggested that much LDC manufacturing depends on imported material inputs. Malawian manufacturing is no exception, although like much else this varies across industries. In all industries concerned, by far the larger proportion of value of imported inputs is made up of manufactures and a sizeable proportion of this is made up of fuels. The share of imported materials in gross industrial output in Malawi dropped from an average of about 37% per cent over the 1964-1969 period to 27% over the 1969-1972 period. This indicates its fall in relative importance although the absolute value of the imported inputs was actually rising over the entire period.

Although foreign exchange rationing in Malawi is not as extensive as in other African countries, the fact that it is there means that industries are vulnerable according to their dependence on imported inputs. The danger of using the ratio of the value of imported inputs to total consumption of material inputs in analysing this phenomenon is of course that production can be disrupted even if this value were minimal, if the input in question is vital, as in the case of spare parts for machinery lack of which could mean no production at all. However it might be expected that in general the foreign exchange constraint and the variability of import prices, are likely to affect a particular industry in a milder way the lower is the relative value of the imports to total material inputs.

Figures for imported raw materials are available in ASEA up to 1972. The values of imported goods and materials used as inputs as a percentage of total consumption of goods and materials show that in general agro- and forestry-based industries (food, and sawmill and furniture) have the lowest dependence on imported raw materials. These have average percentages of less than 20%. The exceptions are bakery products and non-metallic mineral products which have each around 80%. In the former case this is because of imported wheat, while in the latter case fuel (coal), gypsum and packaging materials constitute the major imported inputs. For all the rest of the industries, textiles, clothing and footwear, paper products and printing and publishing, chemical and allied, and metal products, the average import dependency is over 80%. Import dependency is therefore a possible constraining factor in production.

c) Skilled Labour

From the results of the 1967 survey of excess capacity, it was suggested that the supply of skilled labour was less of a constraint in highly mechanised processes (ASEA, 1967, p. iv). It was further suggested on a speculative basis due to lack of data, that this supply posed a serious constraint in 'footwear and clothing', and durable goods.

Since Malawi has always had a free earnings repatriation scheme, the international labour market is open to manufacturers. The only constraint with recruitment on this market is the relatively high price they have to pay, including requisite inducements, compared to recruiting local personnel even if this involved the financing of training. It can be hypothesised that recruitment of skilled labour will depend on the production process involved and also on the productivity of that labour. Thus some industries will require higher levels of skills (however defined) than others. But the level of employment of those will depend on the employer's ability and willingness to pay which is related to the expected productivity of the labour.

Although it is true that labour productivity will depend on the value of investment per employee, an analysis of average earnings and net output per employee could allow a rough investigation of the hypothesis on the employment of skilled labour. These earnings, averaged between 1974 and 1975, reveal the following. Chemical and allied products; paper products, printing and publishing; metal products (including machinery and motor vehicle assembly) among them had the highest average earnings. Considering the types of industries that have established in Malawi, these industries are among those that might be expected to have relatively high proportions of skilled labour and high average net output per employee. The bottom industrial groups were clothing and footwear, tea and tobacco processing. Generally, average capital/labour ratios were more remotely related to average earnings, reflecting different new investment and capital renewals patterns among industries. The pattern of skilled labour requirements is therefore likely to differ among industries and so are the constraints imposed by the availability of that labour.

SUMMARY AND CONCLUSIONS

The economic conditions existing in Malawi, and particularly the limited size of the market and scarcity of investment funds have resulted in low levels of competition in most industries. Although some industries owe their very existence to active government inducement in the form of granted monopoly status involving subsequently barred entry, the evidence analysed here indicates that incidents of either are relatively very few. For practical purposes the entry conditions as far as institutional barriers are concerned, may be described as free in the sense that in the very few cases where entry has been barred, the reasons have largely been economic, such as existing excess capacity. In other cases there are hints of the desire by existing firms to influence their industrial structures via entry deterrence by either using existing or deliberately investing in excess capacity, and by advertising.

High degrees of concentration are most likely to be found among industries that are expected to have high economic barriers to entry in terms of minimum efficient plant scale and skill intensity of the production process. Lower barriers in other industries, typically clothing, wooden products and furniture, have resulted in much competition from 'competitive fringes'.

Two factors that are likely to have exposed domestic firms to strong moderating influence on pricing and perhaps behaviour generally are price controls and easy entry of competing imports. These could play an overriding role in influencing performance in the industries.

It appears that problems with input availability, and particularly imported materials, have the potential of seriously constraining production decisions and could therefore influence behaviour and consequently performance. It has been more difficult to derive any such prediction with respect to the other inputs such as working capital and skilled labour. But it may well be that they present much less of a problem compared to imported materials.

It will be possible at a later stage to investigate in the form of testable hypotheses, many of the aspects of structure/conduct that have been handled rather informally here, and for which neither this chapter nor the next two can

provide more definite answers. For instance, we shall be able to look more directly at such questions as, How prevalent is excess capacity? What are the causes? Do firms really seek to deter entry and what are the important strategies?

In conclusion, the above discussion permits us to make several remarks in anticipation of econometric results. Firstly, it may be said that the concentration-profits relationship is likely to be weak for Malawi because of price controls. Secondly, other structural factors, particularly foreign trade and growth of domestic market are expected to be important in determining profitability. The former is due to Malawi's liberal position regarding international competition. Thirdly, as expected, scale economy barriers to entry can be expected to be important in the determination of industrial concentration, and perhaps in the determination of profitability, via pricing behaviour. Lastly, on advertising, apart from saying that this tends to reflect product differentiability and possibilities of intra 4-digit SIC industry diversification even on the international level, no definite hypothesis can be postulated with regard to its relationship with profitability.

NOTES

1.The absolute value of exports rose even more dramatically between 1970 and 1979 to MK 184.5 million. It should however be noted that the change between 1964 and 1970 represented a fall (though a small one) in the share of exports in GDP. In 1964 this was 16% while in 1970 it was 15%. Despite this fall, the fact that the proportion only fell by a small margin could still mean a worthwhile achievement for a country exporting only primary products.

2.One can still approximate the actual import duties by taking the ratio of import duties to the 'cost, insurance and freight' value of imports which figures can be obtained in the more readily available *Annual Statement of External Trade*. But since in a study of this nature it would be important to do some sort of time-series analysis including the investigation of lagged responses, the number of observations is limited by the fact that prior to 1975, import duty and surtax figures were combined. Even so, a useful study could still be done but we do not embark on it here. In Chapter 8 we shall investigate a hypothesis which involves the effects of import duties, under a variable which represents overall barriers to entry for imports.

3.Chenery has since extended his classic model to incorporate technological change (see Chenery, 1979). But for our purposes here the earlier model will suffice.

4.Nigerian figures have been used in this table because they were available. But they also serve to contrast Malawian manufacturing with that of a larger economy.

5.For a price-cost margins equation this might be a case for arguing that there is likely to be interaction between the import intensity and the advertising intensity variables.

CHAPTER 6

MEASUREMENT OF THE VARIABLES AND MALAWIAN DATA

INTRODUCTION

This chapter is concerned with describing the form of the variables that are to be used in the estimated models of Chapter 7. The approaches that have been adopted to deal with the more serious problems are also discussed in some detail.

The period of analysis is 1969 to 1972. The choice of this period was prompted by two data considerations. The first was that some of the published data for earlier periods were by industrial groupings which are too broad. The second reason was that for later periods although data were published according to more disaggregated industries than the 1969–1972 period, the questionnaire did not cater for information relevant for the derivation of certain important variables.

One advantage of basing the study on the 1969–1972 period is that this period just avoids some of the unusual problems associated with the post-1972 oil price increases. But this could also be a source of criticism in that it could be argued that in the post-1972 period conditions had since become the norm, so that the milder conditions of the earlier period could now be regarded as unrepresentative. But even though this criticism may well be valid, a period relatively free from wild economic changes such as rampant inflation could be an ideal one for analysing the effects of economic policies on behaviour of firms.

The variables described here are derived from time-series data in two main sources. Both are publications of the Malawi National Statistical Office (NSO). They are *Annual Survey of Economic Activity* [ASEA] [later changed to *Annual*

Economic Survey (AES)] and Annual Statement of External Trade (ASET). Another source was unpublished Ministry of Trade and Industry's working lists for licencing of manufacturing activities. In addition, access to individual firms' files for ASEA returns, was obtained from the NSO.

Ideally the access to the firms' ASEA returns should have meant that we would be in a position to construct our own data series and thus be able to use industries disaggregated to levels of our choice. However two problems prevented this. The first was that some files for firms which had existed during the study period were missing. The second reason was that since we were examining the original completed questionnaires some had been heavily edited in the course of updating and cross-checking of the information. This often made it difficult to ascertain which figures were the correct ones. This affected some variables more than others and in certain cases the questionnaire itself provided a means of checking, eg. from the fact that total sales figures must be the sum total of component sales figures. As might be expected, the information found to be quite reliable and relatively free of editing, was that regarding employment and this was probably also the easiest for the firms to supply.

Despite these two problems with information from the ASEA returns, it must be stated that the approach to that source proved quite invaluable. Without the detailed information from this source the task of deriving some of the important variables used in this study would have been very problematic. This point will be demonstrated in examples given below.

Before discussing the derivation of the variables, a number of concepts require to be explained.

The Sample Firms for ASEA

The sample firms for which data are reported in ASEA are the largest in each industry. For the period of study, the size criterion for inclusion was employment of twenty or more persons. Since a licence is required for manufacturing employing ten or more persons, or using machinery of at least 25 horse-power, it means that the ASEA firms are all licenced. That is the ASEA firms are a subset of all licenced firms. The total number of firms

excluded from ASEA reporting for each industry comprises smaller producers of what may be termed the competitive fringe, whose size depends on the technological possibilities in the respective industries.

From Chapter 5, we saw that there is a tendency in Malawian manufacturing, for the small producers of the fringe to be associated with only a few low barrier industries. This would mean that the problem of misrepresentation due to cut-off smaller producers would be worse, compared to a situation where for example all industries had the same proportion of these small producers (in terms of output) cut-off. At the same time we also saw that there were factors that also tend to reduce the impact of the excluded small producers. These factors include the fact that the small producers are typically very small and producing inferior products compared to the larger firms, and this reduces the cross-elasticity of demand between the products of large and small firms and this in turn reduces interdependency of decisions between the two groups of firms. But the fact that we are talking about 'reduction' rather than 'elimination', means that some problems of misrepresentation are bound to remain. But we shall see below, that for some important variables this problem is lessened further by the fact that they attach less importance to the smaller producers.

'Plants' vs 'firms'

Ideally the unit of coverage for the ASEA is supposed to be the establishment or plant. This is the individual workshop or factory in a single type of manufacturing activity. But the returns for the survey are typically by 'firms', where for instance multiplant firms complete and return only one questionnaire each.

The ASEA Industries

The data in AES are published according to industry groups which combine 4-digit SIC titles according to the inputs and processes involved. One of the reasons for this is compliance with disclosure rules, which do not permit the

publication of information relating to less than three firms.

The result of the grouping is that many of the groups correspond to those used elsewhere like Industrial Orders for the United Kingdom. A notable difference is that for the 1964-1975 period the group 'food, drink and tobacco' was disaggregated to reflect the type of demand, that is whether it is mainly domestic or foreign.

THE VARIABLES

The following variables are defined and measured at the industry level.

Price-cost margins

This is defined for the i th industry as

$$M = \frac{(S - AVC)}{S}$$

where S is the revenue from sales and AVC is the average variable costs. M is therefore a rate of return on sales.

The exact nature of the variable and its satisfactoriness in empirical studies has depended a great deal on the nature of the available cost data. This problem is stated in detail by Ornstein (1975):

"The typical procedure using census data is to subtract material and payroll costs from sales to estimate price minus these costs relative to sales. The price-cost margin so measured does not account for other expenditures such as advertising, research and development, taxes, depreciation, distribution expenses and components of overhead costs".(p107)

What is achieved in these circumstances is profits plus these other expenses,

which mainly comprise elements of overhead costs, divided by sales. Phillips (1975) has raised objections against measures of M which do not exclude at least some of these expenditures. A very similar measure can be obtained from ASEA by defining

$$M = \frac{(\text{Gross Output} - \text{costs})}{\text{Gross Output}} = \frac{\text{Net Output} - \text{Wages \& Salaries}}{\text{Gross Output}}$$

Gross Output at factor cost (because sales figures are net of indirect taxes) = total receipts from goods sold and resold, and/or services rendered. Net Output = Gross Output - value of current goods and services consumed, and rent and interest paid. Net Output is the fund from which wages and salaries, direct taxes, dividends, profits and depreciation must be met. Note that since we want M to approximate $[(\text{price} \times \text{quantity} - \text{average cost} \times \text{quantity}) / \text{price} \times \text{quantity}]$ the use of Net Output in the denominator rather than Gross Output, would be inappropriate. This is because the former would be further removed from the notion of 'price x quantity', by the subtraction of the costs of materials.

Apart from resold goods, whose values are usually minor, M includes in Gross Output or Net Output, some inappropriate items, 'value of capitalised work done'. This is defined as the "amount paid in wages and salaries to own employees engaged on work of a capital nature, e.g. new roads, installation of machinery, erection of new buildings, etc." (ASEA, 1970, p6). The crucial point is that such output would be credited to gross fixed capital formation and should have little to do with margins since the output is not sold and does not involve any pricing decisions. The inclusion of the value of net changes in stocks of finished products would also be inappropriate because they involve net additions to unsold output.¹

Finally Costs include depreciation. It has been suggested that this should be excluded from M (Phillips, 1976).

After these considerations, the measure that is adopted is

$$M = \frac{(\text{Total sales receipts} - \text{costs of sales and operations} - \text{wages and salaries and other employment benefits} - \text{interest} - \text{rent} - \text{depreciation})}{\text{Total sales receipts}}$$

where the total sales figures exclude 'capitalised work done'. The 'costs of sales and operations' include materials, electricity, work given out, transport services, insurance, bank charges, audit fees, and advertising, (ASEA, 1970 pp. 6-7).

The numerator of M is an approximation of profits gross of direct taxes and dividends. It is an approximation because the depreciation used for accounting and tax purposes may not reflect true utilisation of capital assets. The total depreciation figures are composed of depreciation charged against different categories of fixed assets; factory buildings, plant and machinery, vehicles, and 'other'. The inter-industry differences in the total depreciation are likely to account for differences in the composition of the fixed assets and therefore the level of fixed costs among industries.

Three-firm concentration ratios CR3

The problem of missing files means that we also missed an opportunity to derive and use the Herfindahl index of concentration. The k-firm concentration ratio was considered because of this.

The k-firm concentration ratio is the proportion of an industry's output supplied by the k largest firms in that industry. In related studies for the industrialised and larger economies k is usually larger than three because of information disclosure rules. For this study, alternative values of k have been used namely $k = 1$, $k = 2$, and $k = 3$. This was of course made possible in most cases, by the use of information from the ASEA returns.

The grouped data from which the concentration ratios were derived, are contained in the firm size distributions published by the NSO. They represent all the firms that were operational during the study period and therefore provide a good basis for the complementary use of the ASEA returns information. The size of the firms is given by employment, which is also where the ASEA returns information was most reliable.

The two major problems encountered with this variable were in some cases, the industry aggregation levels and in other cases how to determine what

employment was accounted for by the largest one, two, or three firms. We next illustrate how the information from the returns was used in conjunction with published size-distribution tables to achieve higher levels of disaggregation and CR indices corresponding to alternative values of k . Note that this discussion is also relevant for the derivation of the scale economy variables discussed below.

Table 6.1

Illustration of Firm Size Distribution by Employment

for 'Ginning, Spinning, and Weaving' and 'Netting Products'

(ie. SICs 3211; 3213, 3215)

20 - 49		50 - 99		100 - 199		200 - 499/		1000+		Total	
Units	Empl.	Units	Empl.	Units	Empl.	Units	Empl.	Units	Empl.	Units	Empl.
2	75	3	238	2	275	2	583	1	1435	10	2606
		[3215]	94	[3211]	113	[3212]	352	[3211]	1435		
		[3215]	90			[3212]	231				
		--	--		---						
			54		162						

The figures next to the SIC numbers in brackets in the bottom half of Table 6.1 are from the firms' returns, (except for the figures right at the bottom ie. 54 and 162 which are the remainders after subtracting from the total of each size class, the employment figures from the returns. The NSO also published tables with information on total employment by fairly disaggregated industries. From this information and for the above example, the total number of units for 'netting products' SIC 3215 was 2 and total employment was 184. This effectively accounts for that industry and from the file information we could identify the two firms by their employment (ie. $94 + 90 = 184$). We then know that the rest of the size distribution must relate to 'ginning, spinning, and weaving', and we can proceed to calculate the concentration ratios for two industries, SIC 3215 and the combination of SICs 3211 and 3212. We note that relying on only the information from the returns, we would have lost 4 firms,

accounting for total employment of 291 (that is $75 + 54 + 162$). On the other hand without this information from the returns, it would have been impossible to obtain concentration ratios corresponding to the disaggregated industries.

The next problem to illustrate relates to the cases where from the size distributions it was not possible to allocate employment to the largest firms, without resorting to extrapolation. Suppose that the information in the top half of the above table is for one industry at the 4-digit SIC level (eg. tea, tobacco, bakery products, etc.) and suppose that we could not allocate the employment in the '200-499' size class to the two firms. This would mean that we could calculate CR1 and CR3 but not CR2. Bain (1966) described a method of extrapolation that we found useful. We need to get a statistical estimate of the largest firm in the '200-499' size class. We proceed by obtaining the average of the smallest statistically possible and the largest statistically possible as follows:

- a) The smallest statistically possible estimate is when both firms are of equal size, ie. $583 \text{ divided by } 2 = 291$.
- b) The largest statistically possible is the minimum of the following;
 - remainder (from 583) after assigning the lower limit of the size class (200) to the smaller firm
ie 200×1 (or $200 \times \text{number of smaller firms in the case of more than one}$).
 - the upper limit assigned to the largest firm(s), in this case 499×1 .

From this we get

$$\begin{aligned} & \min \{ [583 - 1(200)], [1 \times 499] \} \\ \text{or} & \min [383, 499] \\ & = 383. \end{aligned}$$

- c) The arithmetic average of a) and b) give us the required estimate which is 337 (cf 352).

Table 6.2 illustrates how 4-digit SIC Industries are grouped by the NSO. It also compares the concentration ratios calculated for the 4-digit industries, with those of the industry groups. The former include firms with more directly

competing products, that is with high short-run cross-elasticities of demand (or supply). Due to the high concentration of some 4-digit industries grouping them leads to lower joint concentration ratios.

This is the type of problem that has prompted many economists to comment on the meaningfulness of 'industry'. Shirazi notes "... the census industries seldom correspond to the theoretical concept of industry in economics."p 71. Phillips (1976) also expressed similar disillusion:

"Also industry definition is arbitrary in both product and geographic dimensions, irrespective of the concentration ratio concept that is used".

Stigler (1955) had earlier suggested that a rough solution would be to base the industry groups on large long-run cross-elasticities of either supply or demand. This, as has already been indicated, is roughly the criterion used by the NSO. The concentration ratios that are derived are therefore rough, but Adelman (1964) has defended their use:

"though a concentration measure tells us little about a given industry at a given time, groups of concentration ratios, permitting comparison in time and space, do give us some solid information and hence the most important use of concentration is in comparison: over time; or among countries, or regions, or industries at the same time".

In order to alleviate the problem of downward bias when CR_k calculations are based on aggregated industry groups (as opposed to 4-digit SIC industries) a weighting system was used. The CR_ks were first of all calculated for the disaggregated industries, and then these were weighted by their shares in the total employment of their corresponding industry groups (that is the industry groups corresponding to the way other industry data were published. The composite weighted CR_ks for the industry groups were then obtained by summing the individual weighted CR_ks.

The calculated concentration ratios do not take into account the contribution of imports. Other researchers eg. Shepherd (1972) and House (1974) have

The Effects of Grouping 4-digit SIC Industries on

Measured Concentration Ratios*: Malawian Manufacturing 1974

Product	4-digit SIC	No. of Firms	Concentration Ratios for				
			4-digit SIC Industries				Ind. Groups
			CR1	CR2	CR3	CR3	CR3
1. Meat	3111	1	100			100	
Fruit	3113	1	100			100	
Fish	3114	1	100			100	
Sugar	3118	1	100			100	77
Potable Spirits	3131	1	100			100	
Malt Liquors	3133	2	57	100		100	
Soft Drinks	3134	1	100			100	
2. Grain Milling	3116	2	73	100		100	
3. Bakery Prods.	3117	8	53	70	83	83	83
4. Tea	3123	19	16	26	36	36	36
5. Tobacco	3140	6	29	54	75	75	75
6. Ginning	3211	2	91	100		100	
Blankets	3212	2	58	100		100	
Knittwear	3213	2	58	100		100	80
Rope & Netting	3215	2	69	100		100	
7. Clothing	3220	17	15	30	39	39	39
Leather prods.	3240	1	100			100	
8. Sawmill prods.	3311	4	61	79	92	92	92
Furniture	3340						
9. Paper prods.	3412	3	63	85	100	100	69
Printg. & Pub.	3419/20	5	61	73	82	82	
10. Ind. Chems.	3511	2	67	100		100	
Paints etc.	3521	2	60	100		100	
Pharmaceuticals	3522	1	100			100	
Saops etc.	3523	1	89	95	100	100	64
Matches	3529	1	100			100	
Tyre retreadg.	3551	2	71	100		100	
Plastic prods.	3560	3	42	73	100	100	
11. Clay prods.	3691	2	71	100		100	
Cement	3692	1	100			100	95
Other non-met.	3699	2	64	100		100	
12. Farm Imple.	3811	1	100			100	
Furniture with metal fixtures	3812	1	100			100	
Structural met.	3813	1	100			100	
Other non-machine met. prods.	3819	4	56	83	93	93	54
Other non-elec. machinery	3829	2	55	100		100	
Radio assembly	3832	1	100			100	
Motor Veh. ass.	3843	3	62	93	100	100	

Note:* The economic variable for the measurement of concentration is employment.

