Gray, Michael (1996) *Concentration dynamics and bargaining power: a theory of two-dimensional competition in the agri-food complex.* PhD thesis.

http://theses.gla.ac.uk/5021/

CONCENTRATION DYNAMICS AND BARGAINING POWER: A THEORY OF TWO-DIMENSIONAL COMPETITION IN THE AGRI-FOOD COMPLEX

BY

MICHAEL GRAY BSc

THESIS SUBMITTED FOR THE DEGREE OF Ph.D

FACULTY OF SCIENCE
DEPARTMENT OF AGRICULTURE
UNIVERSITY OF GLASGOW

CONDUCTED AT
SAC AUCHINCRUIVE

AUGUST 1996

ABSTRACT

This thesis attempts to explain vertical market interaction within the food chain from a new perspective. It takes a two-stage game-theoretic framework from industrial organisation literature, and extrapolates this into the area of bargaining relationships. In turn, the inter-sectoral paradigm developed is applied to the specific area of agricultural marketing and the conventional wisdom of cooperatives is challenged. The resulting model allows new insights into such issues as countervailing market power, the dynamics of market structure and competition policy. Although the principles have been developed within the context of the U.K. food chain, they are of wider relevance. The conceptual framework developed underlines that in studying bargaining relationships and market structures the economic concept of equilibrium may be better replaced with a broader game-theoretic understanding of the market process.

Table of Contents

List of Tables

List of Figures

ACKNOWLEDGEMENTS

Chapter 1

INTRODUCTION

1.1 Market Structure and Market Power as a Two-Way Process

In a set of vertically-related industries, such as those that comprise the food chain, the conventional picture of how the relative market structures of two industries affect bargaining relationships is given by the structure-conduct-performance paradigm (Bain, 1959). The basic premise of this approach is that the structure of an industry has an impact upon its performance, through the conduct of the firms within the industry. The idea is easily demonstrated by considering the models of perfect competition and monopoly. In a profit maximising monopoly, with only one firm in the market, the total industry output is lower and prices are higher than in a perfectly competitive market with many firms. Thus, market structure affects industry performance, in terms of resource allocation, through the conduct of the firms within it. However, not all influences flow from market structure to performance. For example, sellers' pricing and output decisions may yield relatively high profits to incumbent firms and so attract the entry of new firms into the market. Thus, conduct has an affect on structure and the direction of causality is not simply one-way.

Within the set of industries which make up the food chain, the structure-conduct-performance paradigm may be used to illustrate how *relative* industrial structures, expressed in terms of comparative concentration and size, might affect the bargaining positions between buyers and sellers and hence the overall performance of the chain. However, once again, not all influences flow from relative market structure to overall performance. There are also important feedback effects. For example, the strategies of the selling industry may affect the level of concentration of the buying industry and so alter the relative market structures. An example of this would be the manner in which the strategy of resale price maintenance (RPM) by food manufacturers retarded price competition in the retail sector. Thus the concentration of the retailing sector and the development of supermarkets in the

U.K. was retarded by the manufacturers' strategy, until laws discouraging RPM were passed (Scherer and Ross, 1990, p.553). Again the direction of causality is not one-way.

The aim of this thesis is to elucidate the manner by which, in the longer run, it is bargaining relationships which fundamentally shape market structures. In the food industries bargaining relationships may be conceptualised as layers of oligopolistic games. As such the hypothesised games have both horizontal and vertical elements. Horizontal competition between the firms in a sector is for market share, while vertical competition between buyers and sellers is for bargaining power. These two-dimensions of competition are clearly linked, because horizontal competition affects market share and so affects the relative size of buyers and sellers. Likewise, the relative degree of consumer patronage affects the bargaining power relationship between buyer and seller, but is also an aspect of horizontal competition between the firms within a sector. The application of game theory might offer new insights about competition between firms and industries and which might be used to understand the structure of the food chain and the marketing of agricultural produce in particular.

The importance of bargaining relationships is not new. Galbraith (1952) first introduced the concept of countervailing market power to explain how relative market structures affect bargaining relationships. However, the idea of countervailing market power means different things to different people, and so needs some clarification. In its basic context the theory of countervailing market power is concerned with the manner in which powerful buyers can force oligopolistic sellers to conform to consumer wants and keep prices close to costs. In order for the final consumers of a good to benefit, it is necessary for there to be an asymmetry between buyers and sellers; the buyer must be powerful enough to countervail upstream oligopoly power, but lack the power as a reseller to charge monopoly prices.

It is countervailing market power in this context which provides a starting point for the description of the evolution of the industrial structure of the food chain. This inter-sectoral force is conceived to be an important element in the shaping of market structures within each sector in the vertically arranged set of industries which constitutes the food sector. Thus, Figure 1 depicts the hypothesised relationship between countervailing market power and market structure. The relationship is not uni-directional. Instead, because industrial structure affects countervailing market power, countervailing market power influences market structure in the longer run. Vertical competition relates to other strategies which affect bargaining relationships, and these are returned to below.

Figure 1: *Market Structure and Market Power as a Two-Way Process*

Retailing   Concentration

                             ↓ ↑

                      Countervailing
                      Market Power
                      (Vertical Competition)

                             ↓ ↑

Manufacturing   Industrial
                            Structure
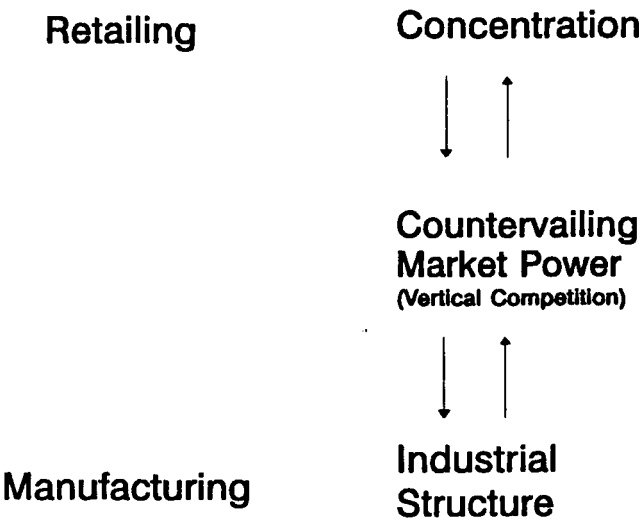
1.2   The Conventional Picture of Agricultural Marketing

Galbraith's (1952) theory of countervailing market power also narrowly applied to the sellers' side of the market. He considered both labour unions and agricultural cooperatives as the manifestation of countervailing market power in

operation on the sellers' side of the market. Thus, symmetry is assumed in the application of countervailing market power to both buyers and sellers. The theory of countervailing market power in this context suggests that powerful sellers can counteract the might of large and powerful buyers. This implies that a concentration of market structure on the sellers' side can force large buyers to pay higher prices than they would if the selling market structure was fragmented. This concept, the theory of countervailing market power transposed to the selling context, has been applied broadly and has in the past guided government policy on agricultural marketing.

However, Galbraith's (1952) application of countervailing market power to the sellers' side of the market has serious limitations. He conceded that the marketing-only[1] cooperative does nothing to enhance the farmers market power because:

> ...it cannot control the production of its members and, in practice, it has less than absolute control over their decision to sell (Galbraith, 1952, p.166).

In Galbraith's analysis, producer marketing cooperatives require government intervention of some form to make them functionable. Thus, in the United Kingdom, the primary producers of food have often been advised as to how best they should market and/or sell their produce. Farmers, however, have not always followed the recommendation of the agricultural experts. The advice usually given to farmers is that they should form cooperatives to increase their bargaining strength. It appears not to matter in this traditional view whether producer cooperatives are vertically integrated into the downstream activities of food processing, or if they are marketing-only cooperatives, i.e. without downstream integration in secondary food processing.

---

[1]The term *marketing-only cooperative* is used to differentiate such marketing cooperatives from vertically integrated cooperatives which extend downstream into food processing activities.

Without downstream integration, the cooperative marketing strategy is based on the idea that concentrated selling structures can gain higher prices from large and powerful buyers. The creation of the Agricultural Marketing Acts of 1931 and 1933 were an important example of the application of countervailing market power to the selling context. Part of the rationale was that producers could exert greater bargaining strength against large buyers when they cooperated to concentrate the market structure of their selling industry. Barker (1989, p.140) cites "...the use of countervailing power to bargain with the initial buyers of their output," as one method by which the Agricultural Marketing Boards can improve returns from a given demand for the commodity. At various times in the U.K. Boards have existed for milk, wool, potatoes, hops, pigs, tomatoes, cucumbers and eggs. Unquestionably, the countervailing power theory has had widespread application to the selling market context in agricultural marketing philosophy in the United Kingdom. As these marketing institutions were backed by Government legislation, they fell within the spectrum defined by Galbraith (1952), where sellers could theoretically counteract the power of strong buyers.

More generally, producers have long been advised to cooperate in the marketing of their produce. Thus, CEAS Consultants (Wye)(1988, p.xiv-xv) state:

> We see little merit in developing farmer cooperatives further in the mature food processing industry in the UK, most especially into the secondary food processing. To be successful and compete internationally such cooperatives would have to behave like limited companies with flexibility in procurement to buy the best quality at the lowest price and to invest in intangibles such as marketing and promotions well as tangibles such as sophisticated plant. It is largely an alien environment for producer cooperatives. Those cooperatives in France and the Netherlands which have entered this arena have done so at the expense of their original objectives. It remains debatable whether or not their producer members have gained an economic advantage from this downstream diversification. What is clear is that these Continental cooperatives involved in food marketing have

become managerially highly autocratic. In practise the farmer members have little influence over the actions of the cooperatives management code. This is a development which most practising cooperatives in the U.K. would fear and resent.

We believe that farmer cooperatives should remain in that domain where they can demonstrate clear member advantage and in which they have a competitive advantage in relation to merchant alternatives. Thus, cooperatives should continue to be predominantly concerned with procurement and primary produce marketing. Value-added activities should be restricted to those activities which improve the efficiency of primary produce marketing, eg, storage, distribution and packhouse activities.

CEAS (1988, p.xiv) also noted:

The U.K. promotion of federalisation was for marketing and not for investment in downstream plant and resources.

Likewise Barker (1989, p.136) stated:

One of the main aims of cooperation, both voluntary and compulsory, is to reduce the inherent weakness of the farmer who operates as an individual in the market, since the influence of the individual on the market is severely limited by the relative smallness of his scale of operations compared to the people with whom he is trading. It has long been held that if farmers act in the market, not as individuals, but co-operate in some way to market their produce in unison, then there will be synergistic returns available because of the increased scale of operation.

Synergy is sometimes known as the '2+2=5' effect, and is said to have taken place when the combined return on the firm's resources is greater than the sum of its parts. When farmers co-operate, there is a pooling of

a variety of resources, including management and marketing competence and know how. It is thought that this pooling will result in an increase in the returns enjoyed by farmers for their output, although the actual extent of the increase is difficult to quantify.

In summary, the traditional view of agricultural cooperation in the U.K. is that it in some way increases the bargaining strength of producers. However, this view encompasses the unquestioned assumption that the theory of countervailing market power can be logically transposed to apply to the sellers' side of the market. In other words the theory suggests that large sellers can counteract the power of large buyers. It is on the basis of this assumption that U.K. farmers have been advised to cooperate.

As stated, the literature on countervailing market power in bilateral oligopolies deals almost exclusively with the impact of buyer concentration on selling oligopolies. Countervailing market power was conceived as the force by which large buyers could constrain the pricing power of oligopolistic sellers. In applying the idea to the agricultural selling context entails the sweeping assumption that the theory applies symmetrically to selling, as it does to buying. However, in terms of the bargaining power exerted by large buyers and large sellers there is limited and conflicting evidence of this type of symmetry in their relationship (Scherer and Ross, 1990, p.529). Large buyers can employ various tactics to break the pricing discipline of oligopolistic sellers. For example buyers may concentrate their orders in large lumps, dangling the temptation before each seller and thereby encouraging a break in the established price structure. Alternatively, large buyers may spread their business over a few suppliers. In this way they can threaten to shift, or actually shift the distribution of orders between the various sellers. Moreover, buyers may fabricate fictitious claims of price concessions from unnamed rivals, encouraging a seller to believe that his rivals are secretly undercutting his price (Scherer and Ross, 1990, p.528-529). These buying tactics, which attempt to lower selling prices, do not require any form of buyer collusion. Rather they break seller coordination. Thus, sellers cannot raise prices by symmetric tactics. They require

coordination to raise prices. The reason for this asymmetry lies, in part, in the balance of supply and demand. When production is unconstrained, it is sellers who require coordination to raise prices. However, when supply is constrained, as in the U.K. market for raw milk, while the buying tactics discussed above may still have some effect, ultimately it becomes the buyers who require coordination to keep prices down.

These buying tactics are most likely to be successful when demand is weak and sellers may have excess capacity which can be utilized profitably if extra business could be won. During a downturn in demand, the balance of power is clearly in the hands of the buyer, and especially the large buyer (Scherer and Ross, 1990, p.529). As agricultural production is subsidised it is typically over supplied. As such agricultural markets are naturally typified as buyers' markets. Whether large sellers can exert an equal and opposite force when demand is strong remains to be proven. Yet the basic logic of agricultural cooperative marketing in the United Kingdom depends upon the existence of this symmetry assumption, namely that countervailing market power is transposable to the sellers' side of the market. The arguments developed in this thesis demonstrate that this transposability of countervailing market power in turn depends on the assumption that producers face oligopsonistic buyers.

What type of tactics and strategies large sellers might employ to gain higher prices still requires further investigation. There is also some evidence to suggest that highly concentrated agricultural marketing structures may depress prices to producers by precipitating collusion between buyers (Gray, 1995); the opposite of the desired effect. This argument is fully developed in Chapter 6.

Galbraith's (1952) theory contains within it the evidence of asymmetry in countervailing market power. It is necessary at this point to distinguish between *countervailing* market power and *original* market power. Galbraith (1952) states that countervailing market power only operates when there is original market power to countervail. He makes this assertion in reference to buyers:

Such an opportunity exists only when their suppliers are enjoying something that can be taken away, i.e., when they are enjoying the fruits of market power from which they can be separated (Galbraith, 1952, p.124).