Source: Calculated from Annual Economic Survey firm-size distribution

adjusted concentration ratios for imports. For the less developed countries imports are indeed likely to be very important and account for large shares of total domestic sales. The approach taken here has been to account for the imports separately as has been done by a number of other researchers (Shirazi, 1974; Geroski, 1982). The reason for adopting this is that import competition reflects interesting aspects of industrial structure such as barriers to international competition, which are best dealt with separately for their policy implications. A fuller discussion of the role of this variable in the structure-performance models has already been presented in Chapter 3. At the practical level this approach also gets round the problem due to the fact that the size distributions on which the concentration ratios are based, are by employment, while imports are given in value terms.

The next problem relates to the effect on the representativeness of the CRks, of the cut-off smaller producers in certain industries due to the 20 employee size criterion for ASEA data. Apart from the factors which we indicated above as likely to reduce the problem of misrepresentation, it can also be expected that the definition of CRk itself helps reduce the problem further. This is the fact that small producers outside the k largest ones, are only represented in the denominator, where they are likely to have a lower impact. Also, as indicated in Chapter 5, although in some industries the small producers contribute significantly to employment in those industries, their output contribution is relatively much less.

Capital intensity (KS)

This is defined as

$$KS = (K_{t-1} + K_t) / GOUT_t$$

where K_{t-1} = book value of fixed assets at end of the previous year, K_t = gross fixed capital formation during the year, $GOUT_t$ = gross output during the year.

This is nearly the form that has been used in other studies, except for the use

of gross output in the denominator rather than value of sales. If KS is to measure the degree of capital intensity of production, then gross output must be the better denominator, because the rate of production is not always equal to sales. The series for K_{t-1} , K_t , and $GOUT_t$ are readily available.

Growth of industry sales (G)

This is a straightforward variable and is defined as

$$G_t = (S_t - S_{t-1})/S_{t-1}$$

where S = sales, and the subscripts t, t-1 denote time periods.

Import intensity (IMPS)

In line with the discussion of Chapter 3, this variable is taken here to be a representation of the many types of barriers to entry for imports, which tend to exist in LDCs, and some of whose effects would not be picked up by alternative variables such as effective rate of protection. The variable has been measured as

$$IMPS = (\text{Imports})/(\text{Total domestic sales})$$

The import series was constructed from trade statistics published in *Annual Statement of External Trade (ASET)*. This classifies items according to the Brussels Trade Nomenclature (BTN) which does not correspond to SIC.²

Reclassification of imported items according to SIC - based industries is not as problematic as deciding which of the imported items can be considered to be competing with domestic products in the domestic markets. This problem is

similar to that of deciding what products can be regarded as belonging to the same industry. The solution is therefore similar, and can be based on Stigler's suggestion noted earlier.

The requirement in this instance is high long-run cross-elasticities of demand between imports and domestically produced substitutes. This was assumed to be the case when similar products - in that they require similar levels of technological sophistication - were already being produced in the country. This implies that the country already had immediate capability of producing the products.

On the whole, the list of excluded items by BTN Chapter (2-digit level) is short. It includes expected items such as mineral fuels, capital goods, products of high precision industries, and basic metals.

Export intensity (EXPS)

This was measured as

$$\text{EXPS} = (\text{Exports})/(\text{Total sales})$$

The ASEA sales figures distinguish between domestic and export sales. The EXPS series was constructed by adding the export figures under 'goods sold' and those under 'services rendered and work done for others'. The latter is usually zero or very minor.

Advertising Intensity, (AS)

The ASEA questionnaire has no separate provision for advertising statistics. Although radio advertising data were obtained, which could be indicative of the vigour of advertising within industries, these are for a later period.

In the published ASEA sources, advertising figures are included in the general expenses item 'electricity, services, rent and interest'. The use of 'general selling expenses' had good data been available would probably be more

appropriate than advertising ones. Advertising expenses in industries with highly differentiated products reflect only a small part of that differentiation and there is no guarantee that this is even representative. For example, some firms might prefer to give discounts to their distributors, who might then be motivated to do their own advertising. As far as the manufacturers are concerned, purely advertising expenses would not in such a case reflect the discounts.

Another approach was to use figures for expenditure items that were as close as possible to selling expenses. These were obtained from the firms' files with returns for the ASEA and are under the title 'other non-industrial expenses'. They include advertising, accounting, insurance, legal and other similar expenses. But the availability of the firms' files meant that the information would relate mainly to the largest firms.

Two proxies for advertising intensity have been derived and used, one based on 'non-industrial services', and other, a dummy variable based on radio advertising data. The first proxy was measured as the ratio of expenses on 'non-industrial services' to total sales. The dummy variable was constructed according to whether an industry could be regarded as being a heavy advertiser or not. These judgements were in turn based on their relative expenditures on radio advertising, that is whether this was above or below average. Radio being the most accessible mass medium, radio advertising was assumed to be representative of the distribution of other selling expenses among industries.

Diversification (DV)

Firm diversification has been described as the lateral expansion of firms which is neither horizontal nor vertical integration 'but in the direction of other different, but often broadly similar activities' (Robinson, 1958 p114). A number of measures that are in constant use have been reviewed and their properties assessed by Gorecki (1974).

The form of this variable adopted for application to Malawi is similar to 'entry by diversification' used by Utton (1979) and which can be measured by the proportion of output or employment in an industry accounted for by firms

classified under other industries. This would be one minus the coverage ratio, where the latter 'measures the extent to which the products primary to an industry are shipped by plants classified in that industry', and which measures the inverse of potential entry from existing firms.

Much of the affiliation of manufacturing firms to parent enterprises in Malawi is associated with horizontal as well as vertical integration. The more prevalent form of diversification within the manufacturing sector ie. in the Robinson sense is that associated with the convenience and possibility of joint production and generally cannot be observed at the 4-digit SIC industries level from the published sources.

Considering the important role played by reliance on private sources of capital to finance investment in countries such as Malawi, it may not be appropriate to ignore diversification. Where barriers to entry are high because of capital requirement, entry associated with already established firms may be the most probable form and this is especially so given that gearing in Malawian companies is generally zero or negligible.³

The measure devised to reflect this diversification was derived from the ASEA information, licencing lists and the organisational chart of the Malawi Development Corporation (MDC) which has extensive equity participation in the manufacturing sector.

DV was measured as the proportion of total employment in firms that are subsidiaries of diversified enterprises, to the total employment of their industries or industry groups.

The list of the subsidiaries comprised firms in which MDC had controlling ownership plus subsidiaries of other enterprises. The latter were identified from applications for manufacturing licence variations on the licencing working lists. These relate only to enterprises which already had ongoing concerns in the manufacturing sector. This is a limiting factor in that diversification of a purely vertical integration kind is not represented. However, this disadvantage must be reduced by the fact that most enterprises which are vertically integrated into manufacturing, usually have more than one affiliates in that sector, in which case vertical integration can be taken as being indirectly represented in DV.

Market size (MKT)

This is defined as

$$\text{MKT} = \text{Value of total domestic sales} = \text{Value of} \\ \text{domestic sales by domestic producers} \\ + \text{value of imports}$$

This is an estimate of the potential domestic market faced by domestic producers. The imports also indicate the scope for import substitution. The data for imports are the same as those described under IMPS and EXPS.

Minimum efficient plant scale (MES) and cost disadvantage ratio (CDR)

In the literature, a number of approaches have been proposed for variables reflecting various aspects of the long-run average cost curves. For practical purposes the important consideration in choosing among them is the nature of the data that are available. For this reason, the approaches adopted by Lyons (1980), and Fuss and Gupta (1981) were not considered for application to Malawi. (Their problems have been discussed in Chapter 3 and relate mainly to their data requirements in terms of number of production units which exist.) But the MES proxy proposed by Comanor and Wilson (1967), and the CDR proxy proposed by Caves *et al* (1975) can both be derived from published tables of size distribution of firms. Before discussing the procedure, one point which needs to be made is that in view of what has been said about the coverage of ASEA data, the variables derived from them relate to the larger firms. This means that there would be a tendency for estimates of MES to overstate while those of CDR understate the true industry values.

One solution to this problem which was considered, was to make use of independently derived estimates for MES and CDR such as the engineering estimates calculated and reported in Pratten (1971) for various UK industries. Those which correspond to Malawian industries would then be 'adopted' to

represent those industries. The major attraction of engineering estimates is that they are not limited by the nature of existing firms and therefore are less compromised by the existence of very few firms. However the idea of adopting the Pratten measures was abandoned on two counts. First of all no estimates are available for 'tea', 'grainmilling', 'tobacco', 'clothing', 'sawmill products', and 'furniture'. This would lead to the potential loss of 24 observations. Secondly, and perhaps even more important than the first reason, there are almost no grounds for justifying the use on Malawian industries, of estimates based on UK manufacturing because their environments are different from the point of view of market size, factor intensity, vintage of the technology, etc.. It can also be noted that despite the similarities one might expect to find between UK and her Western European neighbours, manufacturing conditions have been noted to differ enough to affect labour productivity even within the same companies in different European countries. Such differences would almost certainly affect calculations of MES and CDR even among these countries.⁴ We are left with the Caves *et al* proxies for serious consideration despite the fact that they are not without their problems in application to situations such as that of Malawi.

The two proxies for MES and CDR expressed in terms of gross output are

MES1 = average size of the largest firms accounting
for 50% of industry output.

MES2 = MES1 as a percentage of total industry output.

CDR = average output per worker in plants accounting
for the bottom 50% of industrial output,
divided by average output per worker in the
firms accounting for the top 50%.

MES2 is the relative measure of MES and is the one used in the estimates of Chapter 7. It can be derived from size distributions based on employment, which is the way they are published for Malawi from 1967 to 1975 excluding 1969 when none was published. The use of value-added would have been preferable for the CDR proxy since we are concerned with relative labour productivity, and this also happens to be the way Caves *et al* defined CDR. But one might expect that the use of gross output figures will reflect the value-added measure, fairly closely.

There are two major problems associated with the use of these measures on

Malawian data.

First of all there is again the problem of the exclusion of small producers employing less than 20 persons from the data set. But then one of the assumptions on which the Caves *et al* measures are based is that 'labour quality and wage rates should not vary with scale', which assumption would most certainly be violated if the fringe producers were included since the relative quality of their labour and the wage rates tend to be very low.

Secondly, when number of firms are small there are such basic problems as for instance how to measure MES when there is only one firm? In order to resolve this problem we went back to ask what either variable was supposed to be measuring and from this it would seem reasonable to say that the case where only one firm exists in the industry could be taken to represent very high barriers to entry and consequently MES and CDR should both be very high. 100% was therefore assigned in such cases. The other related problem was that of the difficulty of dividing firms according to the 50% cut-off point for industrial output. An industry with two firms the larger of which is twice as big as the smaller one, would have the larger producing 66% of industrial output. The question is whether poor approximation of the 50% cut-off point will seriously affect the results. It is difficult to answer this question directly but it can be said that if this problem affects only some industries and not others, then some bias would result from the unequal treatment of the industries. But then the scale economies situation represented by the two firms in the above example could well correspond to the situation where there are many firms (and where the 50% output cut-off can therefore be more closely approximated), in which case the small number of existing firms does not lead to bias. In practice we are usually not in a position to know what sort of bias would result from the problem or indeed whether any bias would arise in any particular situation.

Since CDR requires output information, there was need to generate estimates for this for the size classes. With these estimates and other available information, MES and CDR could then be derived for 4-digit SIC industries, after which the same type of weighting system which was used for CR was also used to obtain industry group MES and CDR.

One approach to the problem of missing information would have been to

generate independent output figures for the size classes from the firms' files. This was however abandoned because of missing files, a problem which mostly affected firms which would be in the bottom ranges of the size distributions.

The indirect approach that has been adopted, involved estimating gross output for the size classes by extrapolating from the output figures published for the 1970 and 1971 size distributions.

Extrapolating gross output

The procedure involves the average productivity of firms in each size class for the years for which size class output information was available. That is,

$$\hat{Q}_{st} = \frac{1}{2} \left[\left(\frac{Q_s}{L_s} \right)_{1970} + \left(\frac{Q_s}{L_s} \right)_{1971} \right] L_{st} \quad (6.1)$$

where \hat{Q} is the estimate of gross output, Q is actual gross output, L is actual employment, s is the s th size class and t is the year (in this case 1969, 1970, 1971, and 1972).

Empty size classes in the two base years 1970 and 1971 but which were not empty for some other year presented a special problem. This is one consequence of small numbers of firms. It means that the appropriate labour productivity for the size classes in the base years was not observable. In such cases the productivity for the nearest years to 1970 and 1971 was used by resorting to information from the ASEA returns.

One interpretation of 6.1 is that it assumes that labour productivity in each size class is constant over time (although the variables being measured would not necessarily be constant). This implies similar technology associated with both new entrants into a size class and the old firms. However, the effects of changes in technology are reduced by the short period of study and having base years in the middle. The effect of wide differences in technology due to grouping of a wide range of SIC categories has been reduced by tracing and separately accounting for the mobility of some individual firms across the size classes. This was particularly essential for the industry group 'chemicals and

allied products' which comprises six 4-digit SIC categories.

From the above discussion, the factors that are left to influence MES and CDR are those that influence the structure of industries' size distributions. Such factors are growth or decline of firms, and new entry or exit from the industry. These change the relative employment in the size classes by changing their composition.

The role of these effects can be illustrated by expressing MES and CDR algebraically and relating them to 6.1. Letting Q stand for output and i, the ith firm

$$\text{MES} = \frac{1}{n-j} \sum_{i=j+1}^n Q_i \quad (6.2)$$

where $i = 1, \dots, j, j+1, \dots, n-1, n$; $(1/(n-1)) \sum_{i=j+1}^n Q_i > 1/2 \sum_{i=1}^n Q_i$ and $Q_n > Q_{n-1} > \dots > Q_1$.

Suppose the largest firms are in the largest S-m size classes such that $S = 1 < \dots < m < \dots < S$. Substituting 6.1 into 6.2 with the firms allocated into size-classes.

$$\begin{aligned} \text{MES} &= \frac{1}{n-j} \left(\sum_{s=m}^S \hat{Q}_s \right) \\ &= \frac{1}{n-j} \sum_{s=m}^S c_s L_{st} \end{aligned} \quad (6.3)$$

where c_s is a constant for any size-class over time and $j+1$ is the smallest plant in m . Change in MES over time can be expressed as

$$\text{MES} = f[(\sum_{s=m}^S \hat{L}_s), L_s] \quad (6.4)$$

which consists of changes that affect the composition of the S-m size classes and those that only affect employment within certain size-classes. If firm sizes in the size-classes are normally distributed, or negatively skewed the former changes would be associated with the more dynamic forces in an industry. It is therefore conceivable that such forces will be more associated with creation of new capacity or exit. This however is not to deny that both types of change may be part of the same process.

Similarly, CDR can be expressed in terms of estimated output and the employment in the size classes.

$$\begin{aligned} \text{CDR} &= \frac{\sum_{s=1}^{m-1} \left(\frac{\hat{Q}_{st}}{L_{st}} \right)}{\sum_{s=m}^S \left(\frac{\hat{Q}_{st}}{L_{st}} \right)} \\ &= \frac{\sum_{s=1}^{m-1} \left(\frac{(\frac{c_s L_{st}}{L_{st}})}{L_{st}} \right)}{\sum_{s=m}^S \left(\frac{(\frac{c_s L_{st}}{L_{st}})}{L_{st}} \right)} \quad (6.5) \end{aligned}$$

CDR will therefore also be sensitive to changes in employment whether this affects firms' size distributions or not.³ The important thing about 6.3 and 6.5 is that they emphasise the two types of change that can affect MES and CDR.

Relative employment among size classes in the industry must change, if the variables are to be affected. This is not a weakness of the procedure that has just been outlined, but is a feature of statistical measures of this types in so far as they are based on the existing firms (as opposed to say engineering estimates which can deal with hypothetical sizes of firms or scales of production. In the derivation of the variables, MES could be calculated directly from the size distribution tables, so that the output estimates were only used in the calculation for CDR.

Table 6.3 indicates the significance of changes in the distribution of firms due to growth or entry or both. The relative distribution of the firms in size-classes are plotted in Fig. 6.1. The tendency of the proportion of the largest firms to rise is more than hinted. The total employment in Fig. 6.2. also

Table 6.3

Firm Size Distribution Changes due to Growth, Entry and Exit

	20-49	50-99	100-199	200-499	500-999	1000+	Total
1967 No.(%)	41(38)	27(25)	19(18)	17(15)	4(4)	0(0)	108(100)
1971 No.(%)	38(28)	40(30)	32(24)	19(14)	4(3)	1(1)	134(100)
1975 No.(%)	25(22)	28(24)	25(22)	23(20)	8(7)	6(5)	115(100)

Note:Size distributions are by employment.

Source:AES

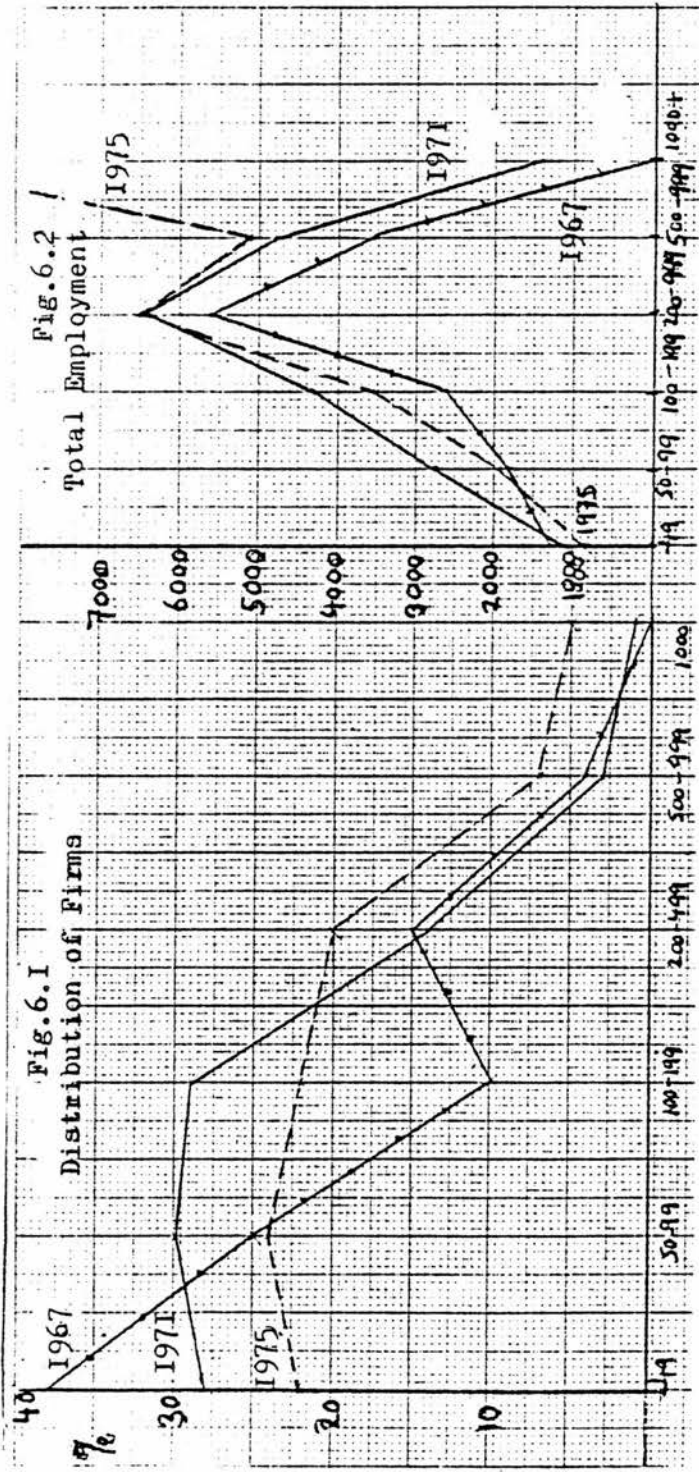
Table 6.4

Changes in Average Firm Sizes in Size-classes

	20-49	50-99	100-199	200-499	500-999	1000+	Total
1967	30	69	139	330	895	-	138
1971	31	70	135	341	1201	1435	157
1975	34	68	142	284	642	1670	243

Note:Size distributions are by employment.

Source:AES



reflects these trends. Table 6.4 only shows what is happening to average sizes of firms in each size class. It cannot support any view since average employment can be affected by any type of change. For instance this can be affected by whether entry or exit from a size class is by firms which are below or above average size.

Generally, the proxies that have been derived could have been better the larger the number of firms in each industry. This would have meant more size classes and fewer empty ones. It would then have been possible to approximate the size distributions with smooth curves, allowing for better approximation in the cut-off size-classes for 50% of the output. A related problem is due to uneven size-classes, getting broader in the upper ranges. This means that movements in the bottom ranges are more easily detected and picked up than those in the upper ranges.

Imported raw material intensity (RMS)

This has been measured as

$$\text{RMS} = \frac{\text{Value of imported raw materials}}{\text{Total consumption of goods and materials}}$$

'Goods and materials' include fuels and goods for resale. The denominator includes stock adjustments.

Working capital ratio (FIN)

$$\text{FIN} = \frac{\text{STASST}}{\text{STLB}} = \frac{\text{total short-term assets}}{\text{total short-term liabilities}}$$

where STASST = stocks of goods + trade debtors + bank deposits + intercompany debts + other, and STLB = supplier's credit + trade bills discounted + bank advances + inter-company debts + other.

FIN is also known in financial ratio analyses as the current ratio and is used as a measure of liquidity for firms' ability to survive in the short-term. Its role

may not be insignificant in a capital scarce economy and may affect the type of financial management as well as pricing behaviour in different industries.

Skilled labour intensity (SKLL)

There are no published data on skilled labour at the industry level, whatever the criterion for 'skilled'. Although the NSO has used certain criteria in collecting information that reflects this, none is usable for the present study. For instance although the population censuses use better criteria their data are not continuous and provide no industrial breakdown.