The critical distinction in the transposition of this idea to agricultural marketing is to determine on which side market power depends on collusion, and thus which side needs to counteract collusion. This thesis develops the argument that the "incentive to collude" can lie on either side of an agricultural market, and that this depends upon specific market circumstances. In turn the implications for effective agricultural marketing structure are argued to depend upon the direction of asymmetry in the market.

Theoretically, when a concentrated food processing industry faces atomistic agricultural producers there is no original market power on the selling side to countervail, yet it is implicit that these strong buyers can force lower prices from an already competitive industry. LaFrance (1979, p.475-476) also noted that buyer concentration is theoretically irrelevant if conditions of perfect competition are assumed in the selling industry.

The reason that market power can operate against agricultural producers is because the sector is not perfectly competitive. The firms have *different* levels of marginal and average costs. This means that the some producers can accept a price that others must reject. Therefore, the price which producers receive affects the rate at which the highest cost producers are forced to leave the industry. Therefore the power of food processors does not counteract original market power, instead it forces the atomistic sector to adjust more quickly, compelling it to become more efficient at a greater rate. Therefore, food processors do not exercise countervailing market power in the manner that food retailers are assumed to.

In this context the theory is turned on its head. The buyers are the possessors of original market power (ie. original buying power), and it is the sellers' task to

develop market power to counteract large buyers. However, as Galbraith (1952) pointed out, the mere concentration of selling structures is insufficient to counteract buying power:

> A strong bargaining position requires the ability to wait - to hold some or all of the product. The cooperative cannot make non-members wait; they are at liberty to sell when they please and, unlike the members, they have the advantage of selling all they please. In practise the co-operative cannot fully control even its own members. They are under constant temptation to break away and sell their full production. This they do, in effect, at the expense of those who stand by the co-operative (Galbraith, 1952, p.166).

In Galbraith's analysis, countervailing market power when applied to sellers requires Government intervention or legislation to make it work. Clearly, there is an asymmetry in the countervailing market power hypothesis between its application to buyers and sellers. Large buyers can countervail the power of oligopolistic sellers, but large agricultural sellers are not sufficient in themselves to countervail the power of large buyers. This is so because in agricultural marketing, large sellers co-exist with a long fringe of individual producers in the market.

Galbraith's theory was written in the context of the United States of America. U.S. agricultural production is geographically dispersed, which raises the transport costs for raw products, and processing firms often operate on a very large scale. As such buyers may be able to perceive their interdependence in the market, which gives rise to the possibility of oligopsony behaviour[2]. Thus, it may be that Galbraith's theory of countervailing market power in agricultural marketing was developed against a backdrop of spatially oligopsonised buyers. Oligopsony may have been prevalent in some sectors of the U.K. food industry, and spatial

---

[2]Azzam (1992) and Koontz, Garcia and Hudson (1993) among others have more recently tested for oligopsony behaviour among buyers in U.S. agricultural markets.

oligopsony may occur in certain markets, but not universally. However, these distinctions appear not to have been made every time the idea of countervailing market power has been discussed.

Thus, through the application of game theory, one of the fundamental tenets of agricultural marketing philosophy has been thrown into question, namely, that the concentration of selling structures counteracts the strength of large and powerful buyers. Moreover, the thesis also presents the theoretical conditions under which countervailing power of agricultural cooperatives may apply. Accordingly the starting point for this research is to outline how the market structure of the various sectors of the food chain have been shaped, not only by intra-sectoral factors, but also by inter-sectoral influences such as the bargaining relations with firms upstream and downstream. A central postulate of the thesis is that the factors which shape industrial structure are not only endogenous to the sector, but stem largely from the bilateral oligopoly bargaining relationships with the sectors upstream and/or downstream. This postulate is explored with reference to the U.K. food retail and manufacturing industries in Chapters 3 and 4 of this thesis.

1.3   Structure of the Food Industries and a Relevant Economic Paradigm

The traditional picture of the marketing channel for the majority of food produce sectors has become outdated. Food marketing channels have changed radically over the last 20 years. At one time seen as a simple tiered structure, the food chain has developed into a complex web of relationships between supermarkets, independent retailers, wholesalers, processors, cooperatives, primary processors, dealers, importers and producers. Therefore a holistic view of the food chain is required in order to gain a picture of the manner in which market structures not only affects intra-sectoral and inter-sectoral relationships, but also develops out of these relationships.

The advantage of an holistic approach is put concisely by Street (1990). In reference to the fruit and vegetable sector Street argues:

In a systems sense, a system which previously showed homeostasis in terms of products and organisation becomes a highly disturbed one with adaptation and feedbacks all along the chain. Reduced institutional support and technical developments are the key to this adaptation; they permit innovation, product development and differentiation. Buyers and users increase control and influence, and formal and informal vertical links follow. The market becomes more dynamic and obsolescence and short life become product development criteria. Those who identify the potential and react appropriately survive largely by the acquisition of the resources and markets of others....

...What is certain and true of all applications of the systems approach (quantitative or qualitative) is that the holistic view assures an improved perception of the system being studied and awareness on the part of the analyst of the relative importance of the issues and relationships involved (Street, 1990, p.196-198).

Thus, to understand the interaction at one level requires an understanding of the relationships and forces at all the other levels in the system. Accordingly the thesis is focused on the food industries as a whole.

1.3.1 The Operation of Bilateral Oligopoly and Countervailing Power

It has already been suggested that the agri-food complex is best represented in terms of bilateral oligopoly and countervailing market power. However, the use of the bilateral oligopoly paradigm requires fuller justification.

Retail Sector

Estimates of food retail sales concentration ratios vary quite widely. This is so because estimates may include or exclude various non-food products. What is certain is that the share of the grocery market accounted for by the multiples has

increased markedly over the last 30 years. Table 1.1 gives sector shares of the grocery market from 1950 to 1987.

Table 1.1: *Sector Shares of Grocery Market 1950-1987, Percent*

Year	Multiples	Independents	Co-operatives
1950	20	58	22
1960	24	56	20
1970	40	43	17
1980	60	22	18
1987	72	19	9

Source:BSO/Nielsen/IGD, in: Revell, B.J. *The Agro-Food Complex in the UK.* Scottish Agricultural Economics Review. Issue No.6. December 1991.

Thus the super-market sector in 1987 accounted for 72 percent of the U.K. grocery market. In 1989, Mintel estimated the four largest companies as Sainsbury, Tesco, Gateway and Asda, with a market share of 11.9, 11.5, 9.0 and 6.1 percent of the total grocery market respectively (Mintel, 1990). This equates to a four-firm *grocery* sales concentration ratio of 38.6 percent. However, in terms of total sales by grocery stores in 1989/90, Sainsbury, Tesco, Argyll, and Asda controlled 16.0, 15.3, 11.0 and 10.5 of the market. This equates to a *total* sales four-firm concentration ratio of 52.3 percent (Revell, 1991).

The perceived interdependence of the sector in their sales markets is evident by observation of their behaviour. For example, during the 1980s strategies involving non-price competition became the norm in the supermarket sector. This strategy shifted competition away from price and into the realm of "store ambience" and "ease of shopping" (Ritchie, 1991). The U.K. retail multiples have enjoyed higher profit rates than retailers in the rest of Europe, and these high profits have funded a rapid expansion in superstore sites. The new entry of foreign firms such as Aldi and Netto, with a low price strategy, have provoked a response from the

incumbent chains who have responded by introducing low price own-labels[3]. Moreover, the fact that new entry occurred might suggest that monopoly profits existed in the sector, as a result of the previous trend away from price competition. Therefore it seems fair to place the retail sector, when they act as sellers, in the category of *oligopoly* models.

However, the concentration of the retail sector is perhaps even higher when retailers act as buyers. In the context of the present theory, it is the economies derived from being large buyers which has driven the retail sector to higher levels of concentration. Indeed, the Monopolies and Mergers Commission in its report "Discounts to Retailers" dealt directly with the buying power of the supermarket chains (M.M.C., 1981), demonstrating the U.K. competition authorities concern about the market power of retailers as buyers.

However, as this buying power does not necessarily imply collusion between buyers, it cannot be represented by the model of oligopsony behaviour. Rather the "incentive to collude" may lie on the sellers side of the market, and so large buyers exercise market power through their ability to affect upstream coordination between firms, without recourse to coordination between themselves. These arguments are developed fully throughout Chapters 3, 4 and 5.

Food Manufacturing Sector

Table 1.2 gives four-firm sales concentration ratios for a variety of U.K. food manufacturers. Only for soft drinks and sugar confectionary sectors are *four*-firm concentration ratios under 50 percent. For milk and milk products the *five*-firm concentration is over 50 percent. Therefore, while fragmented structures may exist in some sectors, it would seem reasonable to reject models of perfect or pure competition as paradigms to describe this stage of the food chain. In the model of

---

[3]Throughout the thesis the term "own-label" refers to *retailers* own brands, also known as "private label" by U.S. authors.

pure competition firms are too small to affect the price, which effectively negates the model's usefulness to this stage of the food chain. When four firms control more than half of the total domestic market it is unreasonable to assume that a firms behaviour does not affect the market price.

Table 1.2: *Four-Firm Sales Concentration*

Industry	C_4 (%)
Salt	~99.5
Sugar	94
Flour	78
Bread	~58
Canned Vegetables	81
Soup	75
Soft Drinks	~48
RTE Cereals	79
Mineral Water	73
Sugar Confectionary	38
Biscuits	62
Pet Foods	83
Baby Foods	80
Beer	59
Milk and Milk Products[a]	54
Fish Processing[a]	69
Organic Oils and Fats[a]	79

Source: Sutton, J. *Sunk Cost and Market Structure.* MIT Press. 1992. p.106.
Figures for market size and market shares are for 1986, or, if that figure was unavailable , for a date as close as possible to 1986.
a. Ref. year 1984. Source:PA1002 Business Statistics Office, in Mackenzie, M., *Competition and the Food Manufacturing Industries* p.47, in Burns, J. and Swinbank, A.(eds) *Competition Policy in the Food Industries* (1988). Figures are *five*-firm concentration ratios.

Models of imperfect competition lie on the spectrum between perfect competition and monopoly, which is the least competitive situation. In the U.K. food

industries, monopolies have existed under the legal framework of the Governments Marketing Schemes. These monopolies are also single buyers and so can also be defined as monopsonies. Upstream the producer sector is highly fragmented, with thousands of small firms, none of which can have an impact upon the market price. Thus the producer sector can be generally regarded to be represented by the model of pure competition.

However, the food manufacturing sector is neither purely competitive or monopolistic. It lies on the spectrum between these two extremes. Evidence from both concentration ratios and Herfindahl indices suggests that the food processing sector is *oligopolistic* with an increasing degree of concentration (McDonald et al, 1989). However, as defined by Scherer and Ross (1990, p.17):

> ...although pure monopoly ends and oligopoly begins when the number of sellers rises from one to two, it is difficult to specify exactly where oligopoly shades into a competitive market structure. The key to the distinction is subjective - whether or not the sellers consider themselves conscious rivals...

To consider themselves conscious rivals firms must believe that their actions will have an impact upon the overall market price or the demand for rivals' products. Therefore they must consider that their actions are likely to cause a reaction from rival companies, and so, they consider their mutual interdependence as an important element in their decision making. It is this perceived mutual interdependence which defines oligopoly, and has led industrial economists towards the use of game theory for the analysis of such situations.

An alternative market model is that of *monopolistic competition*. The assumptions behind this model include differentiated products within a broadly defined product group, atomistic competition, with free entry and exit and uniformity of costs and demands. However, the assumption of *symmetry*, namely that the impact of one firm's decisions are distributed over a large number of rivals, such that the impact

on any one rival is negligible, invalidates the use of this model to the food industries. Concentration ratios are high enough in both the manufacturing and retail sector, both when they act as sellers and as buyers, to ensure that the actions of individual firms will be perceived by rivals. Therefore firms realise their mutual interdependence in many U.K. food sectors and so constitute the definition of *oligopoly*. Indeed the MMC (1981) also note that U.K. food manufacturing tends to be oligopolistic (p.29).

When firms possess some degree of power over price, they can be said to possess *monopoly power* or *market power*. However, a main postulate of this thesis is that market power is a catchall term which can encompass different aspects of a parties bargaining position relative to his trading partner. Thus, in this thesis a clear distinction is made between the elements of strategy and structure within the idea of market power, and the very different effects of these on the dynamics of market structure.

Clearly, when a few powerful buyers face oligopolistic sellers the appropriate economic paradigm for the situation is *bilateral oligopoly*. Collusion between buyers is not necessary within the bilateral oligopoly paradigm. Rather bilateral oligopoly represents the situation where large buyers can restrain the pricing power of upstream oligopolistic sellers through various tactics, without recourse to collusion to constrain demand[4]. As the U.K. multiple retailers constitute large and powerful buyers and certain sectors of food manufacturing may be described by oligopoly, the structure and relationship of both sectors taken together fits the model of bilateral oligopoly. Galbraith's (1952) theory of countervailing market power, and many of the buying tactics discussed above, can be seen to operate in the relationship between the two sectors. Moreover, as the actions of a firm may be perceived by other firms in up- or downstream sectors, this leads towards a more complete understanding of bilateral oligopolistic interaction. This idea is developed further in Chapter 7 of this thesis.

---

[4]See Scherer and Ross (1990, p.528-533) for a discussion of these tactics.

Producer Sector

The relationship between food manufacturers with their upstream suppliers also requires some preliminary consideration. In 1985, of the £10.6 billion worth of raw farm product bought-in by food manufacturers £6.7 billion comes from domestic U.K. producers, with the remaining £3.9 billion imported from abroad. Farmers also sell £1.2 billion worth of produce to wholesalers, and export another £0.7 billion (Slater, 1988). Thus the majority of farm produce flows from UK producers to U.K. manufacturers.

As stated the producer sector itself may be regarded as atomistic, and as such purely competitive. However, in terms of the trading relationship this sector has with its downstream buyers, it is necessary to consider not the structure of food production, but the structure of food marketing. The structure of primary produce marketing varies across sectors and within sectors. Indeed the structure of U.K. agricultural marketing varies across the entire spectrum from atomistic to monopolistic. On the atomistic side of this spectrum are the products sold mostly through auction markets, private agents, dealers and wholesalers. Thus beef, lamb, pigs and many fruit and vegetable products have largely atomistic marketing structures. Nevertheless, cooperatives also exist in these sectors which has the effect of increasing the concentration of the marketing structure. In turn this may change the nature of the relationship with downstream buyers. A main purpose of this work is to understand the effect of concentrated and/or vertically integrated selling structures on the bargaining positions of both parties.