There were two contenders for a proxy of skill intensity. These are labour productivity (labour/output ratio) and average earnings per employee.

In many respects, labour/output ratio is directly influenced by capital intensity, which may or may not reflect skill requirement. On the other hand, there are good reasons for believing that the levels of average earnings across industries reflect all important aspects of skill, the general level of educational requirement, experience and even the need to recruit from the relatively highly priced international labour market. These are requirements of the nature of the production process rather than a reflection of labour productivity, which is influenced by capital intensity. Thus although many of the firms in the 'chemicals and allied products' are not obviously more capital intensive than say those in 'paper products, printing and publishing', the former has the highest average earnings among Malawian industries.

SUMMARY AND CONCLUSION

Some of the problems discussed in this chapter relating to the suitability of the available data for variables which conform to the standard definitions are generally not drastic and are not peculiar to Malawi. In other circumstances they have not deterred the use of the derived variables. Most of the variables that have been discussed here have conventional definitions and meanings. They have involved mainly minor data-related modifications. The relatively more serious problems might relate to advertising intensity (AS) association with diversified enterprises (DV), and cost disadvantage at less than minimum

efficient scale (CDR). These however are among the variables that are typically problematic and are often left out in empirical studies.

On the more general level there are however two problems which we have highlighted in the Malawian context. These relate to the industry grouping used in the publication of the data, and the coverage of the data in terms of size of units represented.

In some instances the combination of 4-digit industries has meant that the industrial grouping in the Malawian context is further from the ideal than those used in other studies. This has generally been a result of having few firms in some industries, necessitating the combination of several 4-digit SIC industries to preserve confidentiality. This problem was particularly pronounced in the case of the food industries, chemical and allied industries, and metal industries. In other studies a solution to this type of problem has been to exclude from consideration industrial groups that are considered to be too inclusive. For Malawi, the fact that the spread of industries is itself narrow, limits the use of this solution, as it would drastically reduce the number of available observations. We have therefore used a number of solutions to redress this problem. These are;

- dropping one industrial group which is too inclusive.
- the use of both cross-section and time series data to increase the number of observations, but restricting the time period to one during which data were published according to relatively disaggregated industries.
- basing the calculation of important variables on highly disaggregated industries through the use of original source data, and using weights to obtain variables corresponding to the more aggregated industrial groups.

On the question of the restrictions of the coverage of NSO data to large firms employing 20 or more persons we noted that this would have the potential of leading to some bias due to misrepresentation. However we have noted a number of considerations that will tend to reduce the impact of this problem. The first is the difference between the products of small scale manufacturers and those of larger ones, which make them somewhat distant substitutes for

each other. The second consideration is that some of the variables including the important ones, concentration and the scale economy variables, are to some extent insulated from the effect of excluded small producers by some of the assumptions which accompany their use eg. high cross elasticity of demand for products (in the case of concentration) and production similarities with respect to labour (in the case of the scale economy variables).

In the following chapter results of regression analysis using the above variables are presented. Where it was suspected that particular results may have been influenced by measurement problems, this is indicated.

NOTES

1. The stocks item is included in gross output as 'stocks of finished goods at the end of year' minus 'stocks of finished goods at the beginning of year.'
2. This is subject of a special article in the *Financial Times* 23, Sept., 1983.
3. Note that the numerator and denominator of 6.5 are not constants. Mobility of firms among size classes can make m variable, and Lst can also change due to growth of employment that does not necessarily affect size distributions.

CHAPTER 7

EMPIRICAL SCP ESTIMATION

INTRODUCTION

The model suggested in Chapter 4 was to a large extent designed to reflect the direction pointed by theory and measurement problems. None of its features are exclusively peculiar to the conditions existing in either the developed industrialised economies or the less industrialised ones. The rest of that chapter provided sufficient guidelines about the treatment of peculiarities that may well exist in any economy but may be more prevalent in LDCs such as the roles likely to be played by problems of availability of inputs, and price controls.

The Malawian conditions described in Chapter 5 were not presented with much formal reference to the basic model. It is now time to bring the two together to establish a framework for empirical estimation and the interpretation of the results. Given that the problem of simultaneity must be seriously considered, some prior impressions must be obtained about the endogeneity/ exogeneity of some variables in the Malawian context.

IMPLICATIONS OF MALAWIAN CONDITIONS

The Malawian conditions with respect to a number of issues can be summarised as follows:

1. THE ENTRY PROCESS.

Institutional barriers to entry are minimal and generally conform to economic conditions such as existence or potential existence of excess capacity.

2. INPUT AVAILABILITY.

In Malawi as in many other LDCs, rationing of both foreign exchange for imported inputs and bank advances for working capital is potentially constraining on capacity utilisation. The supply of skilled labour does not seem to be too much of a problem and

consequently might be the least constraining on output.

3. PRICE CONTROL.

The system of formal and informal price controls tends to impose pressure on pricing similar in direction to that of competitive forces.

4. IMPORT POLICY.

Liberal import policies with no quantitative controls and relatively mild tariff protection ensures a tendency towards competitive pricing.

5. EXPORT INTENSITY.

In Malawi exports are generally associated with traditionally export-oriented industries. These are typically agro-based and are little affected by domestic competition or government price policies. The rest of the manufacturing industries are oriented towards the domestic market.

IMPLICATIONS FOR THE ESTIMATED MODEL

Entry

The implications of 1) is simply that only the usual economic barriers to entry need be considered. That is, there is no need to take special account of institutional barriers to entry as did Gan and Tham (1977) in their Malaysian study. The implications of the rules of the entry process on conduct have been explored in Chapter 5 and will be taken up again in Chapter 8.

Input Availability

As argued before, if problems of input availability merely lead to constraints on production and nothing more, they need not be considered directly for the price-cost margins equation. But then it may be that such problems can have the same effect on collusion (via their effect on conjectural variations) as common membership in trade associations. This seems to be the more general interpretation and is the view adopted here.

Price controls and the concentration – profits relationship

According to the official documents cited in Chapter 5, under the Malawian price control system, the basis for determining the markup over cost was said to be 'security of markets' which we might take to mean the combination of the level of demand and the degree of concentration. The former would mean that capacity utilisation could be potentially high (unless it is affected by supply problems or strategic reasons) and that the market could potentially support higher prices. The latter would ensure that there is little competition to bid down prices. These two are important factors in the exercise of monopoly power so that the price control system can be viewed in terms of its anti-monopoly effects. One of the reasons why this form of monopoly control has been popular in LDCs is their tendencies to have more monopolistic industries due to the barrier effects of small markets and the fact that the proportion of new industries is relatively high so that the pioneers become natural monopolists for some time.

The expected effect of price controls on the concentration–profits relationship is, as was suggested in Chapter 4, that the positive relationship would be dampened because of the restrictions on the exercise of monopoly power and because these restrictions are effectively based on the degree of concentration.

Effect of Import policies

There are a number of industries, such as the non-resource based 'chemical and allied' group, that are characterised by heavy import competition. The pressure of import competition on pricing must already be indicated by the fierce competition in those industries, which has manifested itself in heavy radio advertising. But the implied positive correlation between import intensity and advertising should not be allowed to influence the specification of the estimated model. This is because the industries characterised by both high import intensity and heavy advertising are too few, while some industries e.g. beverages with relatively little import competition are by nature of their products heavy advertisers. This suggests that advertising and import competition should retain independent treatment.

The question of whether import intensity should be regarded as endogenous or exogenous in the profitability equation depends on whether it might be expected that levels of imports respond to domestic performance. Another way of putting it would be to ask the extent to which prices of imports can be said to depend on Malawian market conditions or whether these are determined abroad leaving the Malawian importers to pay the going prices. For a market the size of Malawi the latter sounds the more reasonable. However, were protective tariffs widespread, the former would apply. This is because in order for the tariffs to be indeed protective they would themselves need to respond to domestic prices regardless of what caused them to change in the first instance¹. Although in Malawi protective tariffs are said to be limited, the fact that they exist, may require that we treat import intensity as endogenous. (In Appendix CH 7A we report results of formal tests of exogeneity, which indicate that import intensity can be treated as exogenous in the price-cost margins equation.)

Effect of performance on export industries

In order for export intensity to be treated as endogenous in the profitability equation, the question of whether profitability affects the levels of exports must be answered in the affirmative.

In Malawi the tea, tobacco and to a lesser extent the grain industries are heavily oriented towards the export market. These industries may be expected to sell all they cared to export, at the going international market prices. Domestic competition or the levels of concentration are of relatively little importance to their output or pricing decisions. Combining this with the fact that exports from 'non-export' industries are generally negligible, it should be reasonable to consider export intensity as exogenous.

The foregoing discussion is summarised below:

Table 7.1

Summary of Effects of Malawian Conditions

on the Performance Equation

Condition	Effect/Variables	Special Effect on Performance equation
Institutional Barriers	Barriers (neutral)	None
Input availability	Production Constraint (Working capital) (Skilled Labour) (Imported Inputs)	Restraint on price competition
Price controls	Concentration-profitability	negative
Import Policies	Import competition (Neutral)	none
Export Orientation	Export Intensity	(exogenous)

EMPIRICAL RESULTS

The empirical results presented in this chapter were obtained by using data for the 1969-72 period because of their consistency in terms of continuity of the series and definitions. There is also more published information for this period in terms of the number of variables which could be derived from the *Annual Economic Survey [AES]* and allows for greater disaggregation of the industry groups compared to the data for other periods. The estimation was based on 16 out of a possible 17 industry groups because one industry group was too diverse in composition and that certain variables could not be derived. Consequently a total of $N \times T$ ($= 16 \times 4 = 64$) observations were possible for each variable.

In the first instance, it was assumed that simultaneity and pooling of cross-section and time-series data presented no serious problems. That is, we

are assuming that the classical assumptions about the error term hold (independence between the error term and explanatory variables, no autocorrelation, no heteroscedasticity, etc.). In addition, we assume the stability of the model over time and across industries. With this Ordinary Least Squares (OLS) estimates could be obtained by using the combined data set of NxT observations and provided a basis for comparison with subsequent results when these assumptions were relaxed.

Earlier exploratory analysis (with both OLS and Instrumental Variables) concerning the measurement of AS and CDR and the role of MKT are worth mentioning. Briefly, CDR and AS (measured as 'general expenses') both resulted in high standard errors. It is possible that this could be indicative of the measurement problems discussed in Chapter 6. It was decided to exclude CDR from the structural equation and substitute AS estimates from a sub-sample of firms whose data were obtainable from the firms' files at the NSO. This way the list of items entering the general expenses could be narrowed down to correspond more closely (though far from being exact) to sales promotion-related ones. The MKT variable in the margins equation, consistently had a relatively very small and non-significant coefficient. It was also decided to exclude this from the margins equation. Though these variables were excluded from the margins equation those that were believed to be exogenous a priori were used as instruments in later stages of the estimation. These were CDR, MKT and a dummy variable ASD for industries characterised by 'heavy' radio advertising according to the evidence presented earlier.

Table 7.2 presents OLS estimates of the full model with alternative values for k in CRK. If the assumptions stated above hold, the results indicate that they are little affected by the inclusion/exclusion of input variables FIN and SKLL. The input variable most likely to have been directly relevant in the margins equation is RMS.

With the exception of CRK and MES, the signs of the coefficients of the rest of the variables are consistent and conform to expectations. The coefficients for IMPS, DV, G and RMS are consistently significant at the 5 per cent level. One might expect that these variables, with the possible addition of MES, are also likely to be important in a suitably estimated model.

Table 7.2

Ordinary Least Squares Estimates of the Price-cost Margins Equation

t statistics in brackets

	1	2	3
CONST	-0.87	3.88	-2.64
CR1	0.47 (1.82)**	--	--
CR2	--	-0.02 (1.32)	--
CR3	--	--	0.12 (0.64)
KS	0.32 (0.13)	0.41 (0.17)	0.70 (0.29)
G	0.12 (2.93)**	0.12 (2.97)**	0.12 (2.80)**
IMPS	-23.3 (4.07)**	-23.84 (4.03)**	-23.96 (3.74)**
EXPS	-4.83 (0.66)	-8.55 (1.18)	-5.93 (0.73)
DV	0.23 (2.68)**	0.23 (2.69)**	0.21 (2.13)**
MES	-0.24 (1.02)	0.19 (2.67)**	0.10 (0.69)
AS	-0.04 (1.91)**	-0.04 (1.95)**	-0.04 (2.11)**
SKLL	4.79 (0.54)	2.83 (0.31)	3.68 (0.40)
FIN	0.07 (0.99)	0.07 (0.93)	0.07 (0.93)
RMS	0.13 (2.27)**	0.14 (2.51)**	0.14 (2.43)**
R ²	0.55	0.53	0.52

Note:NB. The definitions of the variables used here and in subsequent regressions of this chapter are given in Chapter 6.

* Significant at the 10% level

** Significant at the 5% level

The results of Table 7.2 correspond to a model like

$$Y_{it} = a + bX_{it} + u_{it}$$

where $i = 1, \dots, N$ industries
 $t = 1, \dots, T$ time periods

As indicated above, stacking of observations (T observations for each of the N cross-section units) in the use of OLS in the regressions assumes that the classical assumptions regarding the error term hold. But this may be the case only in rare situations. An elementary way of investigating this would be to see whether major changes result from estimation based on observations averaged over time (avoiding the problem of serial correlation). The resulting model (in the simple regression case) can be described as

$$Y_i = a + bX_i + u_i$$

$$\text{where } Y_i = [\sum_{t=1}^T Y_{it}] / T$$

$$X_i = [\sum_{t=1}^T X_{it}] / T$$

Given the very few sample points (16) this was very restrictive on the degrees of freedom but again the results should be instructive. The results also indicate non-significance for CR3. One of the regressions was²

$$\begin{aligned} M = & 33.54 - 0.43 \text{ CR3} + 0.08 \text{ KS} + 0.28 \text{ G} - 0.08 \text{ IMPS} - 0.56 \text{ EXPS} \\ & (1.02) \quad (1.65) \quad (0.91) \quad (0.79) \quad (2.12) \\ & + 0.27 \text{ MES} + 0.79 \text{ DV} - 0.72 \text{ FIN} - 0.29 \text{ RMS} + 38.04 \text{ SKLL} \\ & (0.70) \quad (2.46) \quad (2.16) \quad (1.42) \quad (2.06) \\ & - 21.52 \text{ AS} \quad R^2 = 0.65 \\ & (0.37) \end{aligned}$$

Several earlier results are now reversed, and these affect the significance of G, IMPS, EXPS, FIN, SKLL, AS, and the signs of the coefficients for RMS and FIN. The results point to the possibility that the classical assumptions regarding the errors might not hold after all, making OLS estimation on the pooled data

inappropriate. This leads to bias and inefficiency, affecting the size of coefficients, their significance and in certain cases, their signs.³ But the use of averaged observations is itself highly questionable on grounds of serious loss of degrees of freedom also leading to inefficient estimates. Before presenting further results, the question of simultaneity is explored next.

SIMULTANEITY CONSIDERATIONS

It can be argued that feedback effects in the margins equation from M are likely to affect variables related to domestic or foreign entry, eg. CRk, G, IMPS and DV. Furthermore, joint determination of decision variables in the act of profit maximisation could also affect AS, KS, EXPS, CR, and possibly G. But due to long interaction lags with M, the variables DV and KS may be taken as exogenous a priori, provided current capital formation is not used in the proxy for KS.

In the case of Malawi, the grounds for taking EXPS as exogenous have already been discussed. The input variables are clearly exogenous as they are process oriented and are unlikely to be influenced by M. The same can be said about the scale economy variables MES and CDR. With this, the following schema can be postulated.

<u>Endogenous</u>	<u>Exogenous</u>
M, CRk, IMPS, AS	EXPS, KS, DV, MES, CDR, RMS, SKLL, FIN, G

There can be no harm in treating these as assumptions requiring to be tested. CRk, AS are treated as endogenous because of indications to that effect in SCP models and IMPS because of the likelihood noted earlier that its responsiveness to domestic profitability might be influenced by protective tariff rates.

Exogeneity tests of the nature introduced into the literature by Hausman (1978) and Wu (1974) were carried out on NxT observations, for the variables CRk, IMPS, G, and AS. The results, which are reported more fully in an appendix, indicate that EXPS is not endogenous nor are G and CR3. In fact the results suggest that the simultaneity problem is important only with respect to AS. But as we saw in Chapter 6, AS has potentially serious measurement

problems which may have affected the outcome of the tests.

ACCOUNTING FOR POOLED CROSS-SECTION AND TIME-SERIES DATA

The final stage in the estimation consisted of investigating the effects of pooling cross-section and time-series data. Since straightforward estimation of the equations using the entire data set ignores the characteristics of the error terms with respect to time effects and cross-section units, the above OLS estimates may not be efficient. The problems we are concerned with here are those of serial correlation and heteroscedasticity.

The former is likely to arise due to the fact that in dealing with time-series observations the errors corresponding to different years may not be independent. Although in the presence of serial correlation, the OLS estimates would still be unbiased and consistent, the efficiency of the estimates is affected. As an example, with positive serial correlation the standard errors will be smaller than the true standard errors giving the impression that the parameter estimates are more precise than they actually are and this can therefore lead to incorrect assessments of the null hypotheses. With our data set, the problem arises because we use observations for the period 1969-1972.

Heteroscedasticity is another situation which leads to efficiency loss. The problem arises when the differences among cross-section units are such that the error terms associated with different units have unequal variances so that we might expect higher error sums of squares than in situations where this problem does not arise. The problem means that the variances of the parameter estimates will not be minimum variances or unbiased, so that standard statistical tests for the significance of coefficients could also be incorrect. In the Malawian case the heteroscedasticity problems might arise because different policies (such as price controls, international trade regulations etc.) are bound to affect different industries differently and we have not allowed for appropriate variables to account for the effects of all such policies.

An obvious way to deal with the problems of serial correlation and heteroscedasticity would be to account for the cross-section and time-series effects by using dummy variables, as in the covariance approach. This model

assumes that the intercept terms (associated with each observation) varies systematically (as opposed to randomly) where the dummy variable coefficients measure the cross-section and time-series intercepts. The problem with this approach is that it not only leads to losses of degrees of freedom associated with all the dummy variables, but it also lets these dummy variables stand in for lack of knowledge of the system represented by the equation(s). In contrast to this, there are several forms of Generalised Least Squares (GLS) techniques whose attraction is that they make use of knowledge about the system, obtained from the errors. These techniques could therefore be more efficient as far as use of information is concerned, and as it turns out, most are also potentially efficient by preserving degrees of freedom.

Two variants of generalised least-squares estimation, were considered to take care of both the problem of serial correlation and that of heteroscedasticity. These are the error components approach [discussed in Judge et al (1980) and the cross-sectionally heteroskedastic and time-wise autoregressive (CHTA) approach discussed in Kmenta (1971). What the two approaches entail by way of assumptions regarding the error term or implementation of the estimation is discussed more fully in the Appendix. Suffice it to mention here that the error components approach is more restrictive in assuming no cross-sectional heteroscedasticity and no autoregression. Consequently we relied on the more general CHTA approach, which permits both serial correlation and heteroscedasticity.

The CHTA was used to get the results presented in Table 7.3b. Since the *Time Series Processor* statistical package was the most accessible and the current version does not deal with the problems of pooling, the estimation was done in stages involving the following procedure;

Table 7.3a

Serial Correlation Coefficients (ρ) and
Error Variances for Cross-section Units (V)

*

Value of k for CRk(=1) Industry	1		2 (=2)		3 (=3)	
	ρ	V	ρ	V	ρ	V
1.	0.43	75.8	0.48	16.6	0.35	22.14
2.	0.94	36.6	0.13	32.8	1.28	15.1
3.	0.88	30.6	0.25	21.8	0.96	4.6
4.	0.93	20.7	0.99	10.6	0.72	14.1
5.	0.28	286.3	0.13	39.6	-0.08	30.9
6.	0.02	54.7	0.19	20.7	-0.28	17.4
7.	3.04	47.4	-0.14	27.9	0.15	35.2
8.	0.69	16.8	0.32	9.8	0.71	14.7
9.	0.06	6.0	-0.26	13.4	0.20	7.1
10.	0.36	66.4	-3.05	13.0	0.08	30.6
11.	0.45	20.7	0.17	2.4	0.07	20.0
12.	1.22	52.6	1.30	4.0	0.63	13.4
13.	0.04	24.9	-0.03	11.8	0.23	17.2
14.	0.06	59.7	0.12	14.6	0.25	10.2
15.	0.93	34.8	0.84	6.1	0.05	10.5
16.	-0.66	57.7	-0.57	5.2	0.00	13.5

Note:

* These estimates were calculated from the errors of the earlier stages of estimation for models whose results are presented in Table 7.3b. For explanation see text.

Table 7.3b

Price-cost Margins Equation: Simultaneity Considerations^{a/} and

Instrumental Variables Estimation

(GLS^{b/}, with Cross-sectional Heteroscedasticity and Time-wiseAutoregression^{c/})

(t statistics in brackets)

	1	2	3
CONST	-0.06	-0.13	0.38
CR1	2.98 (1.21)	--	--
CR2	--	0.02 (0.12)	--
CR3	--	--	-0.48 (0.74)
KS	-10.31 (1.87)**	-1.67 (0.91)	-2.34 (0.92)
G	0.14 (1.68)*	0.11 (5.64)**	0.20 (5.03)**
IMPS	-17.87 (2.03)**	-34.51 (2.36)**	-31.16 (2.03)**
EXPS	8.90 (0.20)	-6.60 (0.67)	-20.86 (1.10)
DV	0.42 (2.58)**	0.27 (3.16)**	0.54 (1.46)*
MES	-2.32 (1.10)	0.23 (1.66)*	0.72 (1.06)
AS	-0.02 (0.29)	0.05 (1.15)	-0.03 (0.31)
RMS	0.19 (1.82)**	0.21 (4.29)**	0.22 (3.23)**
FIN	0.07 (1.28)	0.14 (2.46)**	0.10 (2.38)**
SKLL	0.64 (0.04)	-0.81 (0.83)	-7.94 (0.59)
R ²	0.93	0.92	0.71
ESS	3.53	9.69	12.38
F(11,36)	60.09	51.77	11.66

Notes: a/ The instrumental variables for all equations were CONST, KS, G, EXPS, DV, MES, RMS, FIN, SKLL, CDR, MKT, ASD (the radio advertising dummy).

b/ Generalised Least Squares.

c/ Variables were double transformed for serial correlation and heteroscedasticity using the P and V values listed in Table 7.3a.

* Significant at the 10% level

** Significant at the 5% level

- 1: Estimate the complete model using Instrumental Variable estimation. From the error terms, obtain estimates for the serial correlation coefficients for each cross-section unit. [These are the columns ρ in Table 7.3a where the ρ s can be judged against the null hypothesis $H_0: \rho_i = 0$].
- 2: Adjust all the observations for serial correlation and re-estimate the model. In the simple regression example (with variables as differences from means) we estimate the model,

$$Y^*_{it} = Bx^*_{it} + u^*_{it}$$

$$\text{where } Y^*_{it} = Y_{it} - \rho_i Y_{it-1}$$

$$x^*_{it} = x_{it} - \rho_i x_{it-1}$$

$$u^*_{it} = u_{it} - \rho_i u_{it-1}$$

$$\text{for } t = 2, 3, \dots, T$$

$$i = 1, 2, \dots, N$$

- 3: From the errors u^*_{it} , obtain estimates for cross-section variances (columns V in Table 7.3a), then adjust the observations for heteroscedasticity by transforming the observations as follows,

$$Y^{**}_{it} = Y^*_{it}/s_{ui}$$

$$x^{**}_{it} = x^*_{it}/s_{ui}$$

$$u^{**}_{it} = u^*_{it}/s_{ui}$$

where s_{ui} is the standard deviation of the errors, from $s^2_{ui} = 1/T-g-1 \sum_{t=2}^T u^{*2}_{it}$, where

where g is the number of estimated parameters.

[Note that in our case $T = 4 < g$ so the adjustment for degrees of freedom was not possible, but this is not a major problem since what we have is an alternative measure of variance. From Table 7.3a, the differences in variance are self-evident]

- 4: Estimate the model using the double transformed variables.

The above procedure was streamlined by writing a short program for transforming the variables so that the only task required was simply to obtain ρ and V for each different model. One problem with this method is that it is a bit wasteful of degrees of freedom in the calculation of the correlation coefficients (in our case 16 degrees of freedom were lost in this way)⁴.

After estimating the models with the results shown in Table 7.3b, some

experimentation was done to find out the effects of non-linear specification, since in Chapter 2 it was indicated that price-cost margins were related to barriers to entry in a non-linear way. Following the models by Saving (1970) and Encaoua and Jacquemin (1980) a similar argument can be extended to the relationship between price-cost margins and the k-firm concentration ratio. The experimentation was done by letting dummy variables represent the non-linearities in concentration and minimum efficient scale. These dummies, say d_1, \dots, d_d would represent size classes of the relevant independent variable according to deciles, quartiles or whatever. In our case quartiles were used to classify the levels of concentration and MES because of the problem of few firms which would have resulted in many empty size classes. [Ideally the more size classes the better would be the representation of non-linearities.] For concentration, the dummy variables were defined as; $d_1 = 1$ for $0 < CR_k < 25\%$, and $d_1 = 0$ otherwise; $d_2 = 1$ for $26\% < CR_k < 50\%$ and $d_2 = 0$ otherwise, and so on. The same size classes were used for the MES dummies. In order to avoid the problem of perfect colinearity (which would make estimation impossible) one of the dummies (d_1) was dropped when the estimation was done.

In order to judge whether a non-linear specification was more appropriate than a linear one of Table 7.3b one would need to test for the joint significance of the dummy variables, using the F-test. The equations of Table 7.3b would in this case be considered to be the restricted forms while those which include non-linearity dummies would be the unrestricted forms (because they also essentially involve more variables). The acid test for improvement in moving from restricted to unrestricted form would consist of simply checking whether there was significant reduction in the error sum of squares ESS (after all the F-test is based on this difference). The results of the experimentation were that all our non-linear specifications lead to higher ESS although in some cases this was only marginally so, giving results quite similar to those in Table 7.3b. For example the equation with CR3 and concentration dummies was

$$\begin{aligned}
 M = & 0.06 + 1.53 \text{ CR3} + 1.53 \text{ KS} + 0.18 \text{ G} - 65.29 \text{ IMPS} + 9.22 \text{ EXPS} \\
 & (0.55) \quad (0.55) \quad (5.65)** \quad (4.40)** \quad (1.49)* \\
 & + 0.44 \text{ DV} + 0.27 \text{ MES} + 0.03 \text{ AS} + 0.21 \text{ RMS} + 0.09 \text{ FIN} + 6.58 \text{ SKLL} \\
 & (4.42)** \quad (1.92)** \quad (0.54) \quad (3.50)** \quad (1.86)** \quad (0.66) \\
 & + 0.12 \text{ CR3}d_2 - 0.55 \text{ CR3}d_3 - 0.20 \text{ CR3}d_4 \\
 & (0.23) \quad (1.41) \quad (0.44) \\
 R^2 = & 0.95 \quad \text{Error Sum of Squares} = 13.94
 \end{aligned}$$

The two likely reasons why the non-linear specifications did not represent improvement are the use of quartiles for the size classes, and, even more importantly, the possibility that linear specifications were good enough. The latter is supported by the fact that in the equations without non-linear specification, the ESS achieved were quite low, so that improvement on them was bound to be marginal at the most.

INTERPRETATION OF THE RESULTS

The results of the Table 7.3b are comparable to those of other authors reviewed in Chapter 3 (ie. Geroski, Intriligator *et al*) which showed some changes in signs and significance of coefficients, in moving from OLS to Two Stage Least Squares (approximated by Instrumental Variable Estimation in our case). A comparison of the results of Table 7.2 and those of Table 7.3b shows that most of the results are fairly consistent with each other in terms of which coefficients are significant. The only major exceptions are the changes with respect to the significance attached to the AS and FIN variables.

From the review of the earlier studies for Western economies, it seemed that the non-significance of the concentration variable is not now considered to be remarkable. The Malawian circumstances were such that this result might be an expected one, because of the price controls, whose implementation seemed to be influenced by the degree of market concentration. In this connection, it is noteworthy that the use of different values of k for CR_k brings about little change in the results of Table 7.3b.

With regard to KS, the usual practice is to use the variable to represent capital intensity because price-cost margins are usually not measured properly to account for the return on capital (ie. depreciation, interest, and a risk premium). In this study, price-cost margins were measured exclusive of depreciation and interest, ie. they were included in the deducted costs. Our measure could therefore be described as an approximation for net return on sales, though it is a rough one because of measurement problems⁵. With this

interpretation, the non-significance of the KS coefficient could be indicating that controlling for capital intensity was not necessary.

The coefficient for G is consistently positive and significant, indicating that despite price controls firms were still largely free to respond positively to the demand stimulus. This in itself implies that while the restrictiveness of price controls was sensitive to levels of concentration it was not at the same time restrictive as far as responses to demand were concerned. This is not such a curious result as it might sound since demand considerations in the form of estimates for actual size of market or its growth are not involved in calculus of price increase determination.

IMPS has the expected sign throughout and the significance of its coefficient suggests that the competitive pressures which were noted in connection with import competition and radio advertising for the late 1970s, were also at work during the 1969-1972 period. This acted in such a way as to reduce margins in the manner suggested by either the import barriers to entry hypothesis or the market shares hypothesis (which we saw to be very closely related). That is for some industries import competition could have been important enough for them to maintain low prices in a bid to maintain their shares of the domestic market or prevent these shares from falling rapidly. The intensity of radio advertising activity among foreign and domestic competitors in some of these industries is another indication of such pressure.

It has already been suggested that high export intensity in Malawi, is associated with price-taking. Although the sign of EXPS coefficient is mostly negative its non-significance is a surprising result. The theoretical expectation would have been that where the international market is associated with highly elastic demand functions this would lead to lower monopoly power in export-dependent industries. The typical export industries in Malawi are agro-based and prone to the influences of oligopsonistic/monopsonistic market structures on the buyers' side in the domestic market and on the international market. Another consequence of this is that it is also not worthwhile for firms in these industries to exercise international price discrimination against the domestic market because their individual domestic demand curves are also likely to be highly price-elastic. Apart from this and from a policy point of view export activity was free from the restrictions that might be associated with price controls⁶. In view of this, one possible explanation for the present result may

therefore be the fact that export activity is itself largely confined to only two industries, tea and tobacco, which would make them isolated cases so that the results are not sensitive to their influence.

DV has been measured in terms of industries' association with diversified enterprises. Conventionally defined (as in Chapter 3), the diversification variable is usually intended to control for the measurement of concentration which is affected by imbalanced diversification of firms among products allocated in an industry. In our case, DV could be seen in terms of the advantages (or disadvantages) derived by firms from association with diversified enterprises. The results, suggest that there are advantages, which have a significant influence on margins. The nature of some of these advantages will be explored in the following chapter.

The scale economy barriers represented by MES did not make a significant impact on the pricing decisions of Malawian firms, which is consistent with the findings of other studies. Although we have noted that this variable was poorly measured due to the nature of the data, we argued that in relative terms it reflected the relative ease/difficulty of entry into the various industries, and could closely approximate the effects of a better measured variable. If this is the case, the possible explanation for the result obtained in the case of Malawi would be as follows.

Firstly, price controls already imposed constraints on pricing so that limit pricing or entry regulatory pricing would not be necessary in the industries which would otherwise be attractive to prospective entrants (ie. the highly concentrated industries). Secondly, and perhaps more importantly, there is also the possibility that entry regulatory pricing was simply not an important strategy for entry deterrence among Malawian firms, whether price controls were effective or not.

The results suggest that entry regulatory pricing based on barriers to entry, was not an important entry deterring strategy for Malawian firms. In Chapter 5 we examined some of the strategies available to existing Malawian firms in deterring entry. We saw that lobbying against new manufacturing licence applications based on the existence of current excess capacity, was potentially a very direct way of trying to deter entry. Even if it was anticipated to be potentially unfruitful in preventing the granting of the new licences, firms could

still use it for effective entry deterrence. This is because the representation against the licence application can be used to make the prospective entrants aware of the existence of excess capacity, and because the existing firms can gain time for the implementation of other strategies. We pointed out in Chapter 5 that these possibilities may have accounted for the fact that despite the granting of numerous new manufacturing licences, effective entry trailed far behind. These same reasons (apart from the potentially serious measurement problems mentioned in Chapter 6) may also account for the non-significance of the AS coefficient.

Of the three input variables, skill intensity is the only one which did not significantly influence price-cost margins, while the rest, RMS and FIN do so in a way that supports the hypothesis postulated in Chapter 4. That is, the potential constraints on production caused by input availability problems might influence conjectural variations and through this would facilitate collusive tendencies in pricing. This might still be effective in raising margins despite the price controls because, as we have seen above, the price controls did not seem to affect other factors which could affect pricing, eg. demand, and also because industries with colluding firms might be in a better position to influence the price control authorities in authorising price increases.

THE DETERMINANTS OF CONCENTRATION

In this section we investigate the determinants of the degree of concentration.

Let the change in the degree of concentration be a function of entry. The latter is usually taken to depend on barriers to entry, and industry profitability. Most specifications of static concentration equations are made with respect to these variables.

In a more sophisticated specification for concentration Martin (1979) (reviewed in Chapter 3) included lagged M and CR_k variables, the variables MES, CDR and AS for barrier effects, and G for demand. In a similar approach using averaged observations it was decided here that the use of variability of margins would be particularly suitable for measuring the attractiveness of entry or the risks associated with it. That is, the possibility of high margins will attract entry, but

their variability would discourage it. One should therefore not expect to find that highly concentrated industries are associated with high margins with low variability unless entry there is faced with high barriers or is foreclosed. On the contrary, if barriers are controlled for, highly concentrated industries would be associated with high average margins but which are also highly variable because this discourages subsequent entry.

OLS was used for the estimation. The argument here is that even if there were feedback effects between concentration and margins, the use of variability of margins ensures that the simultaneity problem does not arise. On the basis of the exogeneity tests of Appendix CH 7A, the simultaneity problem does not arise even when M is an explanatory variable.

The main result of comparing alternative specifications is that the significance of the variability variable VarM was reduced by the inclusion of DV in the equation. The coefficient of DV was itself positive and nearly significant at 5 percent level. This in itself has the significance that diversification is a likely source of finance for 'risky' ventures. This explanation would not be at odds with the 'cross-subsidisation' effects of diversification observed by other authors, except that in the Malawi case the cross-subsidisation would often be more in terms of entering 'new' industries rather than intra-industry rivalry.

The substitution of M for VarM in the CR3 equation results in;

- a) reduction in the F-statistic.
- b) nonsignificance of the coefficient of M.
- c) reduction of R^2 .

a) to c) imply that the use of VarM instead of M in the CR3 equation is probably more appropriate and that though the M and CR3 equations may be part of the same system, it is a recursive one. Thus CR3 may play a role in the M equation but with no feedback effects from M to CR3 (at least not directly through current-dated values of M and CR3). One could say that VarM represents dynamic feedback effects and that these are somewhat similar to specifications with explicit lag structures such as in Martin's (1979) model.

The regressions are well determined, and highly significant in terms of the F-statistics. Not surprisingly, much of this is due to the barrier to entry variable

Table 7.4

Determinants of Concentration

Ordinary Least Squares: Dep. Var = CR3; Observations = 16

(t statistics in brackets)

CONST	M	VarM	G	MES	DV	AS	KS	R ²
30.46		0.04 (1.46)*	-0.12 (0.38)	0.91 (7.16)**(1.29)	0.19	27.89 (0.50)	-0.08 (1.53)*	0.93
								F(6,9) = 20.36
34.41		0.05 (2.51)**(0.41)	-0.14 (0.41)	0.88 (6.81)**		27.48 (0.47)	-0.11 (1.96)**	0.92
								F(5,10) = 22.58
28.31	0.07 (0.26)		-0.01 (0.02)	0.88 (6.21)**(2.23)**	0.31	16.82 (0.27)	-0.04 (0.81)	0.92
								F(6,9) = 16.30

Notes: * Significant at the 10% level.

** Significant at the 5% level.

MES. This confirms the earlier observations made in Chapter 5 that government's role in regulating entry could be regarded as an informative one concerning economic conditions, while barriers to entry play the role of entry regulation.

SUMMARY AND CONCLUSION

The GLS estimates presented in this chapter for the profitability equation, indicate that some variables which might be directly connected with domestic pricing (CR3, and MES) do not exert significant influence on it. In connection with CRK, we have noted some peculiar features of the Malawian conditions such as

- high degrees of concentration in certain industries
- the absence of anti-monopoly legislation
- the likelihood that price controls were stiffer, the higher the degree of concentration

On the basis of this combination of factors it is highly probable that the negation of the expected strong tendency towards collusive pricing (facilitated by the first two factors) is largely attributable to price controls.

As far as MES is concerned, we have suggested here that the result that it does not play an important role in pricing may have something to do with price controls. But what to us seems to be an even more important possibility is that firms do not extensively use pricing for purposes of entry deterrence. The reason for this is that there are available some other direct avenues for doing this. One such avenue is excess capacity, where its existence could easily be signalled to prospective entrants via a provision in the entry regulations, which allows existing firms to make representations against new licence applications, and where excess capacity is considered to be a legitimate ground for doing so. Moreover, such representations could also be used to gain time for implementing other strategies.

Other results of this chapter indicate that the existence of price controls did

not completely constrain firms from making decisions based on commercial principles. For example, demand factors and import competition were still important determinants of profitability, while profitability and barriers to entry respectively provided stimulus and deterrence to entry.

One result, whose investigation is still relatively rare, relates to the influence of potential input problems, on pricing behaviour. On the basis of the results of this chapter, it appears that potential problems with imported inputs and working capital might be instrumental to collusive behaviour and ultimately, to the exercise of greater monopoly power. We use the cautious 'might' here because we have not yet examined any evidence explicitly linking these potential problems to collusive behaviour. If such a link does exist, then we have an unusual source of monopoly power.

In the next chapter we shall examine evidence of a different type, relating to some of the issues discussed here, including the felt effects of price controls, the popular entry deterring strategies, and whether input problems really have anything to do with collusive tendencies.

NOTES

1. It is possible that in some cases firms in monopolistic industries could influence the levels of tariffs on competing imports through lobbying. One suspects that this has been the case particularly in industries with granted monopolies such as in the brewing industry. For some other industries, this type of protection would not be necessary. For example, firms producing products like soft drinks, bricks etc. with low value-to-weight ratios would be protected from import competition by transportation costs.

2. *t*-statistics are in brackets. The levels of significance indicated with asterisks have the same explanation as in Table 7.2. This is the convention we shall adopt for reporting regression results for the rest of this study.

3. For a discussion of bias and efficiency in connection with pooling of cross-section and time-series observations see Jugde *et al* (1980).

4. A way of replacing the observations in the correction for serial correlation involves the use of the estimated ρ s to transform the observations associated with $t = 1$ by multiplying them by $\sqrt{1-\rho^2}$ (see Maddala, 1977, pp278-279). Although the method is simple, implementing it in the present estimation is too involved (because it involves every cross-section unit necessitating numerous sample statements in the TSP program). We therefore decided to forego it. However there are now statistical packages which can handle the pooling problem and using the observation replacement procedure eg. White's, (1984) *SHARZAM*

5. For example, the risk premium is not accounted for and the depreciation used for tax purposes often bears little relation to the 'economic depreciation' which takes into account 'wear and tear' and technical obsolescence of the capital stock.

6. Export activity has not been completely free of controls of the nature being discussed here. For example, export levies have been in effect and have only been abolished recently, in March, 1986.

CHAPTER 8

SOME DIMENSIONS OF CONDUCT: RESULTS FROM A SURVEY

INTRODUCTION

In this chapter we present an analysis which is an advance on previous work for Malawi or elsewhere, (including the analyses of the foregoing chapters), by illuminating the 'conduct' part which is so often neglected in the structure-conduct-performance approach. This analysis is based on first-hand information from the firms themselves about their behaviour with respect to certain issues and what constrains that behaviour. As far as Malawi is concerned (and possibly other African countries with similar manufacturing conditions) this type of information should be invaluable for policy formulation, implementation, and for monitoring firms' reactions to recent policy changes such as the move towards price control liberalisation.

The data which are analysed here were obtained by means of a questionnaire sent out to manufacturing firms in October, 1984. But before we start examining the data, we indicate below, some specific ways in which the present analysis improves on the analyses of previous chapters.

THE NEED FOR PRIMARY SOURCE DATA

The resort to a questionnaire to obtain the data used in this chapter was mainly prompted by the fact that analyses of the type presented in the previous chapter are limited by the nature of available secondary data. Typically the restrictions are such that while the analyses are expected to answer general questions about relationships among variables, the measurement of the variables and indeed the models themselves are often compromised by data problems. And perhaps more important than this, the analyses are based on assumptions that are meant to be taken at face value and basic questions such as the prevalence of certain aspects of behaviour or phenomena, cannot be answered in a straightforward way. The following problem areas are discussed according to how they have been represented in the questionnaire, and the discussion is presented in such a way as to show what weaknesses in the

foregoing chapters could be improved on by analysing questionnaire-based data.

Entry by diversification

In Chapters 6 and 7 a variable was defined and used in regression analyses to represent the extent to which firms in an industry were associated with parent enterprises. It was suggested that such association could create problems in the measurement of individual firms' price-cost margins and therefore those of the industries in which they are classified. Apart from this, it was also suggested that the firms associated with diversified enterprises might derive advantages, particularly financial ones, which could modify their behaviour vis-a-vis rivals who do not enjoy such advantages. A problem therefore arises, of whether to interpret this variable as merely controlling for the measurement of price-cost margins or whether it represents the behavioural traits of diversified firms. In our case another problem that was identified with respect to this variable was a measurement one, since it was only possible to measure diversification from parent enterprises which already had interests in other manufacturing activities. Thus for example diversification from enterprises with interests in only one type of manufacturing activity but with extensive activities in non-manufacturing sectors, would not be represented despite the fact that this association may provide advantages to the affiliates just as any other type of association. With the survey data it is possible to investigate not only the relative extent of different types of diversification, but also to specifically deal with the question of whether such affiliation makes any difference to behaviour.

Capacity utilisation

In Chapter 5 it was suggested that firms in Malawi could deliberately invest in excess capacity as a way of influencing the government to prohibit new entry. Even if the government did not concur with this, the existence of excess capacity might still have the effect of deterring entry, where the potential entrants are made aware of the existence of excess capacity through Malawi's entry regulations, which allow for representations to be made by existing firms, against new licence applications. Thus the Malawi situation provides an excellent opportunity for the strategic use of excess capacity and yet there is currently no source of information that can be used to assess the extent of excess capacity. This is why in Chapter 5 we were unable to make an adequate

assessment of the situation or make useful suggestions regarding the likely causes of excess capacity. Apart from this, the variables used in Chapter 7 to represent likely problems with inputs, were measured in such a way that they represented the potential problem rather than its actual occurrence. In the regression analysis of that chapter, there was also the possibility that one of the input variables, dependence on imported inputs, was associated with another independent variable, export intensity, giving rise to problems of interpretation of the individual coefficients.

This chapter allows us to make an assessment of the extent of excess capacity, to identify the likely causes, and to verify whether input problems do influence pricing behaviour.

Pricing

Pricing behaviour is central to the SCP as well as to the recent changes in the Malawi government policies with respect to price controls. From both the theoretical and policy points of view it should therefore be interesting to find out even in a merely indicative way, whether the absence of anti-trust legislation might foster more explicit collusive behaviour be it in relation to pricing or entry prevention. Here there is also scope to study related issues, such as whether the phenomenon of price leadership is prevalent, whether pricing behaviour responds to cost and demand conditions, and whether price controls were felt to be effective.