Other sectors already have highly concentrated marketing structures. Some of the commodities which fell under the Governments Marketing Schemes, such as milk and eggs, were sold through monopolies. In particular the market for milk is a special case and has been singled out for particular analysis for three reasons. First, under the Common Agricultural Policy (C.A.P.) the total output of milk is constrained by the quota policy. This constraint on supply affects bargaining positions and marketing structures. Second, the history and operation of the system

of marketing of milk differs greatly from other agricultural sectors. Thus, the Milk Marketing Board system requires separate treatment, not only as regards producer marketing, but also the impacts on the liquid milk and milk product sector. Third raw milk is highly perishable and bulky to transport. As such the sector may offer an opportunity to consider countervailing power under spatial oligopsony. In addition the sector was deregulated in 1994 and so a detailed consideration of the various marketing structures which developed after deregulation was thought valuable.

1.4 Structure of Thesis

Figure 2 depicts the layout of the thesis as a whole. Each chapter is described in brief below.

Figure 2: *Layout of Thesis Structure*
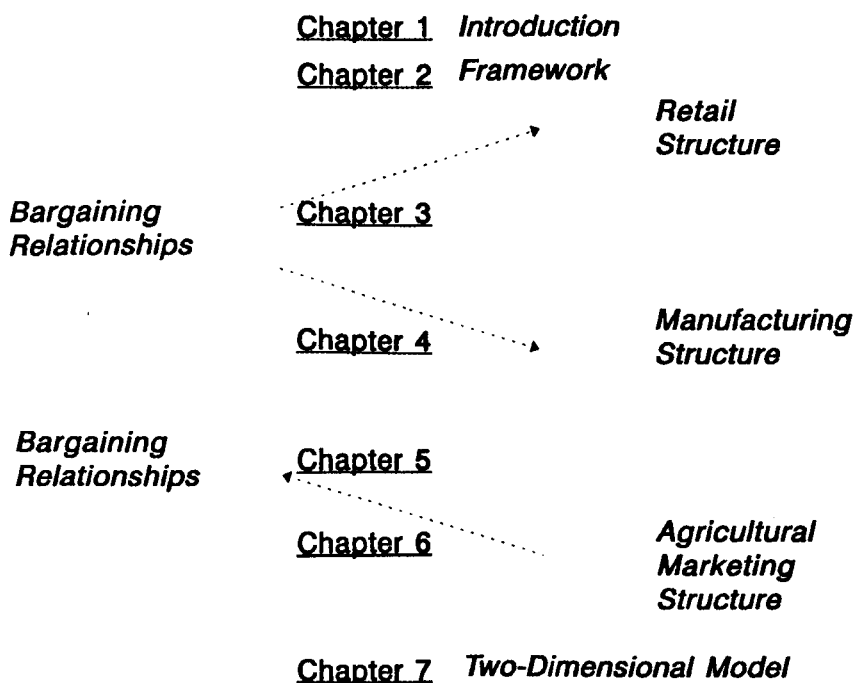
Chapter 2 introduces the conceptual framework based on game theory utilised throughout the analysis and outlines the way it will be used to understand U.K. food industry relationships. Thus, Chapter 2 is divided into two sections. The first section charts the development of game theory in economics from the earliest games of Cournot and Bertrand, through the conjectural variations literature up to the present day models of two-stage supergame competition. In addition price spread models are considered which test for market imperfection without recourse to game theory. This section concludes with the most recent models of two-stage game rivalry. The second section of Chapter 2 discusses the implications of the principles of the various models and their applicability to the U.K. food chain. A few examples demonstrate the usefulness of the two-stage game theoretic approach to examining the complex array of variables affecting equilibrium market structure.

As buying power is seen as the main inter-sectoral force shaping industrial market structure, Chapter 3 looks at the retail sector. The process by which market structure developed is described in terms of the sector's bargaining relationships with suppliers and two-stage games with competitors. The process is not simply one way. Not only have relative market structures affected bargaining positions but equally, in the long run, the effect of this upon bargaining relationships has shaped the market structures.

The banning of Resale Price Maintenance (R.P.M.) in the U.K., became the precursor of a shift of power, through its affect on the retailers' relationships with suppliers. This led to a process of retail concentration through realised buying power economies. The changes in structure in turn led to changes in retail strategy. With high advertising and site acquisition major growth strategies of the multiples, it becomes useful to conceptualize supermarket competition in terms of the two-stage game framework. The shift towards two-stage game competition may have had the effect of further increasing retail concentration. The informational advantages acquired by the very large retailers has meant that power perceptions shifted again with manufacturers having to rely increasingly on retailers for market information. Thus, the thesis considers the degree to which buying power has been

responsible for shaping the retail sector. This idea is investigated through testing the hypothesis that:

H1: Legal differences between the U.S. and the U.K. have given rise to higher levels of retail concentration in the U.K. than in the U.S.

These legal differences relate to laws in the U.S. prohibiting price discrimination between buyers which are absent in the U.K. This leads to the main hypothesis of the chapter that:

H2: The U.K. retail sector entered a process towards higher levels of concentration due to the bargaining advantages of large scale procurement.

Other related issues covered in connection with the hypothesis are the rise of retailer own-label, the lack of upstream vertical integration by U.K. retailers, vertical partnerships and buying alliances. In addition the arguments developed may go some way to explaining the prevalence of non-linear contracts in U.K. food industry relationships.

Chapter 4 continues by considering the factors which have shaped the structure of the food processing industry. The aim is to highlight the inter-sectoral influences on the structure of the U.K. food processing industry and hence build a wider picture of what is meant by "competition" in bilateral oligopolistic markets.

The concept of *sunk cost* is utilised to consider the industrial structure of food manufacturing sectors. Sunk costs represent the irrecoverable costs of entry to a sector. The analysis builds on the theoretical framework of Sutton (1991), such that a distinction is drawn between industries where sunk costs may be treated as exogenous, and those in which sunk costs are endogenous. Sutton treated the level of advertising as a component of sunk cost. As the level of advertising is a result of the game played between the firms within a sector then it follows that the total level of sunk costs incurred upon entry to the sector are endogenous to the game.

In contrast, the sunk costs of entry to a non-advertising intensive sector are purely exogenously given by the set-up cost of one plant of minimum efficient scale (M.E.S.). M.E.S. is defined as the scale at which further increases in plant size and scale would yield cost reductions of no more than 10 percent.

Sutton (1991) treated the "toughness of price competition" as an exogenous factor, in part responsible for the equilibrium level of concentration of a sector. However, in the U.K. both the "toughness of price competition" and the level of advertising of many food products have been affected by the strategies of the increasingly concentrated retail sector. Thus Chapter 4 considers the implications of downstream concentration and strategy on the equilibrium levels of concentration in the various sectors of food manufacturing.

Venturini (1993) and Connor, Rogers and Bhagavan (1994) used the retailer own-label share of a product category as a proxy variable for retailer buying power. These authors postulated that buying power would check increases in seller concentration. However, Mackenzie (1988) regarded merger activity in food manufacturing to be a response to major restructuring by retailers. This contradiction is explained through recourse to the two-stage game theory model of Sutton (1991). If retailer own-label penetration leads to an eventual decline in advertising outlays among manufacturers, it would therefore theoretically lead to a loosening of the restraints on equilibrium market structures and hence may allow for some trend towards fragmentation in the upstream industry.

However, own-label penetration is not an accurate proxy variable for the concept of buying power. As stated earlier market power, and with it buying power, is a catchall term. Within the concept of buying power are all of the factors which affect bargaining positions. These factors include the battle for consumer patronage between retailer and manufacturer which affects the relative bargaining strength. The term "vertical competition" which was coined by Venturini (1993) is used throughout this thesis to denote this aspect of buying power. However the concept of buying power also includes other strategies which large buyers employ in

forcing price concessions from upstream industries. Such strategies include the "lumpiness of orders" strategy (Scherer and Ross, 1990, p.306-308), which can break upstream pricing discipline by the size and infrequency of orders by buyers. This form of buying power, in terms of the Sutton (1991) model, acts as an increase in the exogenous "toughness of price competition" and so should theoretically raise equilibrium concentration in the selling industry. This type of buying power is referred to as countervailing market power throughout the rest of this thesis. This idea is explored through testing the following set of hypotheses:

H3: In sectors where advertising never was important in raising concentration, the increased buying power of the multiples would be expected to lead to increased concentration in the upstream sectors.

H4: In sectors where advertising may have been responsible for raising the lower bound to equilibrium concentration levels, but where supermarket own-label penetration has remained low, increased buying power may dominate and so lead to higher levels of concentration in the upstream sectors.

H5: In sectors where advertising expenditure was high and was significant in raising the lower bound to equilibrium levels of concentration in food manufacturing, and which have subsequently been penetrated by supermarket own-labels leading to a lower advertising spend by the brand manufacturers, market fragmentation in the upstream sectors would be a possibility.

Thus the various sectors of U.K. food manufacturing are categorized as described above, and an analysis made of changes in own-label penetration, advertising and concentration in order to test the theory.

Figure 3: *Bargaining Power and Industry Structure*

Retailing   Concentration

Countervailing   Vertical
Power   Competition

                  Industrial
Manufacturing   Structure
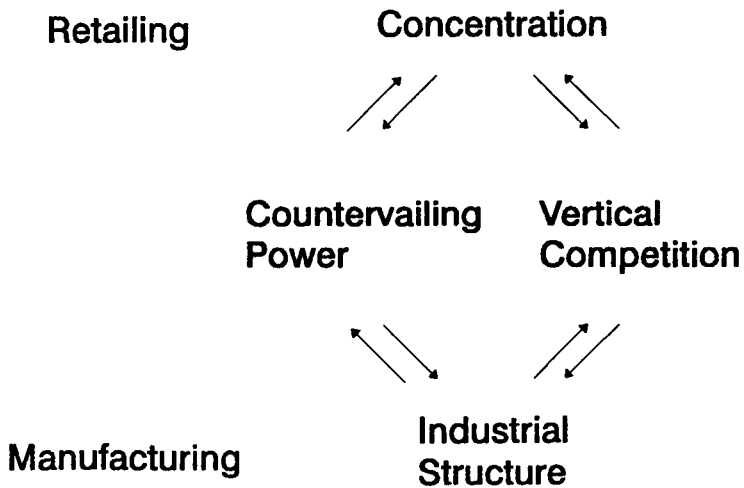
Figure 3 summarizes the manner in which "countervailing market power" and "vertical competition", are perceived to influence market structure both upstream and downstream. Thus "countervailing power" is taken to refer to the *effect of relative firm size* on bargaining, while "vertical competition" refers to the *effect of consumer patronage* on bargaining relationships.

Chapters 3 and 4 consider the manner in which vertical market relationships affect the horizontal relationships between firms and so impact upon the structure of the industry or sector. This view of vertical market interaction and concentration dynamics forms the basis for a consideration of agricultural marketing structures, countervailing market power and vertical competition in Chapter 5.

The approach throws into question the validity of the age-old idea of countervailing market power of marketing-only cooperatives by a comparison with downstream bargaining relationships in the food chain. In short, buying power through large firm size is not symmetric to selling power through increases in firm size. Seller power rests upon coordination between the firms, whereas buying power rests

upon the ability of the large buyer to break the established pricing discipline of coordinated sellers. In the agricultural marketing context, the existence of a large fringe of small producers negates the possibility of coordination across all the producers of a commodity. Therefore the formation of marketing-only cooperatives may not yield a gain in market power relative to the buyers.

However, the agricultural sector may gain in terms of market power by integrating into downstream activities. The strategy also has the potential to make processors more competitive in their input markets where oligopsony behaviour is a possibility. The strategy is also likely to expand the geographic dimensions of the market for the producers output and so diminishes the potential for spatial market power of buyers.

Vertical partnerships are also considered in terms of their effect on upstream market power. One of the main problems of vertical partnerships are the price linkages along the chain. Prices tend to be more sticky downstream, and a possible explanation for this is given in terms of game theory.

The U.K. dairy industry is a special case and requires separate treatment. This is necessary in order to isolate the effects which the quota policy might have on the various forms of trading relationship. Second, the industry must be treated separately due to the fact that the buyers have traditionally acted as a legal cartel in their input markets. Third, the difficulties in marketing such a perishable and bulky product, with a seasonal supply profile mean that the sector deserves separate analysis. Chapter 6 therefore considers various forms of dairy producer marketing organisation in terms of their effects on producer market power. A short historical run-in to the discussion, precedes a description of how the market was distorted under the old regime. This allows an analysis of producer marketing in the post-deregulation environment.

Using game theory the various selling options open to producers are considered. Thus comparisons are made between large marketing-only cooperatives, producer-

owned cooperative processors, direct selling to dairy companies and direct contracting through marketing groups. Again, downstream factors are an important element in analysing structures at the producer marketing level. Therefore the various forms of selling structure are considered in terms of their effects on the game situation of cartelized buyers. However, instead of considering the effects of bargaining relationships on market structure as previously, the focus is turned to considering the effects of various producer marketing structures and strategies on bargaining relationships, in a situation where buyers may be both oligopsonised on a national level and exercise some spatial oligopsony power more locally. This analysis suggests that there are limited situations where countervailing market power can be said to apply through purely horizontal cooperation in agricultural marketing.

Finally Chapter 7 draws the various threads together to give an overall picture of inter-sectoral influence in shaping the market structure of the U.K. food chain. In this way a more complete picture of bilateral oligopolistic interaction is developed. The ideas of vertical competition and countervailing power are considered within the two-stage game framework, so that the idea of market power can be seen to be composed of a variety of elements.

Within the paradigm developed the process of competition is seen to operate both horizontally and vertically so that players must consider their strategic decisions in terms of their impact in both directions. The description emphasises the dynamic nature of the two-stage, two-dimensional paradigm developed. Firm strategies are seen to continually shift between the various possible areas of competition. Finally, possible areas of further research are identified.

Chapter 2

THE CENTRAL THEME AND FRAMEWORK

2.1 Bilateral Oligopoly and Game Theory

This chapter reviews the relevance of game theory to understanding the structure and bargaining relationships in the U.K. food sector. As the thesis uses the concepts behind game theory as a means to understanding the evolving structure and behaviour of the food industries, it is necessary to recount the development of game theory models and their relevance to the analysis of industrial concentration. This chapter aims to elucidate general principles of game theory as applied to industrial economics upon which the thesis is based.