Behaviour in the face of entry

The model discussed in Chapter 2 which lead to the estimated form discussed in Chapter 4, assumed as a matter of course that firms were motivated by the prospects of long run profitability and that they were therefore concerned about new entry. This was also reflected in Chapter 5 where we discussed some possible reactions to potential entry. As yet we do not know the extent to which existing firms are aware of potential entry and the courses of action they take to deter it, if they do anything at all. Do they, for instance, use predominantly pricing strategies, or do they resort to non-price strategies such as advertising, product quality improvements or some other strategies? Some answers to such questions can be offered in this chapter.

Performance in a dynamic context

Profitability is only one aspect of performance, and even so it is regarded as a static one. In a dynamic context, firms have been known to engage in activities such as research and development (R&D) which although the activities add to costs in the short run (and can therefore reduce price-cost margins), they are expected to improve firms' long term profitability and survival. Typically industries that are to be found in LDCs such as Malawi at an early stage of industrialisation, are still mostly concerned with import substitution, involving products on which much research and development will have already been carried out in countries from which the technologies were transferred. It should still be interesting to find out whether there is any such activity in Malawi and to determine its nature.

THE SURVEY

The Technique of Investigation

There are several techniques for gathering primary source data, and each is associated with its own mix of problems.¹ For this study the mail questionnaire approach was adopted firstly because it offered the possibility of a wide coverage cheaply, and secondly because it could be carried out without the physical presence of the user of the information. The major problems of this approach are the likelihood of low response rates, and the difficulty of collecting rich information about each respondent without worsening the response rate. Below we discuss some of the steps which we took in order to minimise the problems of the questionnaire approach.

The questionnaire design

The design and coverage of a questionnaire depends on its purpose. The Malawi survey was meant to give an impressionistic view of the extent to which certain phenomena and behavioural characteristics are widespread among large manufacturers. The questions could therefore be simple ones requiring simple answers, while the coverage would be as extensive as possible.

Since the distribution of the questionnaires was by mail, the questionnaire itself was to be as simple and as short as possible to encourage completion. This is why in most cases only categorical YES/NO answers were sought and the questions themselves were meant to be straightforward enough to require no explanation. The whole idea was to make it possible for the respondents to complete the questionnaire in one sitting without recourse to elaborate sources of information such as files and so on. Although this strategy was supposed to influence the response rate, there can be no doubt that it also imposes constraints on the subsequent use of the data. The major constraint is in relation to the formal testing of hypotheses such as in regression analysis. This problem and its resolution is discussed in the section that deals with regression results.

ii)Coverage of the Survey

In order to make the coverage of the survey as extensive as possible the questionnaire was mailed to *all* known substantial manufacturing establishments. These are the ones that satisfied the National Statistical Office's (NSO) size criterion for inclusion in the Annual Economic Survey (AES) (that is those employing 20 or more persons), and those that did not but were nevertheless large enough to require manufacturing licences (those employing 10 or more people or using machinery of at least 25 horsepower). The resulting list was compiled from the NSO's Mail Control List (1984) and the Ministry of Trade and Industry's Licencing Working Lists, neither of which source is published.

The survey therefore covered 100 percent of *operational* substantial manufacturers. In addition, a few firms were included whose operational status was uncertain although they had manufacturing licences. These included firms in the 'pre-operation', 'quitting' and 'merging' transitions. Although the coverage of this survey can in theory be considered to be an improvement on that of AES by attempting to include smaller firms, in practice little of this was achieved. This is because as mentioned in Chapter 5, in Malawi the size distribution of firms is such that small firms that would be in the category of those employing between 10 and 20 persons are very few. The majority of small producers are of the 'informal' type, often employing much fewer than 10 people. While it should have been worthwhile to have a sample of such producers especially in the industries characterised by a large presence of such small producers, there is little information on which to base the sampling or of where to find the units. It will therefore be useful to bear in mind that the analysis of this chapter, much like that of the previous one, is restricted to large firms. But from the type of questions we are interested in, this should not be a serious problem.

Like for NSO surveys, the unit of coverage was the firm, which was initially assumed to be a single establishment (ie. comprising one factory) and responsible for 'reasonably' independent decision-making at least as far as major decisions are concerned eg. output levels, pricing etc.. In certain cases 'firms' in this sense could not be identified with certainty as in the case of branch plants each operating in a different location but producing the same product. If no major decisions were made at the branch level then it was hoped that the branch plants would relegate the completion of the questionnaires to their head offices (as they would for NSO surveys). As it turned out, this is exactly what happened. Those branches that completed and returned separate questionnaires operated under conditions that required taking into account different regional conditions like special product variations, different product ranges, and prices.

iii) Timing of the Survey

The survey was done in October in order for it to benefit from the backup service for the NSO's own surveys. The backup service is itself timed to avoid the busy pre-Christmas period for the respondents. For this survey the respondents were allowed as little time as was practical. According to a recommendation from the NSO, the respondents were only allowed 14 days for completing *and* returning the questionnaires. This was done to discourage 'shelving' of the questionnaire which is a usual cause of low response rates especially in mail surveys.

iv) Administration of the Survey

Semi-official backing was obtained for the administration of the survey. This meant that although there would be no reference to the Statistics Act obliging firms to complete and return the questionnaire, the survey itself could be administered from the NSO (but not necessarily by the NSO). An official of that office agreed to undertake this task and all the replies were to be returned to him. This arrangement was partly instrumental to the achievement of the high response rate discussed below.

Response Rate and Distribution Across Industries

In all 168 questionnaires were mailed, of which 8 were firms that were too small to qualify for inclusion in NSO's AES. 3 turned out to be quitters, 2 were involved in takeover/mergers, and 1 operated a 'service' type of business, where the manufacturing was done to order. 65 establishments were associated with 23 multiplant enterprises.

The total number of responses was 102, from firms in 40 four-digit SIC industries. These comprised 93 usable (in 38 four-digit industries), and 9 not completed (2 returned to sender, 1 merged, 6 non-manufacturing). Non-responses numbered 66.

Taking into account the fact that some branch plants relegated the completion of the questionnaires for reasons described above, the response rate was very high going by mail survey standards. For 'firms' in the decision-making sense, this would be between 60% (ie. $102/168 \times 100$) and 80% (ie. $102/[168-65+23] \times 100$).

Table 8.1

Distribution of Responses in Four_digit SIC Inds.

Product(s)	SIC	No. of Questionnaires			Distribution Total	
		Completed	Not Completed	Tot	of Non-responses	mailed
Meat prods.	3111	1	-	1	1	2
Fruit & veg.	3113	1	-	1	-	1
Fish	3114	-	-	-	1	1
Edible oils	3115	1	-	1	-	1
Grain millg.	3116	1	1	2	6	8
Bakeries	3117	4	-	4	6	10
Sugar	3118	-	-	-	1	1
Confectionary	3119	1	-	1	-	1
Tea	3123	14	-	14	4	18
Distilling	3131	1	-	1	-	1
Beer	3133	2	-	2	2	4
Beverages	3134	-	-	-	1	1
	3137	1	-	1	-	1
Tobacco	3140	3	2	5	4	9
Spinning etc.	3211	3	1	4	-	4
Textiles	3212	2	-	2	-	2
Knitwear	3213	1	1	2	-	2
Rope & netting	3215	1	-	1	1	2
Clothing	3220	4	-	4	10	14
Leather prods.	3233	1	-	1	-	1
Footwear	3240	1	-	1	-	1
Sawmill prods.	3311	4	-	4	4	8
Handicrafts	3319	2	-	2	-	2
Furniture	3320	4	-	4	2	6
Packaging	3412	-	-	-	1	1
Paper prods.	3419	-	1	1	-	1
Printg. & pub.	3420	3	-	3	4	7
Ind. chems.	3511	1	-	1	2	3
Fertilizers	3512	-	-	-	1	1
Paints	3521	2	-	2	1	3
Drugs & med.	3522	2	-	2	-	2
Soaps etc.	3523	4	-	4	1	5
Matches	3529	1	1	1	-	1
Tyre & tube	3551	4	-	4	-	4
Plastic prods.	3560	4	-	4	1	5
Concrete prods.	3690	1	-	1	-	1
Bricks, tiles	3691	2	-	2	-	2
Cemet, lime	3692	1	-	1	-	1
Other non-met.	3699	-	-	-	1	1
Handtools	3811	1	-	1	-	1
Structrl.met.	3813	5	-	5	1	6
Fab.met.prods.	3819	4	1	5	3	8
Agric. mach.	3822	-	1	1	-	1
Other mach.	3829	1	1	2	3	5
Other met. prods.	3813	-	-	-	1	1
Radio ass.	3832	1	-	1	-	1
Batteries	3839	-	-	-	1	1
Motor veh.ass.	3843	2	-	2	2	4
Sports gds.	3903	1	-	1	-	1
Total =		93	9	102	66	168

In order to get an impression of the spread of the responses and non-responses across 4-digit SIC industries an analysis of these is given in Table 8.1.

The modal response frequency per industry is 1. These frequencies reflect the distribution of firms in the industries and the tendency towards high concentration in Malawian manufacturing.

The distribution of the non-responses reveals two important features. The first one is that two industries with the highest number of non-responses (bakeries and clothing) are also associated with large numbers of smaller producers who make up large proportions of the non-responses. This means that we end up in a situation where the effective survey coverage (in the sense of the actual returns) does not offer much improvement over the AES as far as representation of the smaller producers is concerned. The second feature of the non-responses is that about half of them are associated with 28 multiplant enterprises. This reduces the effective number of non-responses (and raises the effective response rate) in so far as we are interested in decision-making units in the manner described above.

THE RESULTS:A PRELIMINARY ANALYSIS

In the summary results presented here, it should be noted that in the returns of the survey and subsequent coding of the data for the YES/NO questions, the YES answers were taken to be the more definitive. NO was assigned to two types of situations, firstly where NO was indicated as the answer and secondly where the question had been left unanswered. The latter was taken as an indication of either uncertainty or non-relevance of the question for the particular respondent. It is for reasons of such possibilities under NO, that the percentages were calculated and presented for only the YES replies. Apart from this problem, which mainly affected questions relating to behaviour in the face of entry, the quality of the responses was generally good and this might be attributable to the simple qualitative replies. Inevitably, for this type of study, there would still be cases where respondents might have been confused by certain questions and where parts of the questionnaire could present problems of analysis. Since these relate to specific parts of the questionnaire, they are discussed below, under appropriate headings.

Affiliation

Hines(1957) argued that diversification is an important form of entry. This is because it is on balance easier for enterprises established in other industries to enter yet others. To them the level of overall barriers to entry is low compared to completely new and independent entrants. For LDCs, where the capital requirements barrier tends to be high, this form of entry can be an important source for the broadening of the manufacturing sector as a whole.

The ties between individual firms and their diversified parent enterprises can also be fortifying to the former in the *modus vivendi* of competition in their respective industries in the manner suggested by the hypothesis of cross-subsidisation of competition. But these ties can also be constraining on the firms' independence in decision-making.

From Table 8.2 , out of 93 responses, 73 (ie.40 + 33) were associated with diversified enterprises. Many of these derived financial advantages.

There are three features of the figures worth noting. Firstly, affiliation to foreign enterprises is quite important in Malawian manufacturing. Secondly, vertical integration from agriculture is nearly as important as diversification within the manufacturing sector. Thirdly, finance seems to be the most important advantage from affiliation and at the same time the major source of restrictions. The financial restrictions are probably associated with long-term decisions such as those relating to capital investment. Decisions on current issues such as rates of production, pricing, and selling, seem to be much less affected. The following figures give some indication of 'other' advantages and disadvantages from information volunteered by respondents.

Table 8.2

Summary:Affiliation

	A1*	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
Base of parent co.												

loc. forgn.												
agr. manu.												
oth. fin.												
oth. out. fin.												
price mktg.												
oth.												

YES												
40	33	24	31	13	30	24	5	24	5	11	7	
%(43)	(35)	(26)	(33)	(14)	(32)	(26)	(5)	(26)	(5)	(12)	(7)	

* These and subsequent column numbers stand for the question codes.

%/Percentages are out of 93.

Other advantages	Frequency of mention
-preferential sales	1
-common infrastructure	2
-bulk purchasing	1
-overseas buying	4
-technical & commercial	7
-use of trade-marks & patents	2
-management	6
 <u>Restrictions</u>	
-capital expenditure approvals	2
-product range	1

Investment in Fixed Assets & Capacity Utilisation

During the mid-to-late 1960s much new industrial capacity was still being created in the early phase of import-substituting industrialisation and excess capacity may not have been pronounced. But it may be that things had changed by the 1980s. Table 8.3 summarises the relevant responses from the survey.

From the table, one form or other of investment in fixed assets has been widespread and firms' own resources were by far the most important source of finance (that is medium-to-long term). Inter-company and bank loans are still a significant source of finance but the latter is not as important (for already established concerns) as one would expect in other economies where capital is less scarce. The major 'other' sources of funds that were mentioned by the respondents were international finance corporations.

The most constraining operational problems affecting investment decisions (and by extending the argument current capacity utilisation) were due to imported material inputs and plant and machinery (presumably also imported). This would tend to lend support to the suggestion made in Chapter 4 and Chapter 5 that imported imports might be an important source of production constraints due to rationing of foreign exchange. It was also suggested that this constraint might facilitate the exploitation of monopoly power via its effects on collusion. Skilled labour does not seem to be as important a source of production constraint as imported materials. Inputs such as fuel, and machinery breakdowns were frequently mentioned among the sources of operational

problems.

Pricing

Price changes for Malawian manufacturers are typically price increases partly because of the influence of ever increasing costs of imported inputs particularly fuel and partly because of lack of vigorous competition. Although the rate of inflation has averaged between 15 to 20 percent in recent years, the price increases are normally effected on a once-a-year basis, usually soon after the budget speech suggesting that firms take advantage of the budget statement to increase prices. It is this kind of general pricing situation which gives meaning to the formulation of the pricing question in the questionnaire, where firms were asked whether they had raised prices once, twice, or never during the previous three years.

Three years was specified in order to reduce the role of special short-term circumstances, in determining price increases. Where responses of 'several' times were indicated, in the Malawian situation this can be interpreted as meaning that price increases were of a frequency of at least once a year. As a post survey lesson, there can be no doubt that there would have been a definite improvement in the data relating to price increases, if firms were simply asked how many times they had raised the prices of their major products in the last three years. This will of course have broken with the general design of the questionnaire but it would have been worthwhile for this important question.

The assumption behind the question relating to price increases is that firms produce products which are related in both production and demand so that price increases sought by firms affect most of those products. Nearly half of the respondents had raised prices several times during the previous three years. Considering that three years is a long time and that production is mostly confined to consumer non-durables which have a high frequency of purchase, one might have expected that a larger proportion of firms had raised prices several times. This could mean that either demand or price controls were constraining. But in view of the high rate of inflation this could also mean that although price increases were infrequent, when they did change, they did so with large margins. The right hand portion of Table 8.4 shows the importance

of various factors on pricing decisions.

Just about a third of the respondents considered demand factors to be very important in influencing pricing decisions while just under a third considered government intervention to be very important. Given that the survey was done about a year after the announcement of price liberalisation the low proportion of respondents who indicated the importance of price controls, may not be unexpected. From the results, it is quite clear that input costs are an important influence on firms' pricing decisions.

It is quite likely that respondents interpreted 'demand' in the questionnaire as referring to the general level of demand². The rather low proportion of respondents who mentioned demand as being very important (37%) suggests that other factors may have had overriding importance.

On the question of how the pricing decisions were implemented, a significant proportion of respondents (24%) admitted that they were price leaders and there seems to be some reciprocity in that a sizeable proportion of respondents admitted to being price followers. The distribution of these responses across industries indicates that the highest incidence of price-leadership was in industries with considerable competition (in terms of numbers) eg. the 'chemical and allied' and the 'metal products' industries.³ *Admitted* collusion was found in 13 percent of the cases. The percentage would be much higher than this if it was based only on respondents producing mainly for the domestic market. This underscores the argument that in the absence of antitrust legislation, conditions favouring collusion could lead to overt arrangements and the existence of recognised dominant firms could facilitate this.

Behaviour in the Face of Entry

Firms which indicated that there was too much competition are in 18 industries. It is now possible to go back to the question of perception by large firms of competition from small firms or the fringe (comprising 'informal' producers). Significantly, of all industries suggested in Chapter 5 as possibly having important fringe competition only respondents in 'meat products' and 'grain milling' did not indicate that competition was too much. The respondent in either case was a giant state sponsored company, the Cold Storage

Table 8.4

Summary:Pricing

Col.	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	
	Raise Have Have Pricing D e t e r m i n a n t s o f P r i c i n g prices price price collusn. Competition Input Prices last foll leadr. Govt. 3 Yrs. _wers. Demand Loc. Imp. Loc. Imp. pol. Oth.											
>2	42	YES	22	14	12	VERY	34	18	19	37	58	6
(8)	(45)	(24)	(15)	(13)	(37)	(19)	(20)	(40)	(62)	(30)	(6)	(6)
=1	26				FAIR	14	18	13	26	12	18	6
sub					(15)	(19)	(14)	(28)	(13)	(19)	(6)	(6)
tot	68				sub							
(8)	(73)				tot.	48	36	32	63	70	46	12
=0	25	NO	71	79	81	UNIMP	45	57	61	30	23	47
												81

* = Several times, ** = Once, *** = Never.

Commission, in the case of meat, and the Grain Milling Company, in the other case. Each has hundreds of very small competitors operating mainly on a family business basis. In the case of grain milling, the small competitors are typically grain mill owners providing private services to the local customers rather than trading in grain products. In the case of meat, the Cold Storage Commission is the sole producer of special meat products such as sausages and other processed meat products, while the competitors trade in basic meat products.

Among the rest of the industries which have significant fringes confectionaries, clothing, furniture and metal products, there were respondents who made it clear from their volunteered comments that fringe competition was the source of too much competition. For example one confectioner complained about 'boys selling peanuts on every street corner', while one metal products firm which happens to be a subsidiary of the Malawi Development Corporation, complained about 'unrealistic' prices charged by the small producers in that they were too low. These two comments suggest that large firms are sometimes obliged to seriously consider the impact of small producers. If they should ignore them, they might do so at great threat to their own survival.

The next set of questions to be looked into relate to whether firms were aware of the dynamics of their industries, whether they sought to influence it, and how they do it. The list of possible variables has been suggested by, among others, Jacquemin and Thisse(1972) in their generalised dynamic model of oligopoly. Table 8.5 summarises the survey results.

The 52 respondents who perceived new entry into their industries within the previous 10 years were in 23 of the 39 4-digit SIC industries. Entry may therefore be described as having been widespread. But then this may have something to do with the ten-year reference period which cannot be described as short. In a small economy such as Malawi with an even smaller manufacturing sector, the fact that as many as 20 out of the 52 respondents had no immediate knowledge of entry is remarkable. That this is so when the entry process has a built-in 'early warning' system and that the responses were from industries with relatively small numbers of firms is even more remarkable. One must attribute such a result to error (of omission) on the part of the respondents.

Implementation of entry deterring strategies in an industry that is not currently monopolistic is complicated by the question of who gains most from the deterrence and who bears what costs. In the case of a clear leader, that firm might be expected to be the one that should worry most about new entrants and hence more prepared to bear a significant proportion of the costs. It is easy to see this in the case of limit pricing. The greatest losses (in absolute terms) would be distributed according to relative size of sales. Consultations among firms about courses of action to be taken could lead to strategies that might avoid heavy costs. It might even lead to non-economic approaches such as lobbying against the issue of new licences. This was mentioned in the volunteered comments of 3 respondents (producing leather and luggage, venetian blinds, and plastic products). Apart from those that appeared on the questionnaire, other strategies mentioned were diversification of sales effort into the rural areas and the offer of hire-purchase arrangements. The rest of the results are given in the table.

25% of the firms indicated that they had 'consulted' others about the course of action to be taken in the face of entry, and this is quite a high proportion. The affirmative responses were spread across 8 industries namely bakery products, confectionary products, sawmill, paints, tyre and tube, plastic products, non-metallic mineral products, metal products, non-electrical machinery and equipment. There is a possibility that in three cases this question may have been interpreted to include consultations between subsidiary or affiliate firms and their parent companies but this would still leave the percentage of consulting firms quite high.

The various types of responses to entry, shown in Table 8.5 must be taken to refer to attempts to frustrate both potential and new entrants. This is because the reactions relate to a number of situations, namely: where the potential entrants were still in the process of applying for licences; where they had been granted licences and were contemplating entry; where the new licence holders were in the process of entry; where the new licence holders were effective entrants.

The much preferred reactions to entry are quality improvements, new products, advertising, and efficiency drives, in that order of popularity. Export drives are relatively less important strategies, supporting the earlier assumption of Chapter 7, that export activity is generally confined to traditionally

export-oriented industries. In all only 16 respondents used prices as an entry deterring strategy. A comment by a respondent on this issue was that price controls reduced price-cost margins and this made firms avoid price based strategies. The overall picture that emerges from the results must be that non-price strategies are much favoured, and these may also be the popular modes of competition.

Modes of Sales Promotion

Table 8.6

Summary:Sales Promotion

Col.	S1	S2	S3	S4	S5	S6	S7
	Posters	Mags.	Newsprs.	Demo. units	Radio Ad/ prog. sponsorship	Quant. discounts	Other
YES	11	23	40	14	26	21	20
(%)	(12)	(25)	(43)	(15)	(28)	(23)	(22)
NO	82	70	53	79	67	72	73

* These figures are based on two most used modes of sales promotion.

Table 8.6 reveals the expected result that the mass media advertising (newspapers and radio) are the favourite modes of sales promotion.

Research and Development

Vigorous R&D activity might be viewed as an indication of future capabilities for diversification of the manufacturing base. According to the responses the incidence was quite high involving 57 per cent of the total respondents. However a closer look at the affirmative responses leads to some qualifications.