As explained in Chapter 1 buying power may be either seen as countervailing market power, or, may be original buying power against an atomistic industry. Game theory models developed to date have mainly dealt with seller collusion. One aim of the thesis is to use these concepts to aid the understanding of how downstream buyers can shift certain parameters to make upstream collusion more difficult or more feasible for sellers and which selling strategies, if any, are likely to be effective against powerful buyers. Therefore the aim of this chapter is to outline the principles and the relevant ground rules of seller collusion.

Within the food industry it is arguable that in the problems of market imperfection are best addressed from a bilateral perspective where an appreciation of buying power is as important as an awareness of seller power. The importance of buying power in the food industries can be explained by the general over-supply of agricultural commodities in the preceding decades, so buyers often hold the balance of power.

Moreover, as outlined in Chapter 1 trading relationships may be best represented by the model of bilateral oligopoly, where sellers recognise their interdependence but face large and powerful buyers. In this context, game theory conceivably

provides a framework for analysing such relationships. However, up to the present, game theory models have been concerned with largely intra-sectoral relationships. Thus, they deal with describing oligopolistic games between players within one sector or industry. However, the basic principles of game theory can conceivably be extended to considering the impact of vertical market relationships on intra-sectoral games. From this it would be possible to build a wider picture of the factors affecting United Kingdom food industry structure.

Before considering how game theory might be applied it is first necessary to lay down its general principles. Section 2.2 briefly reviews the existing game theoretic framework, running through the development of the theory from the static models of Cournot and Bertrand, to repeated games and the models of imperfect information in repeated games. The section concludes with the most recent models of two-stage rivalry.

2.2 The Game Theoretic Framework

> People of the same trade seldom meet together, even for merriment and diversion, but the conversation ends in a conspiracy against the public, or in some contrivance to raise prices (Adam Smith, 1776, p.128).

Industrial organisation economists have been led increasingly to game theory models to describe the behaviour of concentrated market structures. These models have been invaluable in laying down the variables which affect oligopolistic interaction, and the manner in which they affect the set of possible equilibrium configurations. In addition game theory has been valuable purely as an analytical philosophy. Accordingly, an attempt is made to elucidate some basic principles from the theory of games which will be used to understand behaviour in a bilateral oligopoly situation. The various modern theories of oligopoly behaviour are essentially a set of different games that have been described. These games do not represent competing theories, but rather models relevant in different industries or circumstances.

2.2.1 Quantity versus Price Strategies - The Cournot and Bertrand Models

One of the earliest and most cited attempts to model firm behaviour in oligopoly was published by Augustin Cournot in 1838. In the Cournot oligopoly model, competition is in outputs. Firms decide upon quantities and prices are determined by the interaction of the total quantity on the market with the industry demand curve. The Cournot equation is derived by setting the n equations:

$$\frac{d\pi_i}{dx_i} = P + (\frac{dP}{dX})x_i - MC_i = 0, \tag{1}$$

where x_i is the output of Firm i, π_i is the profit of Firm i and MC_i, the marginal cost, is dC_i/dx_i. $P + (dP/Dx)x_i$ is Firm i's marginal revenue. The Cournot model assumes that each firm believes the other will hold its production fixed. Thus equation (1) describes the first order condition for the existence of a maximum to the profit function. The above expression can be manipulated into

$$P[1 + (\frac{dP}{dX})(\frac{X}{P})(\frac{x_i}{X})]$$
$$= P - (\frac{P}{\epsilon})s_i, \tag{2}$$

where s_i is firm i's market share and ϵ is the market price elasticity of demand. Substituting this expression into equation (1) and rearranging terms obtains

$$\frac{P(X) - MC_i}{P(X)} = \frac{s_i}{\epsilon}, \quad i = 1, \ldots, n. \tag{3}$$

This is the basic Cournot oligopoly pricing formula, relating the firms price-cost margin to its market share (Scherer and Ross, 1990, p.228). The solution Cournot devised for his oligopoly model is an example of the equilibrium defined by Nash (1951). A Nash equilibrium, is defined as the common strategies of each player's best response function. Nash equilibrium is the basic solution concept in game theory. A set of actions is in Nash equilibrium if, given the actions of its rivals,

a firm cannot increase its own profit by choosing an action other than its equilibrium action (Tirole, 1988, p.206). Such games are termed "non-cooperative" because each firm behaves in its own self-interest. In a Nash equilibrium there is no automatic presumption that it is best for all the players in the game, let alone for society as a whole (Dixit and Nalebuff, 1991, p.77).

In practice businesses often choose prices rather than quantities as their strategic variables. Bertrand (1883), was the first to criticize Cournot on these grounds. Hence Bertrand's name has become attached to simple pricing games. Stigler's (1964) famous paper also makes a clear cut case that one must pay attention to pricing strategies.

In the selling market context, Bertrand's firms choose prices as strategic variables. Each firm has an incentive to undercut the other firms' prices in order to capture the entire market. With equally efficient firms and constant marginal costs the only Bertrand equilibrium is for firms to price at marginal cost. This constitutes a Nash equilibrium in prices. To see this, label the Firms 1 and 2 such that:

$$p_1 \leq p_2 \qquad\qquad (4)$$

and consider any potential equilibrium where Firm 1 sets its price above marginal cost. The equilibrium cannot allow Firm 2 to price above Firm 1 as it would loose all of its market share and could earn more by undercutting Firm 1. If Firm 2 were to match Firm 1's price it could still earn more by undercutting Firm 1, capturing all the market.

However, since oligopoly theory is generally pertinent to industries with significant scale economies the constant marginal cost condition of Bertrand equilibria must be considered a serious drawback. Adding even a small fixed cost to the basic Bertrand model of constant marginal costs causes non-existence of equilibrium. For example with increasing returns to scale, "destructive competition" will drive prices down to marginal costs, but this cannot be an equilibrium as prices then fail to cover average costs (Shapiro, 1989).

Even with constant marginal costs, the Bertrand equilibrium entails marginal cost pricing, independent of the number of firms or the elasticity of demand. This extreme prediction is not in accord with the bulk of empirical evidence on oligopoly (Bresnahan, 1989, p.1052)[5].

The Cournot and Bertrand models are clearly very different. This difference is due to the fact that demand is more elastic in the case of price competition. Thus, equilibrium prices are lower in the Bertrand model. In Cournot, each firm realizes that the other is committed to producing its announced quantity. In the Bertrand model each firm recognizes that it can take the entire market from its rival.

A resolution to the debate *vis a vis* whether firms employ pricing strategies or quantity strategies was suggested by Kreps and Scheinkman (1983), though this idea takes us out of the static framework. They propose that capital is a relatively sluggish variable, whereas prices can be adjusted rapidly. Thus, firms first select capacities and then they play a pricing game subject to the capacity constraints inherited from the first period. Such *two-stage games* are considered in more detail later in this section.

2.2.2 Interdependence - Models of Conjectural Variations

Cournot and Bertrand models are however essentially static models in which reactions are impossible. Because the Cournot equilibrium is a Nash equilibrium in outputs, which in turn is a self-enforcing or self-confirming set of actions from which no firm would wish to deviate, the model is essentially static and reactions are impossible.

However, attempts have been made to incorporate reactions into the static model. The kinked demand curve is one such attempt (Sweezy, 1939, Hall and Hitch,

---

[5]See Bresnahan (1989) for an account of empirical work on industries with market power.

1939). The most common method of studying "reactions" in the static, homogenous good model is the use of the concept of *conjectural variation* initiated by Bowley (1924), although the term comes from Frisch (1933).

Conjectural variations models are game theoretic models by nature. The idea of conjectural variations is that firms are interdependent. An adjustment in output by Firm *A* will cause a reaction by Firm *B*. Firm *A* also anticipates that any changes in its outputs (or prices) will be reacted upon by its rivals. Therefore Firm *A* is thinking strategically in terms of the optimal strategies of its rivals, and clearly conjectural variations are an attempt to model a static game.

Conjectural variations are measured on the hypothetical spectrum of -1 to 1. Minus unity refers to the case where rivals exactly offset each others changes in production. This is the perfect competition case where price is at its lowest (equal to marginal cost) so that any increase in production by one firm must be offset by a fall in production elsewhere. When conjectural variations are equal to zero, this is equivalent to Cournot behaviour.

Bowley's model of conjectural variation for two firms states that when Firm 1 seeks to maximise its profit, the appropriate first order condition is:

$$\pi_1^1(p_1,p_2)+\pi_1^2(p_1,p_2)\phi_1'(p_1)=0, \tag{5}$$

where,

$$\phi_1(p_1)=p_2 \tag{6}$$

represents what Firm 1 "thinks the other is likely to do."

In the Bowley example Firms 1 and 2 choose prices p_1 and p_2. The firms are considered to make their price decisions simultaneously. However, the simultaneous solution to the two firms profit maximising reaction functions would not be the outcome of a one-shot game. A series of sequential reactions would be necessary for this equilibrium to be achieved.

In the one-shot simultaneous move posited, it is not possible for p_2 to be a function of p_1, and it would be ridiculous for Firm 1 to think that it was. That would imply that as Firm 1 contemplated prices for itself, it would expect various possible p_2 according to the relation:

$$p_2 = \phi_1(p_1). \tag{7}$$

Hence with simultaneous decision making in a single period model, conjectural variation is not meaningful. Doubtless Bowley intended to capture a dynamic process by means of the conjectural variations terms. If both firms were to think in terms of its best price after mutual price adjustments had ceased, then a simultaneous solution to the firm's profit maximising equations would indeed provide the answer as to its optimal price.

In the general case with N firms, a firm's conjectural variation is defined as the response it conjectures about rival outputs if the initial firm alters its own output. Thus, conjectural variation can be expressed as:

$$\lambda_i \equiv \frac{\partial X_{-i}}{\partial x_i} \tag{8}$$

is Firm i's conjecture about rivals responses, where X_{-i} is the total quantity produced by all firms other than Firm i, and x_i is the quantity produced by Firm i. With this conjecture, Firm i perceives that an increase in its output will affect profits according to:

$$\frac{\partial \pi_i}{\partial x_i} = p(X) - c_i + x_i(1+\lambda_i)p'(X) \tag{9}$$

where c_i is the marginal costs of Firm i. Thus, Firm i is led via profit maximization to the modified reaction curve:

$$\frac{p(X)-c_i}{p(X)} = \frac{s_i(1+\lambda_i)}{\epsilon}, i=1,\ldots,n. \tag{10}$$

where s_i is Firm i's market share and ϵ is the market elasticity of demand at X.

In the Cournot model λ equals zero, which reduces the above equation to the Cournot equation. A large λ captures the belief that other firms will react strongly to any attempt by Firm i to increase its output. Such a game situation leads Firm i to behave less aggressively due to its expectations over rivals' reactions. Thus, the outcome is for lower outputs and higher prices than the Cournot equation. The apparent paradox that the expectation of an aggressive reaction leads to more collusive equilibrium behaviour is also a recurring theme in the supergames models (Shapiro, 1989) discussed below.

Conjectural variations are a useful way to parameterize oligopolistic situations and as such can be useful for comparative static purposes. But the idea behind conjectural variations is logically flawed. They attempt to capture the dynamic phenomenon of response in a static model. Thus, their theoretical definition is at odds with their empirical one. At another level conjectural variations suffer in that they are inherently difficult to measure.

Each oligopolist *ex ante* has some definite conjecture about his rivals attitudes. This conjecture may have been formed on the basis of his past experience (Iwata, 1974). However, as mentioned above the notion of a reaction, in a simultaneous-move, one-period game is meaningless. Even in a multi-period game, strategies and expectations are far more involved than current period output choice, and hence involve more than current period reaction to current changes in the output of rivals (Geroski, 1988).

Thus, it is important to develop models which allow market conduct to vary over time. Collusion, if successful, raises industry profitability and so is likely to attract entry (if it is possible) and so lead to changes in market structure over time. These

changes in turn are liable to affect pricing behaviour. However, as entry is likely
to respond to market opportunities with a lag, and as its effects are likely to be felt
gradually over time, it may be unreasonable to assume that the pricing behaviour
observed in any one period corresponds to a well defined short- or long-run
equilibrium (Geroski, 1988). Thus, whether because of the question of entry, or
the question of model suitability, or, in the present context the question of the
effects of vertically related industries, we are inevitably led to models describing
the *process* of market competition.

2.2.3   The Market Process - Austrian Economics and Game Theory

At this point it is worth noting a clear similarity between game theory and the
Modern Austrian Economics of Kirzner (1992). In the view of Kirzner, the market
process approach is more meaningful and accurate than the equilibrium view of the
market. For "process theorists" the idea of equilibrium is of questionable validity
because it assumes a rapid adjustment of the market to the "underlying variables"
of preferences, resource availabilities and technological possibilities. However, for
Kirzner it is the "induced variables" of prices, quantities and qualities which
continually evolve and are the substance of the "market process". The central
feature of the market process concerns the role in it played by ignorance and
discovery. The root insight is that disequilibrium consists in mutual ignorance on
the part of potential market participants. However, such ignorance cannot persist
indefinitely. Sooner or later unexploited opportunities for mutual gain must come
to be discovered. It is because of the existence of these unexploited opportunities
that the initial situation is described as a state of disequilibrium (Kirzner, 1992,
p.44).

Game theory, like Austrian Economics, can describe the market process in terms
of the induced variables (IVs) of prices, quantities and qualities. Moreover, game
theory admits that these Ivs exhibit a degree of independence from the underlying
variables (UVs) while at the same time admitting that the market process also
exhibits an equilibrating tendency towards aligning the IVs with the UVs. This

equilibrating tendency hinges upon entrepreneurial freedom in overcoming unknowable ignorance through discovery. In turn it is this entrepreneurial market process which is the dominant feature of real world market economies. These links are returned to again below.

Stackelberg's (1934) leader-follower model has been assessed as being an attempt to capture dynamic phenomenon within an essentially static model (Friedman, 1983, p.109-110). We must first assume that Firm 1 is the leader and that Firm 2 is the follower. Firm 2 then maximises its profit by behaving in a Cournot fashion and choosing

$$p_2 = \phi_2(p_1) \tag{11}$$

where $\phi_2(p_1)$ is analogous to the Cournot reaction function. Firm 1 realizes how Firm 2 will behave and can use this information. Thus, Firm 1 maximizes

$$\pi_1^1 + \pi_1^2 \phi_2' = 0. \tag{12}$$

Firm 2, being the follower has a zero conjectural variation. However, Firm 1 is expecting a reaction from Firm 2 and so has a positive conjectural variation.

An interesting question about the Stackelberg model is:- Will a given firm choose to be a leader or a follower? In his model the answer is assumed by the flow of information[6]. Obviously a more dynamic framework is required to elucidate such questions. Friedman (1983, p.110) faults Bowley and Stackelberg on three counts: (a) their models are not actually dynamic, time makes no appearance; (b) the firms are assumed to maximise current period profits, rather than discounted profits over some time horizon; and (c) firms have expectations about how their rivals will behave that need not be correct.

---

[6]An interesting conundrum of some games is that the leader in the game has a better chance of remaining ahead by following the strategy of his second place rival (Dixit, 1991, p.10).

As a result research turned to consider the consistency of conjectures, ie. are firms' expectations about rivals' reactions correct (Kamien and Schwartz, 1981, Bresnahan, 1981, 1982)? A conjectural variation by one firm about the other firm's response is consistent if it is equivalent to the derivative of the other firm's reaction function with respect to the first firm's output at equilibrium. However, this research however remains within the static framework and so still suffers the shortcomings listed under (a) and (b) above. It would appear more valuable to move fully into a dynamic framework.

The action-reaction sequence that is posited by the conjectures' theory is very difficult to interpret in the one-shot games characteristic of static oligopoly theory (Friedman, 1983). Marschak and Selten (1977, 1978) compare single period model equilibria with that of a multi-period model. Their decision-making process in which firms announce provisional prices, and are able to revise their own prices after learning the provisional prices of rivals, actually makes conjectural variations meaningful within a single period model. Prices are only final when, in the process of successively revising announced prices, all firms no longer wish to adjust prices. Thus, conjectural variations capture in a one-period model all of the adjustment processes between the firms' reaction functions until a game equilibrium is reached. In the Marschak and Selten model the adjustment cost is so large that it is impossible to gain enough profit in the interim to cover the adjustment cost. This precludes the possibility that firms make temporary gains after a price change and before rival firms react.

The use of the reaction function in modelling oligopoly behaviour stems from the realization that oligopolists are interdependent. Over time, changes in the behaviour of a firm are likely to induce changes in the behaviour of its rivals. Friedman (1983, p.104) asserts that such interaction must take the form: If *A* does *a*, then *B* will do *b*; but if *B* does *b*, then *A* will do *a'*; but if *A* does *a'*: then *B* will do *b'*, and so forth. When such discussion is carried out within the framework of single-period models it is often logically inconsistent or is based on untenable assumptions:

What we most wish to understand is how firms behave in their own best interests, taking into account rivals reactions, and it seems impossible to do this unless each firm's plan of action (strategy) prescribes what to do in each time period as a function of the recently observed choices of rival firms (Friedman, 1983, p.104).

While much work has been carried out in the static model, writers have been unwilling to limit their discussions to a single period framework. What is absent from the conjectural variations' framework is a process of one firm seeing the choice of another, making a decision in the light of that choice, others seeing that decision and making other decisions in the light of it, and so forth. Even with the assumption of complete information this type of interaction is impossible in conjectural variations models.

Within an imperfectly competitive marketing channel firms might also have to consider reactions of rivals in their input markets as well as in output markets. Koontz, Garcia and Hudson (1993) briefly review the use of conjectural variations in an oligopsony/oligopoly context. The conjectural variation approach measures firm conduct by incorporating the response to other firms' actions into the first order conditions of a profit maximising firm. The basic model makes use of the following marginal revenue/marginal cost specification:

$$r(1-\frac{\theta}{\eta})=p(1+\frac{\phi}{\epsilon})+\frac{\partial C}{\partial Q} \tag{13}$$

where r and p denote the output and input prices of the commodities of interest, η and ϵ are output demand and input supply elasticities, and θ and ϕ are output and input market conjectural elasticities, and dC/dQ denotes other marginal input costs.

A shortcoming of this type of model is that little attention has been given to understanding the optimal pricing strategies in oligopoly/oligopsony behaviour (Koontz et al, 1993). Specifically, no oligopoly/oligopsony model is offered to

show that behaviour along the continuum between pure competition and monopoly/monopsony is optimal. Thus, equation (13) above is not derived from an oligopoly/oligopsony model.

2.2.4 Dynamic Rivalry - Repeated Oligopoly Games

George J. Stigler contributed "A Theory of Oligopoly" in 1964. His view of oligopoly theory in which the problem is for firms to police a tacitly collusive industry configuration is now the norm. Since that time his ideas have been formalized and developed extensively and theories are now concerned with the information available to the players, tacit collusion, defections and punishments as reactions to them.

The success of a tacitly collusive arrangement depends upon the ability to credibly punish those who defect from the scheme. Stronger, swifter, or more certain punishments allow the firms to support a more collusive equilibrium. This equates to a high value of λ in the static framework of conjectural variations in the last section. Thus, anything that makes *competitive* behaviour more feasible or credible actually promotes *collusion*. This is what Shapiro terms as the *topsy-turvy* principle of tacit collusion (1989, p.365). The more potentially competitive the situation the greater the potential punishment from defection and so tacit collusion is less likely to be undermined.

The avenue for reaching beyond static oligopoly theory is to study *stationary environments* in which each firm repeatedly sets its price and output and can respond to such choices by its rivals. Such models are called *repeated games*, and those with infinite repetitions are denoted *supergames*. The game played at each date is called a *stage game*.

Finitely Repeated Oligopoly Games

Shapiro (1989) outlined a two-period oligopoly game in quantities. Each firm's strategy is considered to consist of two parts, its first period output and its second period output conditional on its rivals' first period outputs. Let demand be given by $X)$, and assume the firms have constant and equal marginal costs c. Let firm's overall payoff be:

$$\pi_{i1} + \delta \pi_{i2} \qquad (14)$$

where π_{it} is firm i's payoff during period t and δ captures the relative importance of the second period. Thus δ is a discount factor.

Any equilibrium must involve static Cournot equilibrium in the second period, as this must be optimal in the final round of the game. Call π_i^C Firm i's static Cournot payoff. A range of Nash equilibria arise because of different first period behaviour in different equilibria. Let:

$$\pi(x) \equiv xp(nx) - cx \qquad (15)$$

be a single firm's profits if each of the n oligopolists selects output x. Call:

$$\pi^d(x) \equiv \max_y p(y + (n-1)x)y - cy \qquad (16)$$

the maximal profits that Firm i can earn in a single period while deviating, given that all other firms are producing x. What output levels x can be supported as equilibrium choices during the first period? The best chance of supporting a particular x is to specify that deviations from producing x will be met by as severe a punishment as possible. The most severe punishment is to flood the market in the second period, thereby giving the deviating firm a second period payoff of zero. Facing this threat, a firm will comply with the specified equilibrium strategy of producing x during the initial period if and only if its equilibrium payoff,

$$\pi(x) + \delta \pi^C \qquad (17)$$

is at least as large as its payoff from deviating, i.e. any x for which the inequality:

$$\pi(x) + \delta\pi^C \geq \pi^d(x) \qquad (18)$$

can be supported as the first period output in a symmetric Nash equilibrium. The Nash equilibrium described allows the threat to be brandished against the defector in the second period. The market is flooded in the second period even if the defector produces less than x in the first period (an action that actually helps its rivals) (Shapiro, 1989, p.357-358).

However these Nash equilibria are generally supported by *incredible* threats. It is not credible that one's rival will flood the market in the second period. Once the first period is past it is in no one's interest to flood the market. *Subgame perfection* requires that out-of-equilibrium strategies (threats or promises) be credible. Since the only credible outcome of the second stage of the game is the static Cournot outcome, whatever happened during the first period, any threat to behave differently during the first period is not credible. In this way we have refined the concept of Nash equilibrium to one of subgame perfect equilibrium. Since no credible punishment for defectors is possible, it is not possible to support any first period outcome other than the standard Cournot equilibrium. Thus, there are no linkages between the first and second periods. This result in fact carries over to any finite number of repetitions of the Cournot game. Indeed it applies to finite repetitions of any static oligopoly game (Shapiro, 1989, p.359-360).

Allowing the repetitions of the game to continue indefinitely, or at least the possibility that the game will run indefinitely suddenly permits many perfect equilibria, some of which are very collusive, rather than just repetitions of the static equilibrium. Technically, there is a discontinuity in the equilibrium structure as $T \to \infty$. We also introduce dynamics into the equilibrium behaviour of firms if we allow for some incomplete information. Other changes come into the behaviour of firms if we look for an "ϵ perfect equilibrium", in which no firm can gain more than ϵ by deviating.

In finitely repeated games threats of all sorts are not credible in the final period, and hence are not credible in the penultimate period, and so on. The inability of firms to tacitly collude in a credible fashion rests heavily on the exogenously given terminal date at which rivalry ends. In reality competition continues, or at least firms cannot be sure just when it will end (Shapiro, 1989, p.362).

Infinitely Repeated Oligopoly Games

Infinitely repeated games suffer exactly the opposite problem of finitely repeated games when it comes to developing a useful predictive theory; there is generally a plethora of perfect equilibria. This is especially true where there is no discount factor, or when the discount factor used is close to unity.

In infinitely repeated games there is always the threat of retaliation and punishment in the future. A supergame consists of an infinite number of repetitions of some stage game. Thus, player i's payoff in the game is given by:

$$\pi_i = \sum_{t=0}^{\infty} \delta^t \pi_{it}. \tag{19}$$

Discount factors can also be allowed to vary, both across firms and time, hence the payoffs could be of the form:

$$\pi_i = \sum_{t=0}^{\infty} \delta_{it} \pi_{it}. \tag{20}$$

The history of the game up until date t has no direct effect on the payoffs or the feasible strategies from date t onwards. The game beginning at date t looks the same as it did at all other t. History only matters because firms remember what has happened in the past and condition their current actions on previous behaviour.

Friedman (1971) showed that an oligopolistic supergame with δ close to unity could support a self-enforcing collusive equilibrium. However, a noncooperative equilibrium must also exist which is the threat which maintains the collusive outcome. While firms keep production within their individual quotas the

noncooperative equilibrium is avoided. However if a firm cheats, the defection signals the collapse of a tacitly collusive arrangement, and each firm plays its noncooperative strategy thereafter.

The noncooperative equilibrium is decidedly well inside the profit frontier but because it is an equilibrium it is a believable (credible) threat. Firms do not believe their rivals will retaliate to the extent that they also will make losses. They will however believe that their rivals will retaliate to the point such that their profits are reduced to Cournot levels, which is the static (one-period game) noncooperative equilibrium. This behaviour (or threat) is known as *Cournot reversion* and it is the credibility of the threat which maintains more collusive outcomes.

The usefulness of the supergame theories have however been limited on two counts. Firstly, they generate a dazzling multitude of possible Nash equilibria. The second worrisome feature of the supergame result is that the past has no bearing on the decisions of firms. Learning does not enter the model. Thus, for time to matter imperfect information must enter the model. Since many equilibria can exist, the question becomes: What level of collusive behaviour is sustainable by credible threats and arbitrary values of δ?

Abreu (1986, 1988) has been able to characterize optimal punishment strategies, and hence the most collusive perfect equilibria. In fact, Cournot reversion is only the optimal punishment strategy when δ is close to unity. More sophisticated punishment strategies expand the range of discount factors over which full collusion can be supported.

Abreu first constructs the perfect equilibrium strategies leading to the lowest payoff for player i, for $i=1,...,n$. This equilibrium then becomes the reversionary threat which supports the most collusive outcomes. Also, if a player j does not

participate in the punishment when it is required, the strategies specify that player j will be punished *via* reversion to his least preferred equilibrium[7].

Thus the problem is simplified to one of identifying the n least preferred equilibria, for players $i=1,...,n$. Suppose π_i^* is a candidate tacitly collusive equilibrium profit level and π_i^d is the profit from defection, then the rewards of cooperation are given by:

$$\frac{\pi_i^*}{(1-\delta)} \qquad (21)$$

and this represents an equilibrium if it is greater than:

$$\pi_i^d + \delta w_i \qquad (22)$$
$$\textit{for } i=1,...,n,$$

where w_i is player i's worst perfect equilibrium and δ is the discount factor.

Abreu's strongest results come when he restricts attention to symmetric punishments, in symmetric oligopolistic games. Symmetric punishments specify that all firms act identically. He proves that the optimal punishment has a two-phase structure. Following a defection each firm participates in a "price war" for one period; but immediately after this all firms return to their optimal collusive output levels. Abreu describes this strategy as offering both a stick and a carrot. The carrot makes the stick both credible and as menacing as possible[8].

---

[7]This is reminiscent of the Roman army convention where an attacking soldier who fell back in the front line would be killed by his compatriots as punishment. If the soldier next to him failed to punish (kill) him, then he too was to be killed, for failing to punish. At another level again, the original defecting soldier was allowed to punish (kill) the second and third soldiers next to him for failing to punish, and failing to punish for failing to punish (Axelrod, 1984).

[8]This strategy bears a striking resemblance of the successful tit-for-tat strategy, winner of the famous Repeated Prisoners Dilemma Tournament of Axelrod (1984).

Suppose that the monopoly output is not supportable as an equilibrium. Then the best collusive output, x^*, and the price war output x^p, are defined by the two equations:

$$\pi^d(x^*) - \pi(x^*) = \delta(\pi(x^*) - \pi(x^p))$$
$$\pi^d(x^p) - \pi(x^p) = \delta(\pi(x^*) - \pi(x^p)) \tag{23}$$

where π^d is the profit of defection, π is the profit level at the collusive output and δ is the discount factor. The left-hand side of the first equation shows the benefits of defection, and the right-hand side the cost, namely the lost profits due to the single period price war. Thus the first equation represents the no-defection condition, in this care requiring that each firm be just indifferent between tacitly colluding and defecting. The second equation requires that each firm be willing to go along with the punishment, realizing that failure to do so would simply extend the price war by another period. The left-hand side is the gain from defecting during the price war, while the right-hand side is the loss tomorrow from having a price war rather than collusion at that time.

Thus, optimal punishment strategies are more severe than reversion to Cournot. Unless Cournot supports the monopoly outcome, a more collusive equilibrium can be supported by reversion to the Abreu strategy.