Firstly, the research in the tea industry is done on an industry basis by the Tea Research Foundation. The 5 affirmative responses from this industry must be seen in this light.

Secondly, 4 affiliates of multinational corporations indicated that R&D was done on a 'group' basis for the whole corporation. None may therefore be actually done in Malawi.

Thirdly, the heaviest concentration of R&D activity appears to be in the chemicals and allied industries (SIC 3511 to 3560). This involved 14 out of a total of 18 responses. The explanation of this may lie in that they are skill-intensive industries with much product differentiation, which is partly due to intense import competition. These factors coupled with the favourable technological possibilities, encourage diversification of the 'joint production' type, which probably accounts for the R&D.

Fourthly and lastly, much of the rest of the affirmative responses were scattered across many industries. Given that most industries are oriented towards inexpensive consumer goods for which much research would already have been done elsewhere, the expectation must be that some of the R&D concerned is generally of a minor nature and confined to slight product variations.

REGRESSION ANALYSIS & HYPOTHESIS TESTS

In the previous section the survey results for different variables were analysed in isolation from each other. In this section results of regression analysis are discussed. In order to perform the analysis, the special problems resulting from categorical YES/NO responses had to be taken into account.

The use, in economics and business, of data from surveys often means dealing with behavioural responses which typically involve qualitative choices. Qualitative choice responses such as categorical YES/NO responses present a problem in regression analysis when they are used as the dependent variable, and represented by a dummy variable eg. 1 for YES and 0 for NO. Part of the problem is due to the non-normality and heteroscedasticity of the errors, making inappropriate the use of ordinary least squares and the use of classical tests for the estimated parameters. The following model, called the linear probability model, demonstrates these problems.

Suppose we have the simple regression model (written as deviations from variable means)

$$y_i = Bx_i + u_i$$

with $E(u_i) = 0$. The conditional expectation $E(y_i|x_i) = Bx_i$ can be interpreted as the probability that the event will occur given x_i . Let $P_i = \text{Prob}(y_i = 1)$ and $1 - P_i = \text{Prob}(y_i = 0)$. $E(y_i) = 1(P_i) + 0(1 - P_i) = P_i = Bx_i$. From the model above and since y_i can only take the value 1 or 0, the errors can only take the values $1 - Bx_i$ and $[0] - Bx_i$ respectively and the probability of the events will be the same as for the respective y_i that is P_i and $1 - P_i$ or Bx_i and $1 - Bx_i$. We can tabulate the corresponding values of y_i , u_i and P_i as in

y_i	u_i	P_i
1	$1 - Bx_i$	Bx_i
0	$-Bx_i$	$(1 - Bx_i)$

From this we have

$$\begin{aligned} \text{Var}(u_i) &= E(u_i^2) = (1 - Bx_i)^2 Bx_i + (Bx_i)^2 (1 - Bx_i) \\ &= Bx_i(1 - Bx_i) \end{aligned}$$

which indicates heteroscedasticity since the variance of the error term depends on x_i and hence is not constant. For example, observations for which P_i is close to 0 or close to 1 will have low variance while if P_i is close to 0.5 will have large variance. Ordinary least squares would not be efficient in such a case. Another problem arises from the interpretation of the predicted values of y_i as the conditional probabilities that the event will occur given x_i where in many cases these could lie outside the (0,1) limits.

Although there are intermediate solutions to some of these problems, eg. correction for heteroscedasticity by transforming the variables, and constraining the predicted values, the solutions remain inadequate. For example the former

would leave the problem of non-normal errors unresolved, while the latter does not guarantee unbiased estimates.

These problems require a different approach to model specification. The solution involves alternative distributional assumptions so that the predicted values lie in the (0,1) interval. By using the notion of cumulative probability function as the basis of the transformation the values of the independent variable X (which can lie over the entire real line) can be translated to probabilities which lie in the (0,1) interval. The solution can be based on the cumulative distribution function, $F(u_i)$ in the likelihood function

$$L = \prod_{y_i=0} F(-Bx_i) \prod_{y_i=1} [1 - F(-Bx_i)]$$

where F depends on the assumptions made about the distribution of u_i . Two widely used cumulative probability functions (among many other possibilities) are the cumulative normal function and cumulative logistic function, which are similar in form, and give rise to the probit probability model and logit model respectively. With the assumptions about the distribution of u_i , Maximum Likelihood (ML) estimates are obtained by maximising L over the parameter space. Due to the non-linear nature of the first-order conditions for maximising L estimation involves an iterative estimation procedure. Given the desirable properties of ML estimators (including asymptotic normality, unbiasedness etc.⁴), asymptotic tests can be carried out for hypotheses on the parameters and model specification.

For the present analyses the models were estimated using the probit model. The LIMDEP statistical package (see Greene, 1981) was used. It gives t-ratios for the parameters with their levels of significance, as well as the significance level of the likelihood ratio test⁵.

Since the variables of the models investigated here differ somewhat in measurement from those used in earlier regressions, they are defined below.

Definition of the Variables

The following definitions relate to the initial coding of the questionnaire responses.

- P = 1 if prices had been raised SEVERAL times during the previous three years and 0 otherwise.
- CONST = constant
- CR3D = 1 if three-firm concentration ratio > 75% and 0 otherwise.
- AFFIL = 1 if YES and 0 for NO to financial advantages from being an associate firm or subsidiary.
- CAP = 1 if YES and 0 for NO if output rate could be increased by at least 25% using only present fixed assets ie. without the need for further investment..
- INAV2 = problems with input availability in production. 1 for 'VERY' important indicated for at least two inputs and 0 otherwise.
- INAV1 = -do- but with 1 for 'VERY' mentioned with respect to at least one input and 0 otherwise.
- D = 1 if demand was 'VERY' important for pricing decisions and 0 otherwise.
- IMP = 1 if import competition was 'VERY' important for pricing decisions and 0 otherwise. (NB. In the earlier variable IMPS, the S stood for industry sales)
- EXP = 1 If industry is export oriented (see Chapter 5 and appendix to that chapter), and 0 otherwise.
- INCOST= 1 if total score was at least 3 for importance of local and foreign input costs in pricing decisions and 0 otherwise. The scores were from the codes: 2 for 'VERY'; 1 for 'FAIR'; 0 for 'UNIMPORTANT'.
- GOVT = 1 if government price controls were 'VERY' important in pricing decisions and 0 otherwise.
- ENTRYP= 1 if 'YES' to use of price related strategies as a reaction to entry, and 0 otherwise.

AD2 = 1 if at least two modes of sales promotion were used, and 0 otherwise.

AD1 = 1 if one or no mode of sales promotion was used and 0 otherwise.

The Nature of the Regression Models

The models relate to price increases, excess capacity, and the exercise of government price controls. Models concerning pricing draw from the discussion presented in Chapter 4. Those relating to excess capacity and price controls can best be described as exploratory. They are based on the previous discussion of some relevant issues in Chapters 2, 4 and 5 for excess capacity, and Chapters 4 and 7 for price controls.

For the binary ONE/ZERO dependent variables the binary probit estimation procedure was used on the entire set of ungrouped data using the LIMDEP statistical package.

THE RESULTS

1) Pricing

The set of equations from 1) to 4) in Table 8.7 must be seen in a slightly different light from the price-cost margins equations of Chapter 7 not simply because of the nature of the independent variables but because the dependent variables represent different though often related phenomena. The dependent variable in the equations is derived from data relating to the frequency of price increases. This may or may not reflect the potential for high profitability, which the price-cost margins are supposed to measure. While both variables can have common links in the theory of oligopoly pricing, they could be said to be looking at the problem differently, price-cost margins being more general in approach than the price increases. The equations of Table 8.7 can be said to

be investigating in a more direct way, how flexible prices were upward, which corresponds to only the top part of the kinked demand curve.

In its simplest version the kinked demand curve hypothesis says that the top part of the demand curve for firms in oligopolistic industries is likely to be more elastic than the bottom part if the nature of competition is such that if a firm were to cut its prices, rivals would retaliate, while unilateral price increases would go unmatched so that the firm concerned would lose customers. This is supposed to lead to stability of prices in the upward direction, unless effective collusion is possible, which would therefore facilitate the exercise of joint monopoly power. The important question here is whether collusion is likely to be associated with greater upward price flexibility, and what factors are important in independently influencing that flexibility. From the equations it appears that severe problems with the availability of inputs are an important factor in influencing the frequency of price increases. The lack of significance for the overall input availability variable in the first equation is likely to be a result of collinearity from the inclusion of the two variables distinguishing local inputs from imported ones, both of which are incorporated in the composite variables INAV1 and INAV2. It will also be noticed that apart from this the first three equations are quite similar. We can therefore base our discussion on the equations 3) and 4), since 3) adequately represents the first two.

With the highly significant coefficient for the input variable, the regression results of equation 3) appear to lend supporting evidence to the hypothesis postulated in Chapter 4 that severe input problems, if they are common to all the competing firms, could facilitate collusive behaviour which could result in joint monopolistic profits. We might also expect that where input problems are severe and there is a price leader in the industry, collusive agreements to increase prices would be easier to implement than where no such leadership exists. In the former case the arrangements would be easier even where price controls exist since the price leader could present a common front to the price control authorities. The PLEAD coefficient is significant at the 5% level and this together with its positive sign indicates that it might indeed facilitate this type of process. But can we say anything about the explicit link between input problems and collusion? The above results only provide strong circumstantial evidence of a positive link.

Table 8.7

Regression Analysis: Pricing
(t-statistics in brackets)

Method of Est. = Binary Probit
Dependent Var. = P2(=raise prices several times)

Equation No.	1)	2)	3)	4)
CONST	-1.44	-1.50	-1.42	-1.54
CR3D	0.46 (1.13)	0.48 (1.18)	0.44 (1.09)	0.48 (1.22)
D	-0.59 (1.63)*	-0.52 (1.45)	-0.58 (1.72)*	
IMP	0.13 (0.32)	0.14 (0.34)	0.78 (0.19)	
EXP	0.29 (0.59)	0.22 (0.43)	0.26 (0.53)	0.07 (0.15)
GOVT	-0.07 (0.38)	-0.10 (0.28)	-0.10 (0.26)	
INCOST	0.16 (0.42)	0.08 (0.21)	0.25 (0.70)	0.22 (0.63)
INAV2	0.45 (0.88)	—	0.68 (2.13)**	0.71 (2.27)**
INAV1	—	0.33 (0.78)	—	
LOCINP	0.40 (0.85)	0.34 (0.71)	—	
IMPINP	0.19 (0.35)	0.36 (0.86)	—	
CAP	0.14 (0.37)	0.08 (0.21)	0.23 (0.66)	0.17 (0.50)
AFFIL	0.32 (0.94)	0.30 (0.88)	0.27 (0.83)	0.31 (0.98)
PLEAD	0.57 (1.65)*	0.58 (1.68)*	0.66 (1.99)**	0.61 (1.88)*
ENTRYP	-0.46 (1.03)	-0.46 (1.04)	-0.50 (1.14)	-0.41 (0.96)
AD2	0.87 (2.40)**	0.73 (2.40)**	0.88 (2.42)**	0.87 (2.10)**
R ²	a/	a/	a/	a/

NOTES: * Significant at the 10% level

** Significant at the 5% level

a/ The significance of these equations is discussed in the text.

Even though there is no antitrust legislation in Malawi we have a strong suspicion that there were cases in the survey where the respondents may have been reluctant to answer the collusion question truthfully. It was on the basis of this suspicion that an appropriate collusion variable was not used because of the possibility that it may be unreliable. We can still analyse the affirmative responses on collusion to see how they relate to the input availability variable INAV2.

The industries which registered at least one affirmative response to the pricing collusion question were edible oils, bakeries, confectionaries, tea, 'spinning, and weaving', tyres and tubes, structural metals, and fabricated metal products. With the exception of edible oils, all other industries had firms indicating severe input problems. On the basis of this and the results discussed above for the pricing equations we might conclude that input problems are indeed associated with collusion and that in turn collusion is associated with upward flexibility of prices.

The results of 3) also suggest that while advertising mode intensity contributes positively and significantly to the frequency of price increases, demand does so negatively. The result for demand like those for IMP, and GOVT in these equations may be due to the definition of the variables. The fact that they are all derived from questions relating to whether these variables were important in pricing decisions may well mean that their effects are already accounted for in the dependent variable. The fact that the significance level of the Log Likelihood test (see Maddala, 1977, pp. 43-44) associated with equation 4) is 1% (compared to about 3% for equations 1) to 3)), indicates that we are better off excluding these variables, although the results with respect to the remaining variables are not significantly affected.

The frequency of price increases appears to be independent of all the other variables in the equation 4) which interestingly include the degree of concentration. We saw above that a significant proportion of firms (30%) indicated that they were constrained by price controls. It is therefore possible that the non-significance of the concentration coefficient could be attributable to price controls just as in the previous empirical results. But since this is an important question, we shall reserve firmer conclusions on this issue until we have had an opportunity to investigate directly, the question of whether price controls were influenced by the degree of concentration. This is done in the

section after the next.

The non-significance of the export intensity variable for price increases should not be too surprising, given that export orientation is associated with price-taking behaviour.

It might be argued that the above results are partly a consequence of the 'loose' measurement of the dependent variable. That is raising prices several times during the past three years may not be a rigorous measure of the frequency of price increases. But this form of the variable could be defended on the grounds that greater precision would have faced the formidable problems associated with distinguishing the prices of individual products of multi-product firms. Still, an attempt was made to get round this problem by estimating models of the degree of monopoly power by regressing estimates of price-cost margins on the survey variables grouped by industry. The major problem with this was that the latest estimates for the price-cost margins could only be calculated for 1977 and 1981. This was considered to represent a time difference which is too long for a worthwhile interpretation of the results, especially as it involved the dependent variable.

2) Excess Capacity

From the two equations for excess capacity in Table 8.8, the variables that significantly influence excess capacity are import competition, export intensity, government restrictions on pricing and problems with local inputs. We examine the role of each variable in turn.

Table 8.8

Excess Capacity

Dependent Var. = CAP: Estimation = Binary Probit

(t-statistics in brackets)

CONST	CR3D	D	IMP	EXP	GOVT	INCOST	INAV2	LOCINP	IMPINP	AFFIL
-0.46	0.06	0.50	0.84	-1.17	-0.73	-0.24	0.23			-0.61
(0.15)	(1.47)	(2.19)**	(2.09)**	(1.79)**	(0.66)	(0.73)				(1.59)*
-0.47	-0.01	0.30	0.96	-0.90	-0.61	-0.40		1.11	-0.22	-0.39
(0.01)	(0.81)	(2.38)**	(1.60)*	(1.43)	(1.05)			(2.36)**	(0.56)	(0.97)

Notes: * Significant at the 10% level

** Significant at the 5% level

NB. The significance levels of the likelihood ratio test for the two equations are respectively 2% and 0.5%.

The coefficient for the import variable implies that stiffer import competition is associated with higher levels of excess capacity, and we might expect the association to be of this nature. If as was suggested in the previous section, the import tariff duties in Malawi are such that they were high enough to give local producers some protection for their own pricing decisions, it would seem from the present results that the tariffs do not at the same time sufficiently stimulate local production to lead to full utilisation of capacity.

The fact that export intensity has a significant and negative influence on excess capacity is likely to be from the fact that export activities are associated with both the use of local inputs (whose supply is elastic) and price-taking behaviour. These two imply that all that can be produced can be sold. The coefficient of the strictness of government controls variable, GOVT suggests that the variable is associated with higher capacity utilisation which is not meaningful economically. The expected relationship is a positive one rather than the negative one revealed. The positive relationship between local inputs and excess capacity is also surprising in the sense that it is the coefficient of this variable rather than that for imported inputs which is significant. This is contrary to the argument which we have presented before that imported inputs

rather than local ones are likely to be a major cause of excess capacity.

Government Price Controls

Table 8.9 sets out the results of two models of how price controls might be influenced by variables which represent conditions in different industries. They derive from the firms' point of view and so there is a slight chance that the results may not explain the behaviour of the authorities in an exact way. But then the firms' point of view is arguably the best point of view given that records from which to undertake a similar exercise from the authorities' point of view were not available.

Table 8.9

Regression Analysis: Factors Influencing the Perceived Restrictiveness

of Government Price Controls

(t-statistics in brackets)

Dependent Var.= GOVT: Estimation = Binary Probit

CONST	CR3D	D	IMP	EXP	INCOST	INAV2	LOCINP	IMPINP	CAP	PLEAD
-2.33	1.53	-0.11	0.42	0.28	0.89	-0.46			-0.59	0.35
	(2.19)**	(0.29)	(0.97)	(0.43)	(2.30)**	(1.33)			(1.46)	(1.02)
-2.40	1.50	-0.01	0.29	0.18	0.85		-0.51	0.08	-0.48	0.42
	(2.15)**	(0.02)	(0.68)	(0.28)	(2.19)**		(0.98)	(0.21)	(1.07)	(1.15)

Note:** Significant at the 5% level

* Significant at the 10% level

NB. The significance levels of the likelihood ratio test for the two equations is less than 1%.

The significance of the concentration coefficient supports our earlier interpretation of the implementation of price controls in Malawi (described in the model presented in Chapter 7). That is the stringency of price controls is directly related to concentration levels.

The significance of the input cost coefficient and its positive sign suggest that the pressure of price controls is felt more where pricing is most sensitive to input costs, regardless of concentration levels. Since the basis of upward price revisions under price controls is changes in costs, industries or firms for which cost changes are important would also be the most inclined to ask for frequent price increases and therefore the most likely to feel the pressure of government intervention. This explanation is compatible with the fact that demand considerations do not seem to make a significant impact on the exercise of the controls. This indirectly lends support to the hypothesis suggested in Chapter 7, regarding the mutual exclusivity between price controls and demand constraints.

The result that demand pressure does not influence the stringency of price controls may seem paradoxical considering that demand conditions were said to be the basis of the government-prescribed margins over cost. But the explanation must be that market security is only an initial condition for establishing the basis for future implementation of the price controls. The implementation may therefore be little influenced by levels of demand in subsequent periods of time. The best illustration of this would be to imagine a newly establishing industry. At the point of entry of the firm(s) the government decides whether the market may be termed 'secure' or not. An appropriate markup over cost is established for that industry and is applied during subsequent periods of time.

Government control over prices is neither significantly influenced by excess capacity nor import competition. The reason for this is likely to be that these two are not relevant variables for the controls, although they may influence other forms of government intervention in manufacturing such as entry of new firms and tariff rates on imports. In the case of entry, it has been indicated that the government and the firms sometimes see the existence of excess capacity as valid grounds for considering the prevention of entry.

SUMMARY AND CONCLUSIONS

The results of the simple analysis of the survey can be summarised as follows:

the major consequence of affiliation to other enterprises by firms are financial advantages though the restrictions of such affiliation also tend to be connected with finance.

the factors leading to most operational problems and hence potential causes of excess capacity have been availability of imported inputs, including materials, plant and machinery.

the effect of price controls was still felt a year after the announcement of price liberalisation but it was not as widespread as it might have been before this.

demand considerations including domestic and import competition were indicated as important in influencing pricing decisions.

evidence of price-leadership appears to be quite strong. Express collusion over pricing though less in evidence, is still there.

there is fairly strong evidence that firms do try to influence the structure of their industries using non-economic and economic strategies. The economic strategies, which are many, tend to overshadow the former, which is restricted to lobbying against the granting of new licences to potential entrants. Such measures tend to just 'buy time' for the incumbent firms since success is rare. The economic strategies are predominantly efficiency drives and quality improvements and to a much lesser extent price- or sales promotion-oriented. There is ample evidence of consultations among incumbent firms on the course of action to be taken when there is threatened entry.

The regression results for price increases allow us to make some comparisons with results of the previous chapter on certain important issues, particularly the implications on pricing behaviour or the degree of monopoly power, of price controls and potential problems with the availability of inputs.

Both the summary results of the survey and the regression analyses strongly suggest that price controls were still important in 1984. The effect of these controls appears to have been the dampening of the influence of the degree of

concentration on pricing, which might have been expected to be strong in the Malawian setting, due to the absence of anti-monopoly legislation and the tendency towards high degrees of concentration in certain industries. The regression results supporting this are the combination of lack of significance of the concentration coefficient in the pricing equation, and the significance of the concentration coefficient in the price control equation.

The results of this chapter also indicate, as did those of the previous chapter, that input availability problems are positively associated with both profitability and price increases. There is also a positive association between price leadership and price increases and between input problems and collusion. This set of results in combination must represent fairly strong support for a hypothesis posed in this study, of a possible link between input problems, conjectural variations, and collusive pricing behaviour.

NOTES

1. See for example Reid (1981), Chapter 5, for a discussion of some of the problems associated with gathering of primary source data on behaviour.

2. In order to separate out various aspects of demand, eg. its elasticity vs. its level the questionnaire would need to have been much more complicated than it was (see examples in Reid, 1981). But even with an elaborate questionnaire design, there would be the problem that firms (unless they are monopolists, see Triffin, 1940) are likely to be faced with unstable demand curves so that it might be only possible for respondents to supply answers of a general kind.

3. 9 respondents (ie. about a third of the respondents for which this question was relevant) answered affirmatively both the question of whether they were price-leaders and whether they were price-followers. This was permissible since it is possible that firms might alternately act as leaders and followers.

4. However the estimates for error variance is not unbiased, though it is consistent (Pindyck and Rubinfeld, 1976, p53).

4. However, due to the similarity of the cumulative normal and the cumulative logistic distributions, the results generated by the logit model are similar to those of probit. They can be made to approximate the probit results even more closely by means of a simple transformation (see Maddala, 1983, p23).

CHAPTER 9

CONCLUSION INCLUDING POLICY RECOMMENDATIONS

INTRODUCTION

Part One of this study has involved theoretical analyses which have resulted in the highlighting of three characteristic features of Malawian manufacturing industries. These are: high scale related barriers to entry, price controls and scarcity of some inputs. The empirical investigations of the present Part Two, and particularly Chapters 7 and 8, have indicated the strong possibility that policies with regard to pricing and international competition have influenced structure/ conduct/performance relationships in such a way that some important policy-oriented remarks can be made. This chapter discusses the important empirical findings and the policy implications. Since there has been no previous study like this one for Malawi, the discussion will not only be based on the findings of the formal models of Chapters 7 and 8, but will also draw from the evidence reviewed in Chapter 5, on features of Malawian manufacturing and in Chapter 8 from the survey of behaviour.