Price Setting Supergames

Bertrand games, being more competitive than quantity setting games, also mean that the punishments are more severe in price setting games. This can make it easier to support collusion in price setting games. This effect, though, must be balanced against the fact that the gains from deviating can be much greater in Bertrand games. Again we have an application of the topsy-turvy principle of supergames.

With homogenous goods and constant marginal costs, Bertrand reversion gives firms zero profits, and therefore must be the optimal punishment. With $\pi^p = 0$ then:

$$\pi_i^d \le \frac{\pi_i^*}{1-\delta} \qquad (24)$$

where the left hand side is the payoff from defection and the right hand side is the payoff from cooperation. In the symmetric case a very small reduction in price captures the entire market. Therefore $\pi_i^d = n\pi_i^*$, where n is the number of firms, and so:

$$n(1-\delta) \le 1. \qquad (25)$$

Thus, the efficacy of tacit collusion depends only on the number of firms and the speed of retaliation. For a discount factor of 0.99, tacit collusion will be supported for any $n < 100$. Without capacity constraints the rewards from defection are greater. Each firm can expand production to supply the entire market. With capacity constraints however the rewards from defection are less, and punishment profits are even lower, so the topsy turvy principle applies again. A higher level of collusion can be maintained (Shapiro, 1989, p.370-371).

Rotemberg and Saloner (1986) introduce random demand shocks to the game. These shocks are assumed to exhibit no serial correlation. The future always looks the same, however current period payoffs depend on the current state of demand. Current profits from cooperating and defecting are denoted by $\pi_i^*(\theta)$ and $\pi_i^d(\theta)$ respectively when demand is θ. In such a case Bertrand reversion (with constant marginal costs) yields zero profits:

$$\pi_i^p = 0. \qquad (26)$$

Defecting gives the payoff:

$$\pi_i^d(\theta). \qquad (27)$$

In contrast, cooperating gives Firm i a payoff of:

$$\pi_i^*(\theta) + \frac{\delta \bar{\pi}_i^*}{(1-\delta)},$$
(28)

where $\bar{\pi}$ is the expected flow of profits from cooperating. The no defection condition becomes:

$$\pi_i^d(\theta) - \pi_i^*(\theta) \leq \frac{\delta}{(1-\delta)} \bar{\pi}_i^*.$$
(29)

The extra gains from defecting must be less than the future gains from cooperating. The gains from defection can also be written as:

$$(n-1)\pi_i^*(\theta).$$
(30)

So substitution yields:

$$(n-1)\pi_i^*(\theta) \leq \frac{\delta}{(1-\delta)} \bar{\pi}_i^*.$$
(31)

The main point is that, for a given price, the left hand side of equation (31), i.e., the gain from defection, increases with θ. Thus, defection becomes more likely in periods of high demand. This implies that tacit collusion becomes more difficult to sustain in buoyant markets. Firms may require to lower their price in boom periods in order to sustain collusion.

This result is, however, at odds with the bulk of empirical evidence. First, Domowitz, Hubbard and Petersen (1986) report a positive sensitivity of price-cost margins to demand conditions, and that this effect is most pronounced in highly concentrated industries. Scherer (1980) also cites evidence that undermines the "price wars during booms" theory. Second, capacity constraint is likely to be more binding during booms, so defection would be pointless. Third, demand shocks are unlikely to exhibit an absence of serial correlation. In business cycles (which may

be better represented by white noise disturbances) future variables would move along with current conditions.

Supergames with Imperfect Monitoring

The existence of trade associations and the like suggest that observations of rivals' behaviour are valuable to oligopolists. Anti-trust law is very suspicious of the exchange of customer specific pricing information among oligopolists. This has led to the development of models where oligopolists cannot perfectly observe, or infer, their rivals actions. This *trigger price approach* is the most direct descendent of Stigler's (1964) theory of oligopoly.

It is assumed that the firm can observe the market price in period t, but not the production levels of its rivals, x_{jt}, $j \neq i$. If the firm was certain of the level of demand it could infer the production of its rivals from the market price, using the identity:

$$X_{-i} \equiv D(p) - x_i \qquad (32)$$

where X_{-i} is the sum production of all firms other than Firm i, $D(p)$ is the total market demand at price p, and x_i is the production of Firm i. However, perfect information is exactly the assumption we are trying to relax. Therefore demand uncertainty must be incorporated. Demand shocks are then confounded with rivals' defections.

Consider the quantity setting supergame with stochastic demand. Assume that demand in period t is of the form:

$$p_t = \theta p(X) \qquad (33)$$

where θ_t is the realization of the demand shock with the expectation that θ is equal to one. When one oligopolist observes a low price in period t, he cannot tell whether the low price is due to low demand or to defection by a rival. In this

situation one possibility is that a firms behaviour is governed by trigger prices (Green and Porter, 1984).

Each firm produces its cooperative output until price falls below the trigger price, $\bar{p}$. Any price observed below this trigger price initiates the punishment phase, which is Cournot reversion for *T-1* periods. After *T* periods they resume cooperative behaviour. The basic question is now reduced to which trigger price to choose. Basically, the trade-off is between a low trigger price which reduces the probability of initiating a price war, but requires longer punishments, or lower collusive profits such that the incentive to defect on the collusive arrangement is reduced (Shapiro, 1989, p.374).

2.2.5 Sunk Costs - Two-Stage Games

The idea of strategic commitment involving sunk costs has been modeled through the use of two-stage games. A large literature has developed of such two-period models, each of which employs the concept of subgame perfection. This requires that the firms correctly anticipate the outcome of the second-period competition as a function of any first period choices that they make. Generally one or more of the firms in the first period has the opportunity to take some action that will have consequences for the state of competition in the second period. Many of the basic ideas can be traced back to Thomas Schelling's (1960) classic, *The Strategy of Conflict*.

A basic example of this type of model is outlined below[9]. First-period decisions are termed as "strategic" and second-period decisions as "tactical". Let Firm 1 have the opportunity to make a strategic investment during the first period. Let the investment be *K* (measured in period two dollars). Assume *K* alters the costs (or demand) faced by Firm 1 in the second period. Then firms play a noncooperative

---

[9]Following that of Shapiro (1989, p.383).

duopoly game in the second period. In such a case Firm 1's second-period profits may be written as:

$$\pi_1(x_1, x_2, K) \tag{34}$$

where x_i is Firm i's second-period action. Firm 1's total profits (in period two dollars) are given by:

$$\pi_1(x_1, x_2, K) - K. \tag{35}$$

The "sunk" nature of the investment, K, is implicit in the specification which does not permit any disinvestment in the second period. Firm 2's profits are given by:

$$\pi_2(x_1, x_2). \tag{36}$$

To find the subgame perfect equilibrium of this game, we must determine the equilibrium in the second period for any possible K, and then "fold back" to determine Firm 1's optimal choice of K. Formally, we can think of K as a shift parameter in Firm 1's profit function, and hence in its reaction function. Note that K does not alter Firm 2's incentives, only the incentives of Firm 1 at a later date.

For any given K, the equations determining x_1 and x_2 are simply $\partial \pi_i / \partial x_i = 0$ for $i = 1, 2$. These two equations define the Nash equilibrium choices in the continuation game as a function of K, $x_i^*(K)$. The equilibrium second-period profits are therefore given by:

$$\pi_i^* \equiv \pi_i(x_1^*(K), x_2^*(K), K). \tag{37}$$

Acting strategically, Firm 1 sets K to maximise $\pi_1^*(K) - K$. Differentiating this with respect to K using the definition of $\pi_1^*(K)$ gives:

$$\frac{\partial \pi_1(x_1^*, x_2^*, K)}{\partial x_1} \frac{dx_1^*}{dK} + \frac{\partial \pi_1(x_1^*, x_2^*, K)}{\partial x_2} \frac{dx_2^*}{dK} + \frac{\partial \pi_1(x_1^*, x_2^*, K)}{\partial K} - 1 = 0. \tag{38}$$

The first term here is zero by the definition of x_1^*, so we have:

$$\frac{\partial \pi_1(x_1^*,x_2^*,K)}{\partial x_2} \frac{dx_2^*}{dK} + \frac{\partial \pi_i(x_1^*,x_2^*,k)}{\partial K} = 1.$$ (39)

The first two terms on the left-hand side of equation (39) measure Firm 1's marginal benefits from increased investment. The second of these terms is the direct effect on Firm 1's profits. Thus, the first term captures the strategic incentive to invest. In the case of Cournot competition, $\partial \pi_1 / \partial x_2$ reveals how much Firm 1's profits vary with Firm 2's output, and dx_2^*/dK measures the effect of Firm 1's investment on Firm 2's output.

Since K does not alter Firm 2's profit function, it does not directly alter Firm 2's output. K only indirectly affects Firm 2's output through its effect on Firm 1's output, x_1. However, direct effects on Firm 2's demand can be incorporated by an extra term in the formulas. In this model Firm 1 alters its own incentives in the second period, and thereby manipulates Firm 2's behaviour.

In terms of Cournot's reaction curves, the investment, K, shifts Firm 1's reaction curve outward. This in turn causes Firm 2 to contract, to Firm 1's benefit. The conclusion of the model is that, in a homogenous-product Cournot oligopoly, a firm has a strategic incentive to invest in capital as a way of increasing its market share and profits.

With competition expressed in terms of quantities of outputs, investment by Firm 1 causes it to behave more aggressively, and this in turn induces Firm 2 to behave less aggressively. Thus strategic over-investment is the result. In the case of Bertrand pricing competition, investment by Firm 1 leads it to behave more aggressively, but, in response to Firm 1's lower price, Firm 2 behaves more

aggressively, not less, since it lowers its own price[10]. Thus pricing competition leads to strategic under-investment (Shapiro, 1989, p.386).

There are many examples of two-period models. The Stackelberg (1934) leadership model is perhaps the most veteran. It demonstrates the *first mover advantage* of being the leader. The difference between the Stackelberg and Cournot (subgame perfect Nash) equilibria is solely one of the timing of moves, but the importance of timing is one of the main lessons from this whole class of games. The most common criticism of this class of games is the exogenous specification of who is the leader and who is the follower.

Another example is the *strategic investment* model, developed by Spence (1977) and Dixit (1980), to study entry deterrence. As seen above strategic investment need not lead to over-investment. Strategic investment may also lead to under-investment, committing the firm to remain small and thereby evoking a less aggressive response on the part of its rival[11].

2.3   Applications of Game Theory to Understanding the Structure of the Food Chain

This brief review of the game theory literature forms a useful platform from which to embark on a holistic picture of the development of market structures in the food chain. In this section the focus turns to consider the value and applicability of the various models. Here the concern is with the implications for bargaining relationships and equilibrium market structures. The search is not for the ideal

---

[10]This is so because Bertrand reaction function are upward sloping. Strategic investment lifts Firm 1's reaction curve, thereby causing both firms prices to fall.

[11]Other uses of similar two period models include, learning-by-doing, cost-reducing R&D, network competition, patent licensing, advertising, information exchange, mergers, product selection, financial structure, labour contracts and managerial incentives, long-term contracts with customers, investing in disinformation, consumer switching costs, multi-market oligopoly and international oligopoly (Shapiro, 1989, p.389-397).

estimating equation, but rather for a general theory on which it will be possible to expand in order to explain to what extent inter-sectoral bargaining relationships may be responsible for shaping market structures in the food chain.

2.3.1 Conjectural Variations

While conjectural variations may be useful in identifying pockets of market power they are plainly too oversimplified for the purpose required. In the words of Shapiro, conjectural variations at this time remain an ad hoc short cut to the study of oligopolistic interactions (1989, p.355)[12]. Thus, in the one-shot game of conjectural variations it is difficult to derive a lot about the dynamics of how firms in an industry interact. To derive how vertically related industries interact, and to elaborate how this interaction might depend upon the level of competition and other strategic variables of the upstream and downstream stages of a marketing chain, will require a more complex model.

Moreover, conjectural variations research does not address the question of spatial competition in regional markets, which may be an important factor in the degree of tacit collusion in agricultural markets. In the words of Scherer and Ross (1990):

> .. much more needs to be done to perfect statistical techniques and locate usable data. Until then, industry-specific statistical studies can do little more than confirm the lessons of careful descriptive case studies (Scherer and Ross, 1990, p.446).

2.3.2 Supergame Theory

The supergames models discussed above have been useful in defining many of the basic axioms affecting cartel stability. One such example of this is that low values

---

[12]Shapiro also notes that conjectural variations are inherently difficult, if not impossible, to measure (1989, p.354, footnote 45).

of δ, the discount factor, inhibit tacit collusion. By increasing the value of present profits relative to future profits increases the incentive to cheat in the present, and makes future punishments less prohibitive. A second important point is that if each player can rapidly and surely observe rival defections the scope for tacit collusion is great. Thus, policies designed to make secret price cuts possible help to undermine tacit collusion. Sometimes industry practises occur that inhibit secret price cutting and these should be the subject of antitrust scrutiny. More importantly, the structure and strategies of the buyers of an industries output are likely to affect the accuracy and timing of information to sellers. Likewise the structure and strategies of a selling industry will affect the information structure between potentially collusive buyers. Thus it is possible to begin to see the relevance of such basic tenets of game theory to the task in hand.

Green and Porter (1984) formalized the notion of tacit collusion with imperfect price information. Some characteristics of the equilibrium defined are: (a) there are no defections in equilibrium, but price wars occur during periods of weak demand, as they must carry out the specified punishments in order to maintain the tacit collusion; (b) there are alternating phases of collusive and Cournot behaviour; (c) the collusive phases have random lengths; and (d) there is the single punishment of Cournot reversion for *T-1* periods for all crimes.

In games with perfect information, increasing the frequency of moves and observations, helps to support collusion. This is equivalent to an increase in δ, the discount factor. With imperfect monitoring increasing the frequency of moves, and imperfect observations, as modeled by an increase in δ, also helps to support collusion.

However, Abreu, Milgrom and Pearce (AMP, 1991) disentangle the timing of moves and the arrival of information in games with imperfect monitoring. Their main result is that *reducing* the frequency of moves may make collusion more effective. The AMP (1991) work is most useful in illuminating the distinction between the (1) reducing the interest rate, (2) shortening the period over which

actions are held fixed and, (3) shortening the lag with which accumulated information is reported. Although the speedy arrival of information about rival actions does increase the efficacy of collusion, it is not in general true that collusion is supported by an increase in the frequency with which firms can make moves.