PRICE CONTROLS AND COMMERCIAL DECISION MAKING

One of the important findings of this study is that the exercise of price controls appears to have had the required effect of constraining the exercise of monopoly power by firms which would be inclined to do so because their industries are highly concentrated and because collusive behaviour is not illegal. In this sense one can say that the evidence suggests that price controls have interfered with commercial decision making by design. This conclusion is based on two sets of results.

The first set is based on data relating to a period when price controls were widely in effect. The results suggest that the degree of industrial concentration has not exerted a significant influence on pricing.

The second set of results is based on the 1984 survey, and indicates that a significant proportion of firms (30%) still felt very constrained by price controls at that time, ie. after the initialisation of price deregulation. These 30% mostly represent firms in the highly concentrated industries, in which case it could be said that the price controls still modified the influence of concentration on pricing. Regression results also tend to support this direct evidence in that they indicate that the degree of concentration did not significantly affect price increases.

The above conclusion with respect to the effects of price controls specifically relates to the degree of concentration which directly influenced the stringency of the controls. These results do not necessarily mean that all commercial decision making was greatly affected by the controls since other variables relevant to pricing could have been largely independent of the price controls. Further direct evidence from the survey tends to point to this possibility. For example, most firms indicated that they did not consider price controls as the most important factor affecting their pricing decisions. Instead, input prices and demand factors were regarded as the important considerations. There are policy recommendations which can be drawn from these results but they must be taken as conditional upon other policy goals which may be affected, for instance through distributional effects.

Complete abolition of the price controls will facilitate the exploitation of monopoly power where the potential exists, which is in many industries. This is because in the absence of antitrust legislation, express pricing collusion, in which a number of firms have admitted to have engaged, would go largely unchecked. Demand factors and especially the elasticities of demand will of course set the ultimate limit to pricing flexibility. The elasticities will themselves be affected by the regulation of entry, and government policies with respect to import competition.

Long-run elasticities of demand would be higher and monopoly power lower if the entry process were also deregulated so that potential entrants are free to respond to the stimulus of high profits. The evidence reviewed in this study

suggests that there have been instances where the government has barred potential entry. But the incidence has been quite small relative to the number of prospective entrants. The fact that there has been little effective entry during the 1970s despite large numbers of successful licence applications suggests the existence of some other forms of barriers. Likely candidates for this are large minimum efficient plants and significant cost disadvantages of plants smaller than this, the existence of excess capacity among existing firms, and the scarcity of foreign exchange with which potential entrants might procure capital equipment. These are discussed in the sections that follow.

HIGH BARRIERS TO ENTRY AND ENTRY REGULATION

The Malawian economy is small in terms of overall purchasing power. Consequently most markets for manufactures are small and capable of supporting only limited numbers of competing firms. Oligopoly and near-monopoly have therefore been the characteristic market structures especially for industries which are oriented towards the domestic market.

Despite measurement problems with the barrier to entry variables it has been indicated that one of these variables reflected fairly well the relative ease of entry into different industries. Where the stringency of price controls is directly related to the degree of concentration one could argue that the less concentrated industries (those less restricted by price controls) could still use lower prices to deter entry, according to the height of barriers in their industries. But the empirical results have shown that pricing is not significantly influenced by the height of barriers to entry. This seems to be in line with the findings of other studies and suggests that firms do not resort to lower prices in order to discourage entry. For Malawi, and on the basis of the evidence of Chapter 5 and Chapter 8, we have been able to say why this was the case, and this is due to the fact that there are other attractive alternative strategies and in some cases alternative barriers to entry which could effectively serve the purpose.

In some cases, the tendency towards high industrial concentration has been reinforced by government regulation of the entry process implemented through industrial licencing. In certain situations, the government has sought to entice

foreign direct investment in new industries requiring large capital investment by granting monopoly status for given periods of time. In other situations 'too much' competition that was considered to lead to unnecessary market fragmentation and therefore excess capacity, has been avoided by restricting further entry.

In either situation it can be said that entry regulation was influenced by considerations of excess capacity. This and the rules governing the entry process could easily have lead to situations whereby incumbent firms could not only regulate or even prevent entry into their industries, but do so with government help.

The entry rules, under the Industrial Development Act virtually amount to an early warning system to existing firms, about potential competition, and gives them vital information about the potential entrants. Apart from this, the same rules have provision for objections by existing firms against the granting of an industrial licence. From various government statements, the existence of excess capacity is considered to be a valid basis for such objections. This leads to the important question of whether or not firms have indulged in strategic excess capacity with the intention of deterring entry or, worse still, preventing it with government assistance.

The answer to this question can be inferred from three strands of evidence.

The first is that investment in extra productive capacity has been widespread. The second is that a significant proportion of firms consider competition in their industries to be excessive. The third is that the level of awareness of new or intended entry is high and that firms are generally anxious to do something about it. All these combine to make excess capacity a potentially important means of influencing industrial structures by existing firms and especially given the government's position with regard to entry where excess capacity exists.

In this respect, the evidence reviewed in this study suggests that if the considerable existence of excess capacity was strategic, its use in limiting entry via the institutional entry regulatory channel must have met with only limited success. But the authorities need not take too much solace in this because the excess capacity could still have been used strategically, through economic channels but with firms exploiting the entry rules to their own

advantage.

Normally excess capacity among incumbent firms is usually not 'visible' as far as intending entrants are concerned. This would tend to weaken its discouraging effect on potential entrants. But in the Malawian case this can be communicated to the potential entrants during representations against licence applications. This could have led to the situation revealed here, where there is a long list of potential entrants who have not actually established themselves, long after having been granted licences. It is also suggested here, that among other things, non-strategic factors which influence excess capacity, should also be a worrying factor as far as entry or general industrialisation is concerned. These are looked into next.

SCARCITY OF INPUTS, EXCESS CAPACITY AND MONOPOLY POWER

It would not be sensible to allow greater discretion in pricing, designed to provide incentives for industrial expansion, while at the same time having output expansion or new entry frustrated by operational problems. Chapter 7 and 8 of this study have indicated that imported material inputs are considered by firms to be the most important source of operational problems and therefore a potential cause of excess capacity, which in turn can be an effective barrier to entry. This would also have contributed to the fact that despite the granting of many new licences, effective new entry has lagged far behind.

Another result that should be worrying, is the possibility that problems with the availability of imported inputs can be used as a basis for the exercise of monopoly power. In the past firms exercised monopoly power by exploiting the implementation of the price controls, which favourably considered exogenous cost changes, particularly those of imported inputs, as valid grounds for raising prices. In this study another hypothesis has found some supporting evidence. The hypothesis is that common problems with input availability could easily lead to greater awareness of interdependence among competing firms so that collusive pricing arrangements become a strong possibility. The absence of anti-monopoly legislation and high levels of industrial concentration are both features of the manufacturing environment which also facilitate

collusive pricing. For the future, greater discretion in pricing will almost certainly guarantee higher collusive prices.

Discretionary pricing must be seen as eventually providing a stimulus to new entry through the signal of high profits. But to the extent that the possibility of excess capacity inhibits entry and the extent to which this is a result of problems with the availability of imported inputs that role of discretionary pricing may be frustrated unless the availability problems are tackled.

The problems largely result from the scarcity of foreign exchange, which is a general problem in less developed countries. As far as the manufacturing sector is concerned, direct ways of tackling the problems include more active efforts to encourage import substitution in new industries which have extensive forward linkages with existing industries. This is necessarily a long-term measure but the rapid developments in the packaging industries should serve as an encouragement. Here, local production has been rapidly replacing imports and involving all sorts of material inputs. Such a trend could benefit from active encouragement.

INTERNATIONAL COMPETITION

The results of Chapters 7 and 8 indicate that the performance of firms is influenced by their industries' positions with respect to international competition.

Import competition was found in most cases to exert a significant negative influence on profitability, which is in line with theoretical predictions. The moderating influence of competing imports on domestic pricing may largely be attributable to Malawi's policies towards imports.

The absence of quantitative restrictions and the moderate tariff rates (which are said to be largely unresponsive to domestic prices) have resulted in a strong presence of imports. In some industries, such as the chemical and pharmaceutical industries, the competition has been heavy and characterised by much product differentiation and advertising for both domestic and foreign products. This competition will no doubt have ensured quite high levels of

efficiency in such industries. Other industries which currently enjoy high levels of protection, such as the beverages industry, might benefit from similar competition.

As far as export activity is concerned, this too has been independent of the influence of price controls simply because the prices of Malawi's manufactured exports are determined on the international market. The local manufacturers may therefore be taken as price takers and the evidence suggests that as a result of this, they do not enjoy high profits.

Perhaps the best recommendation with regard to export activity is to leave alone the currently export-oriented industries. As far as the rest of the manufacturing sector is concerned, export performance is dismal and its encouragement should be a high priority area.

Aggressive measures in export promotion could benefit from both the Southern African Development Co-ordination Conference (SADCC) agreement and the Preferential Trade Agreement. But the export performance is quite often inhibited by the prohibitive costs to the individual firm of foreign market penetration including the costs of quality improvements. There is no doubt that individual firms must directly meet some of these costs, but there is also a clear need for strong incentives aimed at reducing them. Selling costs to the individual firm could be reduced by enhancing centralised marketing strategies represented by the Export Promotion Council and the International Trade Faire arrangements. Although the government's efforts in this will amount to an implicit subsidy to the industries concerned, there are potentially enormous economies of scale which should make the undertaking worthwhile as far as Malawi's prospects for rapid industrialisation are concerned. In this respect it should be stated here that little hope should be attached to Malawi's recent currency devaluations, as a boost to export activity within the SADCC region. This is because fellow SADCC members under similar pressures have also instituted similar devaluations, thereby cancelling some of the effects of Malawi's own devaluation.

CONCLUSION

Although it is possible to make economic policy recommendations without the

benefit of empirical work, they would be of the nature, 'If such and such conditions/phenomena exist then . . .'. They would not be very useful. The ability to replace 'if' with statements about the existing conditions would be a positive step, where such conditions had not been studied before or given much attention within certain contexts. This is the light in which the policy recommendations offered below should be seen. Many more recommendations could also be generated from this study, for instance, several could be based on each one of the summary tables of the survey results of Chapter 8. But the ones offered here are necessarily few because of the need to highlight the important ones, which are likely to have a great impact on the development of the manufacturing sector. The other thing to note is that the recommendations are made in the context of the recent moves to permit greater discretionary pricing for manufactures.

In the absence of anti-monopoly legislation the move towards an economy with more discretionary pricing would have desirable effects if it is complemented by the following measures:

- a) freer entry, without provision for excess capacity. New entry, through search would provide a vehicle for rationalisation of technology and hence plant sizes; current profitability would be an adequate signal for entry decisions.
- b) problems with imported inputs should receive greater attention, to remove a source of barriers to entry and a likely source of greater monopoly profits.
- c) current policies as they affect imports should at least be maintained if inefficiency and higher prices due to high levels of protection are to be avoided.
- d) drives for exports from the manufacturing sector should be intensified and diversified to benefit industries which are not currently export oriented.

Before concluding this study, the word of caution is that it is not a claim of the

present study, that it has dealt with or even attempted to deal with nearly every important or interesting issue. Gaps remain because we did not set out to fill them. It should therefore be fitting to conclude the study by making brief statements about the issues which could benefit from further work. We restrict ourselves to two important issues.

The first is that although import policies have been mentioned and discussed here much detail eg. about the structure of effective rates of protection is still wanting.

The second issue is that although the study has made much of the recent moves to permit more discretionary pricing of manufactures, this move was not confined to manufactures but involved other prices as well. Other prices affected include those of inputs into manufacturing, namely labour and material inputs (including imported ones affected by currency devaluations). These other moves will certainly affect firms' profitability by countering the effect of increased discretion in the pricing of manufactures. The relevant question here would be What is the net effect of all these changes on profitability in the manufacturing sector? In order to answer this question, one must study the flexibility of costs (due to the increased discretion in setting of other prices) relative to the prices of manufactures.

APPENDICES

APPENDIX CH4

APPENDIX CH. 4

SUMMARY OF HADAR'S^I ANALYSIS OF PRICE CONTROLS

Assume monopoly and that optimal output q . and optimal price p . are positive. Assume further that in the solution to the profit maximisation problem, price would be set at above the government-imposed ceiling P_0 . That is the shut down condition and the case of a redundant ceiling are discounted. If it is further assumed that excess demand exists (rather than supply equaling quantity demanded at a given price), the profit maximisation problem can be given as

$$\text{Maximise } \Pi = pq - f(q) - c \quad (\text{A4.1})$$

subject to

$$q \leq h(p) \quad (\text{A4.2a})$$

$$p \leq P_0 \quad (\text{A4.3a})$$

where $q = h(p)$ is the market demand function, $f(q)$ is the total variable cost function. The constraints can be written with dummy variables v_1 for excess demand and v_2 for excess price ceiling. The latter is the amount by which the price ceiling exceeds the price chosen by the monopolist.

$$q + v_1 = h(p) \quad (\text{A4.2b})$$

$$p + v_2 = P_0 \quad (\text{A4.3b})$$

$$v_1 \geq 0 \quad (\text{A4.4})$$

$$v_2 \geq 0 \quad (\text{A4.5})$$

The problem is now in four unknowns (q , p , v_1 , v_2) with four constraints. With q^* , $p^* > 0$ there are only four exhaustive cases that could hold the solution. Let v_1^* , v_2^* be the optimal values of the

I.Note: See Hadar (I97I).

dummy variables. The four cases can be analysed as follows:

CASE	SOLUTION METHOD (=Lagrangian and first order conditions)	DISCUSSION
1) $v_1^*, v_2^* > 0$ (all vars. >0 at max.) ie. interior sol.	$L = pq - f(q) - c + \lambda_1 [q + v_1 - h(p)] + \lambda_2 [p + v_2 - P_0]$ Diff. w.r.t. the four unknowns $q - \lambda_1 h' + \lambda_2 = 0$ (w.r.t. p) $p - f' + \lambda_1 = 0$ (w.r.t. q) $\lambda_1 = 0$ (w.r.t. v_1) $\lambda_2 = 0$ (w.r.t. v_2)	$q^* = 0$ (since $\lambda_1 = \lambda_2 = 0$) contradicting $q^* > 0$
2) $v_1^* = 0, v_2^* > 0$ (4.2b eliminated subst. h(p) for q) $h(p), p, v_2 > 0$	$L = ph(p) - f[h(p)] - c + \lambda (p + v_2 - P_0)$ $h(p) + ph' - f'h' + \lambda = 0$ (w.r.t. p) (z) $\lambda = 0$ (w.r.t. v_2)	Since $\lambda = 0$ (z) also first order cond. to $\pi = ph(p) - f[h(p)] - c$ (=maximand under no controls) The sol. p^* is same as that for (z) and $p^* > P_0$ by ass. so $v_2 < 0$, contradicting $v_2 > 0$.
3) $v_1^* > 0, v_2^* = 0$ (4.3b and p eliminated) so only two unknowns $q, v_1 > 0$. at max.	$L = P_0 q - f(q) - c + \lambda [q + v_1 - h(P_0)]$ $P_0 - f' + \lambda = 0$ (w.r.t. q) $\lambda = 0$ (w.r.t. v_1)	Out. chosen at $p = mc$ ie. purely comp. sol. so $p - mc/p = 0$
4) $v_1^* = v_2^* = 0$ $q = h(p), p = P_0$	$p^* = P_0, q^* = h(P_0)$	Monopolist's own choice

APPENDIX CH5

APPENDIX CH5

FEATURES OF MALAWIAN MANUFACTURING

Table Ch5.1

Geographical Distribution of Firms

(By Net Industrial Licence Holders, 1978)

SIC	Products	Location					Other
		Blantyre	Lilongwe	Thyolo/ Mulanje	Mzuzu	Zomba	
3111-3115	Meat etc.	3	1	1	1	0	0
3116-3123	Grain-tea	18	4	22	1	0	7
3131-3134	Beverages	4	2	0	1	0	0
3140	Tobacco	8	1	1	0	4	1
3211-3215	Textiles etc.	5	4	1	0	2	0
3220	Clothing	14	4	1	0	4	2
3233-3241	Leather& f/wr.	2	0	0	0	0	0
3311-3320	Wood prods.	17	5	3	0	0	1
3411-3420	Paper,p & p	7	1	1	0	0	0
3511-3513	Chem.& allied	5	0	0	0	0	0
3521-3529	Pharma.,soaps,etc7	1	1	0	0	0	0
3551-3560	Rubber,plastics	6	2	0	0	0	0
3620-3699	Non-met.mineral	4	2	0	0	1	0
3710-3819	Metal prods.	13	8	0	0	0	1
3822-3842	Machine prods.	15	6	1	0	0	1
3843-3909	Veh.ass.,other	9	3	0	1	0	0
Total		137	44	31	4	11	13

Source:Compiled from Ministry of Trade & Industry licencing working lists.

Table CH5.2

Entry Lags for Entrants from 1967-1978

Products	No of firms	Entry Lags		
		shortest	longest	Average
Fruit	1			13
Grain	1			0
Tea	2	1	1+	1+
Beer	2	0	1	0.5
Tobacco	1			2
Ginning	1			0
Textiles	1			0
Clothing	4	2	8+	4.5+
Leather	1			3+
Sawmill	2	0	2	1
Furniture	2	1	8+	4.5+
Paper	2	1+	3	2+
Printg.	3			0
Ind. chemicals	2	1	3	2
Fertilizers	1			1
Paints	1			4+
Pharmaceuticals	1			2
Toiletries	3	0	8+	5+
Matches	1			2+
Brick & tiles	1			3
Structural metal	2	1	2	1.5
Other non-metal	3	1	10+	5.3
Machine prods.	1			1+
Radios	1			5+
Batteries	1			9+
Motor veh. ass.	1			6+

Source: Calculated from licencing working lists and AES information (see Chapter 5)

Fig CH 5.I

Industrial Licences Granted & No. of Holders Operational
(1967 to 1979)

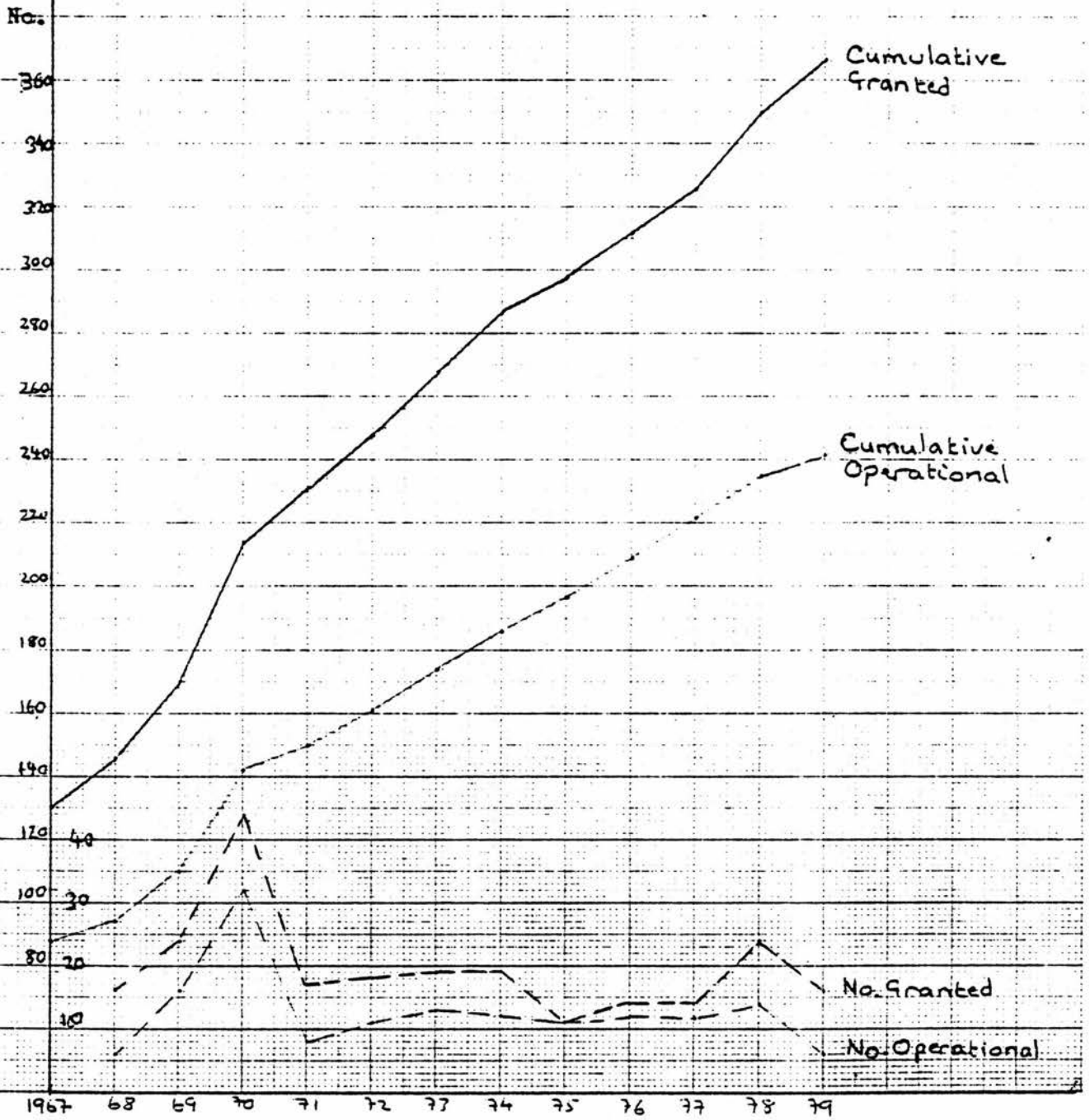


Table CH5.3

Takeovers, Mergers and Exit:1975-1984

SIC	Taken-over/merged	By/with	Relative conc. level
3117	Associated Bakeries Mzuzu	Press Bakeries	Low
3220	Mayfair Fashions Shire Clothing Eros Garments	Press Fashions Press Clothing Spearhead	low
3412- 3420	Jumbo Industries	Blantyre Print & Publishing	high
3829	Steel Works	Press Engineering	low
EXIT			
3215	Central Africa Co.(rope manu.)		high
3311	Nanthipwili Sawmills		low
3419	Artmail (paper stationery)		low
3691	Brick & Tile		high
UNCERTAIN STATUS			
3118	Ruo Jaggery Sugar		high
3832	Nzeru Radio		high

Notes:a)These descriptions can be derived from Table 5.2

b)This applies to paper products

c)These register output on an intermittent basis
in NSO files.