The AMP (1991) result is at odds with the general observation that significant price concessions may be obtained by large buyers from an upstream oligopoly. Large buyers, by concentrating their orders into big lumps can encourage a break from the established price structure in an upstream oligopoly (Scherer and Ross, 1990, p.528). Clearly the "lumpiness of orders" reduces the frequency of moves in the upstream industry. In games with perfect monitoring this would be expected to increase the scope for defection. With imperfect monitoring however, the AMP (1991) result states that *shortening*, rather than lengthening, the period over which actions are held fixed actually increases the probability of defection when the interest rate is small.

Of course the applicability of this result to the food industries depends upon whether we assume information is perfect or imperfect. For the dairy industry, information could be argued to have been perfect or near perfect. This is so due to the information sharing arrangement known as the (Common Approach to Financial Information) CATFI[13] and the quota policy, which means that an expansion of milk supply by one firm is very unlikely to go undetected by rivals. For other sectors of the agri-food complex however it is likely that information is imperfect. Buying prices and quantities of large supermarkets are likely to be imperfectly monitored by rivals, however, there appears to be close correlation between many retail selling prices.

The empirical evidence on price concessions won by large buyers is too convincing to be ignored (see Table 3.6, p.105). Therefore, AMP's (1991) rather unexpected

---

[13]Discussed fully in Chapter 5.

result may be applicable only over some range of interest rates and move frequencies which is not relevant to the food industry situation and so invalidates the usefulness of the result for the purpose of the current analysis. Therefore, for the purpose of the current analysis, the "lumpiness of orders" strategy of large buyers is regarded as being responsible for *increased* price competition between firms in upstream industries.

In this way it is possible to envisage the linkages between stages in the marketing chain by the effects of the strategies of buyers (or suppliers) on the game within a sector. In the case of the dairy industry it is argued that the situation is somewhat up-side-down due to the quota policy. Here buyer collusion is a possibility, and so optimal strategies for sellers must think in terms of their effects on the possibilities for collusion between downstream customers.

2.3.3 Two-Stage Games

The family of two period games models neatly encapsulate many forms of competition in the food sector. For example the *strategic investment* two period game is a relevant model in the food industries context. The retail sector in particular has recently undergone a spate of expansionism which could be considered strategic. Indeed supermarkets have come under criticism for their expansionism and have been held in check by planning regulations and green belt policy (Financial Times, 22 July 1986). Placement of a large superstore in a certain area is likely not only to replace many small independent retailers, but also to pre-empt investment by another supermarket chain. The first-period investment is thus likely to affect the way the competitive game is played in subsequent periods.

A natural way to deal with *product selection* is to treat it as a first-period choice, followed by second-period competition. The model exemplifies the idea that oligopolists will choose products which are not too close as substitutes, in order

to diminish second-period pricing or output competition[14]. Brand proliferation, where a firm enjoying a first mover advantage fills as many market niches as possible to pre-empt new entrants, is also a facet of this type of two-stage game. The breakfast cereal industry can be conceptualised in this way (Sutton, 1992, p228-232). Price leadership has also been a factor facilitating coordination in this area (Scherer and Ross, 1990, p256-258). Competition from own brand cereals has done very little to reduce prices in this area. The product selection model may also apply more generally to retailing. Different supermarket chains differentiate themselves by differences in their product range, other services offered and in-store environment. Clearly the discount sector employs different strategies from the market leaders.

Long term contracts with customers often allow the firm a strategic edge in subsequent periods. This may be the most relevant of the two-stage models to the food industries. Again it appears more instructive to conceive the relationships in terms of buying rather than selling. Large retailers have clear knowledge of the new products they require. This information is passed on to manufacturers and close contact is maintained to develop the new product. Clearly the timing of pricing the product is crucial. It will be in the supermarkets interests to decide the price sooner rather than later. Once the product has been developed the manufacturer will have incurred sunk investment costs. However, the supermarket will have divulged the idea and the necessary information which will now be held by the manufacturer. Post development the manufacturer may then wish to use his selling power by offering the product to other supermarkets. However, the supermarket would not have entered into development with the manufacturer if this was a possibility. Therefore, both the retailers selling and buying price are negotiated beforehand, and some method of tying the parties together must be implicit, to prevent the manufacturer from attempting to renegotiate after the R&D

---

[14]For analyses along these lines see Prescott and Visscher (1977), Shaked and Sutton (1982), and Brander and Eaton (1984).

has been carried out. This may be the reason for the appearance of so called non-linear contracts. This idea is further developed in Chapter 3.

The sourcing of milk by dairy companies is also done by long-term buying arrangement. The detailed negotiation of buying contracts with farmers affects the later competition. Among the important parameters to the two-stage game between company and farmer are the length of contract, leaving arrangements, haulage arrangements, quality and compositional payments, and the seasonal pricing formula, all of which may be treated as Stage 1 variables which will affect competition in subsequent stages. These factors are only the ones relevant to the two-stage game format. Many other factors affect the degree of competition in the market for milk. For example many relevant parameters are decided between Europe and GATT, between the British government and Europe, between the dairy industry and the British government, and finally between dairy companies themselves and between dairy companies and farmers.

If buyers must bear a *cost when switching* from one supplier to find another supplier, the first-period sales have a lasting effect on competition. Therefore, in the example of the supermarket/manufacturer relationship, the supplier has an incentive to act aggressively in the first period in order to secure the supplying contract. During the subsequent periods, the supplier may act less aggressively with a base of locked-in first period customers, because the firms incentives to lower its prices are reduced (assuming that it cannot price discriminate (Shapiro, 1989, p.395).

Two-stage advertising models have many parallels in the food manufacturing industries and the retail sector. Put loosely, firms advertise in the first period, which in turn affects the rivalry in the second period. While this can lead to a competitive escalation in advertising levels, underinvestment in advertising can also lead to strategic advantage in the second period. This would appear to be a part of the game plan of the rapidly expanding discount supermarket sector. The very low prices in this sector indicate by how much the incumbent supermarket leaders

have managed to shift away from price competition. More significantly, advertising is used by both food manufacturers and food retailers as an investment strategy and so the two-stage advertising model offers an opportunity to explore game theory of vertical competition.

Sutton (1991) recognized the importance of advertising as a sunk cost in explaining food industry structure. Sutton's (1991) model makes an important distinction between those industries in which advertising and R&D outlays play a significant role, and those in which advertising is of little importance. Importantly, the negative relationship between market size and concentration breaks down in the advertising intensive industries. As advertising is a choice variable for firms, its level is treated an *endogenous sunk cost*. This endogenous sunk cost delineates a lower bound to the equilibrium level of concentration no matter how large the market becomes. This is so because as the market expands so does the advertising outlays of the incumbent firms. Hence the endogenous sunk cost of entry rises with increases in the size of the market, and so concentration is prevented from falling. This insight is profound and with it spawns a plethora of new ideas regarding the effects on structure and bargaining relationships within the food chain as a whole. Thus Sutton's theoretical framework is of central importance to the thesis presented here.

In Sutton's *exogenous* sunk cost model advertising plays an insignificant role. For exogenous sunk cost model at Stage 1 of the game firms incur fixed outlays, which are associated with acquiring a single plant of minimum efficient scale (M.E.S.)(setup costs), and developing and establishing a product line (possibly incurring advertising and R&D outlays). These Stage 1 sunk costs then held fixed in analysing price competition at Stage 2 of the game. The process of industry fragmentation as market size increases is explained as in the traditional literature. For any given level of concentration in the industry, any increase in the size of the market will tend to raise profits and so induce further entry. Concentration is then given as fixed in the Stage 2 subgame. The Bain hypothesis that collusive conduct, and hence unit margins, declines as concentration falls, is embodied in the Stage

2 subgame in the form of a *function* linking concentration to prices or unit margins. This *function* will be affected by the degree of product homogeneity in the market and the climate of competition policy. These factors, Sutton terms as affecting the *toughness of price competition*. Thus the term refers to these other factors which affect margins and not to the level of prices or margins at equilibrium (1991, p.9).

Thus, an important implication of Sutton's (1991) theory is that the equilibrium level of concentration is argued to depend inter alia on the *toughness of price competition* in the market. It is possible to see this be considering the definition of M.E.S. and the importance of scale economies. M.E.S. is defined as the scale at which further cost savings of no more than 10 percent would be achieved with further increases in the scale of operation. However clearly the importance of these further cost savings depend upon the intensity of price competition in the marketplace.

Thus, if institutional factors cause price competition to become less tough, as in the case in dairy industry where companies were guaranteed a margin under CATFI, then the *equilibrium* level of concentration will be correspondingly lower. Thus, in terms of the theory, the increase in concentration observed in the dairy industry when the Milk Marketing Scheme was removed in November 1994 was predictable. The theory would predict that as the toughness of price competition increased due to the removal of institutional factors, the configuration of firms will no longer constitute a Nash equilibrium. Therefore, some process of merger and consolidation occurred, up until the point that a Nash equilibrium was restored in which margins recovered to an acceptable level. Chapter 6 is devoted to consider the special case of the dairy industry in the light of the theory.

A second implication of the theory is the two-fold manner in which changes in concentration downstream might affect the two-stage game played by the food processing industries. The rise of the retail chains, and the trend towards pan-european buying alliances doubtless increase the price pressure on food

manufacturers. Thus, by increasing the toughness of price competition, concentration in the food manufacturing industries might be expected to increase due to the increased buying power of the multiples. This effect should operate across both the exogenous sunk cost (non-advertising intensive) and the endogenous sunk cost (advertising intensive) food industries.

However, the shift towards own-label by supermarkets may remove some of the demand shift effects of advertising by food manufacturers. Thus the benefits of large Stage 1 outlays on advertising are likely to be affected as a result of the strategies of downstream buyers. Secondly, small firms or new entrants may be able to supply own-label products without large outlays on advertising in Stage 1. Thus, the shift towards own-label might be expected to reduce the lower bound to equilibrium levels of concentration in certain advertising intensive food industries where own-label has become a significantly large segment of the market. Alternatively, a dual market structure might develop, with large advertising intensive brand manufacturers coexisting alongside smaller own-label manufacturers. This type of development, however, is not likely to show up well in concentration ratio data, which only reveals the market share of the five largest companies. As such, a case study approach was thought more appropriate than an empirical approach using data on concentration ratios. Such shifts in strategies between vertical stages in the marketing chain, which are likely to affect equilibrium levels of concentration, form an integral part of the thesis which follows.

2.4   Conclusions

This chapter forms the theoretical basis for an holistic inter-sectoral account of the development of market structures in the food industries. A few simple examples serve to demonstrate the usefulness of the game theoretic approach to examining the complex array of variables affecting equilibrium market structure. The thesis which follows examines in detail many of the facets of vertical market relationships which may affect market structure. The general framework follows

the path of logic which has been set in chain above. Hence, Chapter 3 considers the market structure of the U.K. food retail sector in terms of its relationships with the upstream food manufacturing sector.

Chapter 3

BILATERAL OLIGOPOLY AND CONCENTRATION
THE RETAIL SECTOR

3.1 Introduction

As indicated in Chapter 1 the analysis of the determinants of market structure in the food chain begins with a study of the concentration dynamics of the U.K. food retail sector. The process by which market structures have developed is described in terms of the sectors bargaining relationships with suppliers and two-stage games between competitors. The process is not simply one way. Not only do the relative market structures of vertically related sectors affect their relative bargaining positions, but in addition the effects of long-run bargaining positions shape their relative market structures. The discussion is divided into two sections. Section **3.2** examines the factors precipitating retail concentration within the bargaining power/two-stage game framework. Section **3.3** then goes on to consider other changes in the relationship between retailers and their suppliers which can be explained by game theory.

3.2 The Process of Retail Concentration

A useful point at which to begin is by analysing how the a change in the legal framework in the U.K. precipitated the development of powerful buyers. The resulting concentration led to the development of other strategic shifts by the sector, further enhancing its power relative to the manufacturers. These strategic shifts have facilitated yet higher levels of concentration, and so the cyclical process continues. In this respect, a useful analytical framework has been provided by Davies (1993), who presents a checklist of factors which influence the balance of power between retailers and manufacturers (Table 3.1). It is valuable to see how many of these interrelated factors have contributed to the sequence of events in the

development of the U.K. food chain. Overall this process has been one in which a fairly steady shift of power towards retailers has occurred.

Table 3.1: *A checklist for the potential of manufacturer power*

Legal structure ●Is there effective legislation against discriminatory discounting that would ensure no manufacturer can use discounting to ensure a retailers patronage? ●Is there effective legislation supporting RPM so that retailers do not compete overly on price?
Market structure ●Is retailer concentration higher or lower than manufacturer concentration (in the product sector)? ●Is retailer buying centralised in the major retail business? ●If manufacturer and retailer concentration levels are high is it necessary to use any existing wholesalers?
The product sold ●Is the product unique and widely purchased? ●If not does the product qualify as a brand using the four tests of branding; differentiation; premium price; separate existence; psychic value? ●If not can the product be branded at least as successfully as any existing brands? ●Are there enough shoppers loyal to the product/brand to the point where the retailer would lose significant patronage if the product were not stocked?
Capacity and investment structure ●Is there pressure to maintain and expand sales volume because of excess production capacity? ●Is there spare capacity among competitors selling similar products or is there a shortage of capacity?
Power perception ●Can either retailer or manufacturer rely on coercion, particularly the threat not to supply or not to stock, to ensure compliance? ●Is there a formal or informal agreement with the retailer over stocking and display that ensures retailer compliance? ●Does the retailers image benefit from stocking the product or from its association with the supplier? ●Does the retailer rely on the manufacturers expertise? ●What rewards does the retailer receive for compliance and are these bigger than those available from competitors?

Source: Davies (1993) *Trade Marketing Strategy*, p.57.

Davies' checklist (Table 3.1) identifies the factors which influence the potential for manufacturer power. Here these factors are turned around to look at the manner in which manufacturers' power has diminished with the rise of large retail chains. The analysis is structured so that the process can be seen as a logical and inevitable sequence of events.

The first event in the power shift towards the retailers was the outlawing of resale price maintenance (R.P.M.) without the introduction of legislation against discriminatory discounting. This legal context became the precursor of a shift of power, through its effect on the bilateral oligopoly relationship with suppliers, which led to a process of retail concentration due to realised buying power economies. The changes in market structure in turn led to changes in retail strategy. These shifts in strategy shifted branding, advertising and consumer patronage towards retailers. With high advertising and site acquisition constituting major growth strategies, the supermarkets adopted what might essentially be termed a two-stage game. In turn the shift towards two-stage game competition between supermarkets may have had the effect of further increasing retail concentration. Finally the informational advantages acquired by the very large retailers meant that power perceptions shifted again, with manufacturers having to rely more on retailers for market knowledge.