Sources:NSO,AES files; Ministry of Trade & Industry
working lists.

Table CH 5.4

Relative Magnitude of Selected Variables

Across Malawian Manufacturing Industries

Industry	Price cost margins	Var. of margins	3 Firm conc. ratio	Minimum efficient scale	Export intensity	Skill intensity
Grain mill.	0	104	84	62	53	26
Bakery prods.	9	22	72	45	0	40
Tea	5	24	37	11	83	24
Beverages	42	63	100	83	0	67
Tobacco	0	26	71	39	80	35
Ginning...	23	41	100	83	0	37
Blankets...	30	278	100	54	11	26
Clothing	14	46	41	22	9	28
Sawmill prods.	13	455	99	72	9	29
Furniture	8	56	66	22	0	30
Print. & pub.	15	68	54	32	2	64
Chem. & Allied	21	2	100	89	3	80
Other chem.	15	114	100	80	0	57
Non mach.met.	24	114	94	64	3	43
Mach. & motor veh. ass.	12	34	100	78	5	62

Note. The variables are derived from data averaged for the period 1969-72. Of the variables listed here only variance of margins and skilled labour intensity are not in percentage terms. The derivation of these variables is discussed in Chapter 6.

Table CH5.5

The Extent of Product Differentiation: Brand Products

(based on radio advertising data)

SIC	3140	3512	3522	3523
	Cigarettes	Insecticides	Pharmaceuticals	Washing detergents
1.	Benson & Hedges	Baygon	Andrews	Cold Power
2.	Chesterfield	Blitz	Ashton & Parsons	Punch
3.	John Player	Doom	Aspro	Rinso
4.	Lexington	Mosquito Coils	Cafenol	Surf
				Toothpastes
5.	Peter Stuyvesant	Strike	Conjex	Cheseline
6.	State Express	Zuzu	K.B.S. Tabs	Close-up
7.	Tom Tom		Malaquin	Colgate
				Bathing soaps
8.			Mr. Strong	Ambi
9.			Malidens	Butone
10.			Norolon	Choice
11.			Padrax	Cleartone
12.			Phensic	Darling
13.			Phillips	Elora
14.			Solas	Johnsons
15.			Stearns	Lifebouy
16.			Sterling	Lux
17.			Supertabs	Maluwa
18.				Palmolive
19.				Reward
20.				Rexona
21.				Sunlight
22.				Vinolia
SIC	3529	3551	3839	
	Shoe polishes	Tyres	Batteries	
1.	Hall	Goodyear	Berec	
2.	Kiwi	Firestone	Ever-ready	
3.	Nugget	Njati	Hi-watt	
4.			Novel	
5.			Nzeru	
6.			Phillips	
7.			Power	
8.			Ucar	

Table CH5.6

Short-term Assets and Liabilities: Malawian Manufacturing, 1974-1975

Year	Current Assets				Current Liabilities					
	Total (MK'000)	As % of Total				Total (MK'000)	As % of Total			
		Stocks	Trade debt- ors	Cash	Inter- Co. debts		Suppl'rs' credit	Inter-Co. debts	Advances & O/drafts	
1974	62524.3	65.2	25.9	4.4	4.4	45195.6	45.3	33.7	21.0	
1975	87699.9	66.8	24.8	5.1	3.3	59415.4	40.4	33.5	26.1	
Average		66.0	25.4	4.8	3.8		42.9	33.6	23.5	

Source: NSO, Annual Economic Survey 1974-1975.

Table CH5.7

Composition of Long-term Liabilities: Malawian Manufacturing, 1975

(MK'000)

Industry	Total	Other financial institut'ns	Share capital	Reserves	Provisions	Other
Meat, sugar grain millg. fruit, fish	37841.7	14606.7	9117.5	10466.8	2328.4	1323.3
Bakeries	1276.8	33.8	441.7	440.5	179.5	181.3
Tea	27134.6	1108.4	9772.1	4732.6	2913.3	8608.2
Beverages	9080.4	929.3	3577.1	1517.6	1926.4	1130.0
Tobacco	12618.0	20.6	4810.0	2850.3	1579.3	3357.8
Ginning, spinning blankets	8497.3	3012.1	2527.8	1026.0	1342.8	588.6
Knitting, netting prods.	578.5	18.9	432.5	7.8	7.5	111.8
Clothing	2954.4	25.4	628.6	(147.9)	2145.3	303.0
Leather prods. footwear	1015.2	41.2	686.5	33.7	96.8	157.0
Sawmill & wooden prods.	1676.3	-	-	769.0	-	907.3
Wooden furniture	305.9	5.0	60.0	147.1	35.7	58.1
Paper prods.	1256.5	6.0	460.0	369.0	309.5	112.0
Printing	4809.6	9.9	810.0	677.2	40.4	3272.1
Ind. chems., fertilizers paints etc.	1850.4	70.4	554.0	327.4	557.6	341.0
Drugs & toiletries	5238.0	53.5	2563.5	1663.4	252.3	705.3
Matches & tyre retreading, plastic prods.	1519.3	115.3	658.9	598.7	143.4	3.0
Total	132887.3	23158.7	43333.6	27282.8	16146.8	22965.4

Source: NSO, Annual Economic Survey, 1974-1975.

APPENDIX CH 7A

APPENDIX CH.7A

EXOGENEITY TESTS^I

Assume a linear cross-section model of the form

$$y_i = \alpha_0 + \alpha_1 x_i + \alpha_2 Z_{1i} + u_i \quad i = 1, \dots, N$$

where Z is known to be exogenous. It may not be known with certainty whether x is also exogenous or endogenous and this becomes the object of the test.

In a partial specification of the SCP model such as dealing only with the performance equation, two possibilities of x being endogenous can be distinguished;

- a) x is explained by a set of other variables in the system and which do not include y but could include Z .
- b) the set of explanatory variables for x includes y

Problems of endogeneity in estimating the model only arise when b) applies because the error term is not independent of x . The null hypothesis may be set up as;

Case a) = H_0 ; x is exogenous.

$$y_i = \alpha_0 + \alpha_1 x_i + \alpha_2 Z_{1i} + u_i$$

$$x_i = \beta_0 + \beta_1 y_i + \beta_2 Z_{2i} + \beta_3 Z_{3i} + \varepsilon_i$$

where $\beta_1 = 0$, $E\{u_i \varepsilon_i\} = 0$.

I. Note: These are discussed in Geroski (1982) and Reid (1985).

Case b) = H ; x is not exogenous

$$y_i = \alpha_0 + \alpha_1 x_i + \alpha_2 Z_{1i} + u_i$$

$$x_i = \beta_0 + \beta_1 y_i + \beta_2 Z_{2i} + \beta_3 Z_{3i} + \varepsilon_i$$

where $\beta \neq 0$, $E\{u_i \varepsilon_i\} \neq 0$.

The test of $E\{u, \varepsilon\} = 0$ against the alternative $E\{u, \varepsilon\} \neq 0$, requires looking at the role of y in the equation for x,

$$x_i^* = \beta_0 + \beta_2 Z_{2i} + \beta_3 Z_{3i} + \gamma Z_{1i} + (\beta_1 y_i + \varepsilon_i)$$

where the Z's comprise all the exogenous variables in the system. $(\beta_1 y_i + \varepsilon_i)$ can be seen as a combined error which if found to be random would suggest that systematic effects of y on x are absent or not significant and $\beta_1 = 0$.

Let $v_i = \beta_1 y_i + \varepsilon_i$. Estimates of this can be obtained from the full reduced form for x ie.

$$\hat{v}_i \equiv x_i - \hat{\beta}_0 - \hat{\beta}_2 Z_{2i} - \hat{\beta}_3 Z_{3i} - \hat{\gamma} Z_{1i}$$

Inputting this into the y equation we have a testable hypothesis in the form of the coefficient for \hat{v}_i as in

$$y_i = \alpha_0 + \alpha_1 x_i + \alpha_2 Z_{1i} + \theta \hat{v}_i + \hat{u}_i$$

When x is exogenous $\beta_1 = 0$ and $\hat{v}_i = \hat{\varepsilon}_i$ so that $E(v_i) = 0$ and $\theta = 0$. The last part therefore comprises the test. For tests simultaneously involving more than one variable this would proceed in a conditional manner with the aid of the F-test. That is more than one of the x's are subjected to the test assuming that the rest are taken to be endogenous. A time-saving approach would involve

grouping the variables either according to prior convictions about their exogeneity or according to their relatedness in the model.

The following table gives results of the tests done on individual variables of interest, namely rate of growth of sales (G), the concentration variable (CR3), import intensity (IMPS), and the advertising intensity variable (AS). The corresponding variables with the coefficients to be tested are respectively VG, VCR3, VIMPS, and VAS.

Results of Exogeneity Tests

Dep.Var.=Price-cost margins;No of obs.=64

Method of estimation=Instrumental vars.

C	CR3	KS	G	IMPS	EXPS	MES	DV	AS	Test VAR.

									VG
62.60	-1.51	13.95	0.70	-22.21	-31.32	1.26	0.55	-0.23	-0.60
(1.47)	(1.24)	(0.86)	(0.69)	(0.72)	(2.26)	(1.38)	(1.61)	(1.01)	(0.58)
									VCR3
38.45	-1.06	17.47	1.00	-2.18	-20.30	0.74	0.27	-0.23	0.80
(0.30)	(0.25)	(0.37)	(0.36)	(0.04)	(1.02)	(0.25)	(0.33)	(0.37)	(0.19)
									VIMPS
59.96	-1.53	21.21	0.93	-7.31	-28.19	1.18	0.40	-0.35	-1.53
(0.60)	(0.62)	(0.51)	(0.48)	(0.07)	(0.75)	(0.55)	(0.34)	(0.59)	(0.01)
									VAS
21.56	-0.41	16.96	0.45	12.38	-18.55	0.40	0.04	-0.34	0.37
(0.80)	(0.70)	(1.29)	(0.77)	(0.37)	(1.50)	(0.64)	(0.10)	(1.50)	(1.54)

From the results, only the coefficient for VAS is significant and then only at the 10 percent level. These results suggest that none of the variables G, CR3, and IMPS are likely to be significantly influenced by margins, that is feedback effects from M to any of

these variables are minor. The system of equations comprising these variables may well be regarded as recursive as far as M is concerned. The variable most likely to be affected by the feedback effects from M is AS. It would therefore be desirable to treat AS as endogenous in the M equation.

APPENDIX CH 7B

APPENDIX CH. 7B

POOLING OF CROSS-SECTION AND TIME-SERIES DATA

The general linear model in matrix form can be written as

$$Y = X\beta + \varepsilon$$

where Y is the $NT \times 1$ column vector of the dependent variable, X the $NT \times K$ matrix of K independent variables including the constant term, β the $K \times 1$ column vector of unknown parameters, and ε the $NT \times 1$ column vector of disturbances. In the general case, observations will be over N cross-section units, that is $i = 1, 2, \dots, N$ and T time periods $t = 1, 2, \dots, T$. The generalised least squares (GLS) estimates of β are given by

$$\hat{\beta} = (X' \Omega^{-1} X)^{-1} X' \Omega^{-1} Y$$

Unbiased, consistent and efficient estimates can be obtained from appropriate assumptions about the behaviour of the error term, leading to some error variance-covariance matrix, Ω . Since Ω is usually not known it is necessary to obtain estimates for it. Although in deriving the appropriate estimates, one can be as adventurous as one likes, in practice the limitations are imposed by information and computational requirements. Often too, simpler specifications have similar statistical properties as the more sophisticated ones.

There are therefore a variety of GLS forms based on different restrictions or requirements for the error term. They all eventually involve some type of weighting to adjust the original data. The two types of models used in the chapter are the error components and a cross sectional heteroskedastic and time wise autoregressive

models.

a) Error component models

The error term is specified as comprising three components, u_i associated with the cross-sectional units, v_t with time, and e_{it} the general error term varying over cross-sections and over time. That is

$$\varepsilon_{it} = u_i + v_t + e_{it} \quad (i = 1, 2, \dots, N; \quad t = 1, 2, \dots, T)$$

where u_i , v_t , and e_{it} are all normally distributed with mean zero and variance σ_u^2 , σ_v^2 , and σ_e^2 respectively. The conditions (restrictions) are given as

$$E(u_i v_t) = E(u_i e_{it}) = E(v_t e_{it}) = 0$$

$$E(u_i u_{i'}) = 0 \quad (i \neq i')$$

$$E(v_t v_{t'}) = 0 \quad (t \neq t')$$

$$E(e_{it} e_{it'}) = E(e_{it} e_{i't'}) = E(e_{i't'} e_{it}) = 0 \quad (i \neq i' \quad t \neq t')$$

These conditions imply homoskedasticity. Although the correlation between the disturbances of each cross-section unit over time may be non-zero, that correlation does not change, unlike that for first-order autoregression, which declines geometrically.

Often, the exercise of finding Ω is brought about by the need to account for the differences among cross-section units so that v_t is often ignored for computational simplicity. The matrix for the simplified model is given by

$$\Omega = \begin{bmatrix} \sigma_{\varepsilon}^2 A & 0 & \cdot & \cdot & 0 \\ 0 & \sigma_3^2 A & \cdot & \cdot & 0 \\ \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot & \cdot \\ 0 & 0 & \cdot & \cdot & \sigma_{\varepsilon}^2 A \end{bmatrix}$$

and

$$A = \begin{bmatrix} 1 & v & \cdot & \cdot & \cdot & v \\ v & 1 & \cdot & \cdot & \cdot & v \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ v & v & \cdot & \cdot & \cdot & 1 \end{bmatrix}$$

where $v = \sigma_u^2 / \sigma_{\varepsilon}^2$ or $\sigma_u^2 / (\sigma_u^2 + \sigma_e^2)$, from $\sigma_{\varepsilon}^2 = \sigma_u^2 + \sigma_e^2$.

Ways of estimating and adjusting for Ω based on the error components variances have been discussed by a number of people, including, Balestra and Nerlove(1966), Nerlove(1971), Wallace and Hussain(1969), Maddala(1971) and Swamy(1970).

The Balestra Nerlove-model for instance uses parameters obtained as

$$\hat{\sigma}_{\varepsilon}^2 = \frac{\sum_{i=1}^N \sum_{t=1}^T \varepsilon_{it}^2}{TN}$$

and

$$\hat{V} = \frac{\sum_{i=1}^N \{ [\sum_{t=1}^T \epsilon_{it}]^2 - \sum_{t=1}^T \epsilon_{it}^2 \}}{T \sum_{i=1}^N \sum_{t=1}^T \epsilon_{it}^2}$$

where ϵ_{it} are the error terms obtained from a regression over the whole set of the stacked data (ie. all the time-series observations for one cross-section unit first, followed by those of the next, and so on).

The model that was used on Malawian data is the one due to Swamy and outlined in Judge et al. This model requires two sets of error term estimates. One set, which can be represented by $\hat{\epsilon}_{it}$, is obtained from 'within' estimates, which involve transformations as in

$$(y_{it} - \bar{y}_i) = \sum_{k=2}^K \beta_k (x_{kit} - \bar{x}_{ki.}) + e_{it}$$

where \bar{y}_i and $\bar{x}_{ki.}$ are the respective means of the dependent and independent variables and e_{it} is also in terms of deviations from the means. That is $e_{it} = v_{it} - \frac{\sum_{i=1}^T v_{it}}{T}$

where v_{it} may be seen in terms of T the model

$$y_{it} = \bar{\beta}_1 + \mu_i + \sum_{k=2}^K \beta_k x_{kit} + v_{it} \quad \begin{array}{l} i = 1, 2, \dots, N \\ t = 1, 2, \dots, T \end{array}$$

where $(\bar{\beta}_1 + \mu_i) = \beta_{1i}$ is the intercept of the i th cross-section unit, comprising the mean intercept, $\bar{\beta}_1$ and a disturbance term μ_i (the

difference between β_{1i} and β_1). Estimates of the intercepts can be obtained from $b_{1i} = \bar{y}_i - \sum_{k=2}^K b_k \bar{x}_{ki}$.

The second set of error terms, \hat{u}_i , are obtained in a more straightforward manner from the 'between' estimates,

$$\bar{y}_i = \bar{\beta}_1 + u_i + \sum_{k=2}^K \beta_k \bar{x}_{ki} + \frac{\sum_{t=1}^T v_{it}}{T}$$

which is simply the model for y_{it} above, with all the variables averaged over time.

The final stage is to estimate

$$y_{it} - \alpha \bar{y}_i = (1 - \alpha) \bar{\beta}_1 + \sum_{k=2}^K \beta_k (x_{kit} - \alpha \bar{x}_{ki}) + \varepsilon_{it}$$

where $\alpha = 1 - \frac{\hat{\sigma}_e}{\hat{\sigma}_u}$

The Cross sectionally Heteroskedastic and Time wise Autoregressive Model

This model is described in Kmenta(1977) and is characterised by

$$E(\varepsilon_{it}^2) = \sigma_i^2$$

$$E(\varepsilon_{it} \varepsilon_{i't'}) = 0 \quad (i \neq i')$$

$$\varepsilon_{it} = \rho_i \varepsilon_{i,t-1} + u_{it}$$

These stipulate heteroskedasticity, cross-sectional independence and autoregression respectively. The error terms u_{it} and ε_{it} are normally distributed with zero means and variances σ_{ui}^2 and $\sigma_{ui}^2/(1 - \rho_i^2)$ respectively.

Allowing for ρ to vary from one cross-section unit to another, the matrix Ω is defined as

$$\Omega = \begin{bmatrix} \sigma_1^2 P_1 & 0 & \dots & 0 \\ 0 & \sigma_2^2 P_2 & \dots & 0 \\ \cdot & \cdot & & \cdot \\ \cdot & \cdot & & \cdot \\ \cdot & \cdot & & \cdot \\ 0 & 0 & \dots & \sigma_N^2 P_N \end{bmatrix}$$

where P_i is $T \times T$ and

$$P_i = \begin{bmatrix} 1 & \rho_i & \rho_i^2 & \dots & \rho_i^{T-1} \\ \rho_i & 1 & \rho_i & \dots & \rho_i^{T-2} \\ \cdot & \cdot & \cdot & & \cdot \\ \cdot & \cdot & \cdot & & \cdot \\ \cdot & \cdot & \cdot & & \cdot \\ \rho_i^{T-1} & \rho_i^{T-2} & \rho_i^{T-3} & \dots & 1 \end{bmatrix}$$

Estimation of Ω requires double-transforming the variables. First autoregression is adjusted for by cross-section estimates for ρ ie

$$\hat{\rho}_i = \frac{\sum \varepsilon_{it} \varepsilon_{it-1}}{\sum \varepsilon_{it-1}^2} \quad (t = 2, 3, \dots, T)$$

where ε_{it} are error terms from all $N \times T$ observations. Next, using the transformed variables obtain error terms ε_{it}^* from which the cross-sectional variances can be obtained as (adjusted for degrees of freedom)

$$S_{ui}^2 = \frac{1}{T-k-1} \sum_{t=2}^T \epsilon_{it}^*$$

The standard deviations s_{ui} are used to divide the autoregression-corrected variables to obtain the double-transformed variables yielding estimates that are asymptotically non-autoregressive and homoskedastic. In the final regression $N(T-1)$ pooled observations can be used.

NOTES

1. Simplified descriptions including comparisons with other forms of GLS models can be found in Kmenta(1971) and Judge et al(1981).

2. Transformation for the simple model is illustrated as

$$y_{it}^* = \beta_1 x_{it}^* + \epsilon_{it}^*$$

where

$$y_{it}^* = y_{it} - \hat{\rho}_i y_{it-1}$$

$$x_{it}^* = x_{it} - \hat{\rho}_i x_{it-1}$$

$$\epsilon_{it}^* = \epsilon_{it} - \hat{\rho}_i \epsilon_{it-1}$$

$$t = 2, 3, \dots, T$$

$$i = 1, 2, \dots, N$$

APPENDIX CH 8

4.4. If YES, did you:

4.4.1. - institute an efficiency drive? YES/NO/

4.4.2. - institute an improvement in quality products? YES/NO/

4.4.3. - institute an export drive? YES/NO/

4.4.4. - introduce new products? YES/NO/

4.4.5. - lower the prices of your products or offer higher discounts to wholesalers? YES/NO/

4.4.6. - raise your advertising expenditure by less than 5% YES/NO/ or between 5 and 10%? YES/NO/ or more than 10%? YES/NO/

4.4.7. - take any other action? (please specify) YES/NO/

PRODUCT PROMOTION

5.1 Among the following, which two ways do you rely on most to promote your products? Indicate with a tick (✓)

- a) posters b) magazines c) newspapers
- d) demonstration units e) quantity discounts
- f) radio advertising or programme sponsorship
- g) other (please specify).....

RESEARCH AND DEVELOPMENT

6.1. Apart from quality control, do you engage in major research relating to your present, future or any other products? YES/NO/

DECLARATION

I hereby declare that to the best of my knowledge and belief the information given in this questionnaire is correct.

Signed - - - - - Date - - - - - Telephone No. - - - - -

Name - - - - - Title - - - - -

(BLOCK CAPITALS)

(Director, Accountant, etc).

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