Each of these developments may be seen in terms of game theory and oligopoly behaviour, either applying to the effect of large buyers in a bilateral oligopoly relationship, or to the strategies of large players when they act in the market as sellers. The rest of section 3.2 considers the process outlined briefly above in more detail.

3.2.1   The Influence of Legal Structures on Retail Concentration

In 1964 Resale Price Maintenance (R.P.M.) was made illegal in the UK under the Resale Prices Act. It adopted a *prima facie* presumption that vertical price fixing was illegal, to be relaxed only if the producer could prove before the Restrictive Practises Court that the benefits of resale price maintenance outweighed the detriments. But why was R.P.M. ever adopted?

There are several arguments as to why R.P.M. was adopted. One centres on the retailer collusion theory. Certainly the retail lobby was keen to protect R.P.M. in the U.S.. However studies of numerous R.P.M. cases have found that only a small minority of cases came as a primary consequence of organized dealer pressure. Thus, another theory is that manufacturers initiate R.P.M. to facilitate collusion. Vertical price fixing, if adopted sufficiently widely, removes some of the incentive for price chiselling at the manufacturers level. The third, and perhaps most compelling theory is that manufacturers see R.P.M. as an effective marketing instrument. Increasing retailer margins induces greater outlays on service, more investment in inventories, and other retailer actions which shift product demand curves (Scherer and Ross, 1990). While this theory leaves important questions unanswered the main reasons given for R.P.M. revolve around avoidance of free-riders in retailing, and taking some of the heat out price competition in the early stages of a product's life cycle.

However, regardless of the reasons for it the effect of R.P.M. was to inhibit the development of concentration in retail sector. With widespread R.P.M., discount merchandisers had difficulty in obtaining high quality products. Their inability to offer well-accepted brands prevented their rapid growth and so consumers were deprived of retailing innovations which, under more favourable circumstances would have proved highly beneficial (Scherer and Ross, 1990). Overstreet (1983) regarded R.P.M. as responsible for significantly retarding the appearance of supermarkets in Europe. Thus, in the U.K., the introduction of the Restrictive Trade Practices Act, 1956 contributed to the breaking down of R.P.M. in the

grocery trade and encouraged the rapid expansion of self-service. In 1956 there were approximately 3,000 self-service stores, and few "true" supermarkets. By 1962, self-service food stores had grown to 10,830, and there were 854 "true" supermarkets. Self-service grocery stores accounted for approximately 10 per cent of the grocery trade in 1961, but 40 per cent by 1964, with supermarkets alone accounting for 14 per cent (Pickering, 1966). Thus, it would appear that the manufacturers' strategy of R.P.M. inhibited the growth of concentrated retail market structures, because it removed the advantages of large-scale buying. The rise of price competition in retailing meant that the enhanced bargaining power of large buyers became paramount and this was an important antecedent of concentration in the retail sector.

A comparison with the United States helps to demonstrate the manner in which other aspects of U.K. legislation have facilitated the rise of the large buyer. Even today, in the United States, the level of buyer concentration appears very low relative to the level of seller concentration. Why have concentrated retail chains not appeared in the U.S. to the same extent as they have in the U.K.? One hypothesis is:

> H1. Legal differences between the U.S. and the U.K. have given rise to the observed difference in concentration level between the two nations.

Certainly in the U.S. the largest twenty chains accounted for about 37 percent of national grocery store sales, whereas in the average food manufacturing industry the largest four sellers do about half of the sales.

But relatively low buyer concentration can be a misleading indication of buyer power (Connor, Rogers, Marion and Mueller, 1985). While national buyer concentration is relatively low in the U.S., the retail sales concentration in local and regional markets is generally quite high. In 42 percent of the metropolitan areas of the U.S. the largest four food retailers held 60 percent or more of the sales, as far back as 1977 (Connor et al 1985). Thus, some of the observed

difference with the U.K. may be due to the fact that sellers often do face high buyer concentration within their geographic markets, diminishing the gains to further concentration in U.S. retailing. For this reason supermarket chains in the U.S. may enjoy some the benefits of countervailing market power within their geographic market, and so there are fewer gains from further national concentration of the sector.

However, a more compelling reason may exist for the lower observed concentration in food retailing the U.S.. This relates to an important difference in anti-trust law between the U.S. and the U.K.. The Robinson-Patman Act (1936) amended section 2 of the Clayton Act of 1914. The current version of section 2 prohibits discrimination in price "between different purchasers of commodities of like grade and quality (Connor et al, 1985)." The existence of the Act removes one of the greatest advantages of large scale in retailing. Large retailers cannot legally gain large price concessions in the U.S.. They must bargain for price reductions on all of a manufacturers sales. No similar legislation exists in the U.K. where retailers are relatively free to negotiate any level of discount (Davies, 1993).

3.2.2 Manufacturer Price Discrimination and Retail Concentration

The determinants of market structure are generally defined to include such variables as technology, optimal size economies relative to market size, the effectiveness of managerial organisation, and the receptiveness of consumers to advertising. Of course many other factors also affect market structure such as government policy. However, the contention put forward here is that it is the economies derived from buying power which initially led the retail sector towards high levels of concentration:

> H2. The U.K. retail sector entered a process towards concentration due to the bargaining advantages of large scale in procurement.

This hypothesis follows from Galbraiths' (1952) theory of countervailing market power. Galbraith stated that large buyers could constrain the pricing power of oligopolistic sellers. It therefore follows that the bargaining power economies of large buyers will facilitate the development of a concentrated retail sector. While seemingly uncontroversial, it is important to explore this idea, as buying power, and its relationship to selling power, is a central theme of this thesis. Only by a full interpretation of concentration dynamics at the retail stage of the food chain does it become possible to understand the forces of concentration dynamics at other stages of distribution.

While many studies have been concerned with growing buying power of the retail chains, as the sector concentrates, these studies have generally fallen short of identifying that it is precisely the effect of bargaining strength which initially caused the sector to concentrate.

George Stigler (1964) noted that oligopolistic collusion will often be effective against small buyers, even when it is ineffective against large buyers. When oligopolists sell to numerous small retailers, for example, they adhere to the agreed price, even though they are cutting prices to larger chain stores and industrial buyers. Stigler's observations on the power of large buyers have been supported by subsequent studies of buying power in the food industries (OECD, 1981). Thus, the incentive for secret price cutting falls as the number of customers per seller increases. Or stated conversely, the incentive for secret price cutting rises as the number of customers per seller falls.

A condition which appears necessary for the emergence of buying power, and the validation of both Galbraith and Stigler, is the existence of a moderately differentiated product market and of a certain degree of market power on the sellers side of the market. The essence of buying power is that the large buyer obtains a more favourable price (and often other benefits as well) than the smaller buyer. If buying power is to be exercised in this way then it is a necessary condition that there are imperfections and market power on the sellers side of the

market; otherwise no seller could insist on higher prices to some customers than to others, except strictly temporarily. There is little doubt that most markets are characterised by market power on both sides of the market, i.e. bilateral oligopoly, and that a range of prices will be found in such markets (OECD, 1981). This point is important to remember when the ideas of scale in bargaining power are transformed to other stages and relationships in the food chain, where original market selling power may not exist[15].

Hypothesis 2 is unlikely to attract opposition from most authors on the industrial organisation of the food sector. While various references have stated the importance of buying power in retail concentration, none have explicitly put the phenomena as the direct precursor of concentration in the retail sector. The sources which tend to suggest the validity of this hypothesis are now considered, beginning with Duke (1989). He suggested that new entry to U.K. grocery retailing was made difficult by three main entry barriers: (i) intense competition and low margins in the market itself; (ii) economies of scale (arising in large part from the power that retailers held over manufacturers); and (iii) the dwindling number of viable superstore sites remaining for a new entrant to occupy. Thus, Duke (1989) considered that it was largely the buying power which arises from scale which inhibited new entry to the industry. He believed buying power over manufacturers to be the most important economy of scale. This reinforces Hypothesis 2 in that it is the effect of firm size on buying power over suppliers that has inhibited new entry and hence allowed the retail sector to concentrate.

Likewise the OECD (1981) explicitly linked the large size of distributors with advantageous selling terms from suppliers and hence their rapid growth:

> The growth of the large distributor firms has often had a snowball effect. Having obtained advantageous selling terms, they have been able either to pass on the benefit of this to consumers and thanks to the attractive prices

---

[15]See Chapters 5 and 6 of this thesis.

offered by them, to increase their market shares speedily or to keep the benefits to themselves and strengthen their own positions, for instance, by means of intensified marketing methods or increased investments. They have often kept free of banking constraints by converting supplier credit in respect of goods with a speedy turnover into a source of medium- or long-term credit. By means of advertising, promotional campaigns and the use of trade marks, they have succeeded in increasing their control over the market (OECD, 1981, p.20).

This argument clearly backs the view that it was the buying power of large distributors which primarily facilitated concentration of the sector.

A detailed study of U.K. food distribution by Development Analysts Limited (DAL, 1977) concluded that the gross margins as well as the net profit rates of multiple branches were substantially higher than for the independents. The report concluded that:

> ...the use of their buying power to extract additional discounts from their suppliers or to obtain higher margins on own-label products constitutes a large part of the explanation why multiple grocers can offer price reductions without necessarily putting at risk the level of their return on capital (DAL, 1977, p.39-40).

Davies (1993) also suggested that buying power might be the most important economy of scale in retailing:

> The usual view of the sector is that scale matters although some agile companies can operate successfully at quite limited scale. In general large operators are high performers, but the relationship does not hold universally. The underlying considerations are several and complex. Big stores tend to have lower unit costs than small ones - assuming that turnover is acceptably high. Big depots and big vehicles also have their

advantages. But perhaps the greatest force towards scale is that the big chain can bring great buying power to bear (Davies, 1993, p.67).

The preceding literature review clearly relates the importance of the buying power with the development of large firm size in retailing. In terms of Table 3.1, the legal structure led to a process of realized scale economies in procurement. This had the effect of altering the relative market structures between manufacturers and retailers. In turn the resulting initial increase in concentration led to changes in retail strategy when they acted as sellers. These progressions are considered next.

3.2.3 Selling Strategies and Retail Concentration

The large retailers were able to grow rapidly throughout the 1960s and 1970s by passing on to consumers the lower prices they achieved from manufacturers. The growth of self service also enabled the growing chains to cut costs by deploying staff more efficiently. Thus, the early growth of the supermarkets was based on low prices. This growth, the result of a bilateral oligopoly phenomenon, allowed concentration to develop so that retailers could be seen to behave as oligopolists when selling.

Retailing became concentrated enough for the large players to be able to perceive their interdependence. This can be seen in the development of player *strategies*. In the 1960s and early 1970s large food retailers used the strategy of "selective price reductions" to create a low price image and hence attract more customers. This method of image promotion was accepted for many years as the most efficient strategy for maintaining store turnover and, indeed, companies such as Tesco and Fine Fare made significant gains in market share using this promotional policy. At this time the first of the grocery trade price wars was experienced and some traders collapsed. One reaction was that some independents established voluntary groups such as Mace and VG (Ritchie, 1991).

During the inflation of the 1970s it became the turn of the retailers who operated a policy of modest price cuts across all products to grow. Asda and Kwik Save expanded through offering a greater degree of price stability. The "selective price cutters" responded with increased numbers of reduced lines, and generic, own-label product ranges were developed, as a way of competing on price. During the 1970s and early 1980s price competition was the major battleground for market share (Ritchie, 1991).

The 1970s saw the beginning of the retailer own-label strategy. The success of this strategy, which depended upon the initial process of concentration, has had further implications for the market structure of the retail sector and is considered in more detail later.

The 1980s saw non-price competition grow in its importance and with it the signs of an oligopoly game. Larger stores with a larger range of products and pleasant store environment became paramount. These developments have often been attributed to demographic changes, such as more working women, one parent families, car ownership etc. However, tacit collusion on prices can shift competition into other areas, and so need not be completely consumer led. This shift in the area of competition can occur within a tacitly collusive oligopoly, but is difficult to disentangle from genuine changes in consumer preference.

During the 1980s supermarket strategy embarked on a new phase of marketing. Sainsbury were probably the first to break out of the price-led mould. Since then Tesco also have moved away from its price-led image. Originally based on offering consumers lower prices in an era of lower disposable incomes, the focus shifted to the rather nebulous area of "convenience", with retailers constantly attempting to add value to their shopping "product" in the way of a more pleasant environment. Some of this shift may have been due to the boom period of the 1980s. In 1980, 55 percent of consumers indicated "price" to be the most important consideration in their choice of supermarket, by 1986 this figure dropped to 35 percent. Over the same period, the numbers registering "convenience" as the

chief factor grew from 37 percent to 59 percent of the total (Key Note, 1986, p.16). However, a second important reason exists for the rise of non-price competition and high margins in food retailing. This can be seen by conceptualizing supermarket competition within the two-stage game framework.

3.2.4 Two-Stage Competition and Retail Concentration

Strategic investment, such as superstore site acquisition, and high advertising have become important elements of supermarket competition. These strategies can be analyzed within the two-stage game framework. Their effect on concentration is however ambiguous. On the one hand, funding Stage 1 investment or advertising may raise entry barriers, thus tending to increase concentration. On the other hand, high Stage 2 profits of incumbent firms can attract entry, thus tending to lower concentration.

Geographical expansion has been a major growth strategy of the multiples. Thus, the supermarkets can be conceptualised as playing a two-stage strategic investment game. In the first period the players decide if, and where, to locate new outlets. This in turn affects the pricing game which follows in the second period. The supermarkets have come under criticism for their expansionism in building new stores, and they have been held in check to some extent by planning regulations and green belt policy (Financial Times, 22.7.1986). Placement of a large superstore in a certain area is likely not only to replace many small independent retailers, but more importantly to pre-empt investment by another supermarket chain. The decision over whether to invest in the first period, and the size of that investment, is therefore likely to affect the competitive game in subsequent periods. Moreover, the stage-two subgame must be played in such a way as to provide the maximum resources for further first-period investments.

Mintel (1991) estimates that saturation level to be about 800 superstores, only about 150 more than the current U.K. total. Retailer responses already evident include intense programs of site acquisition and store building, suggesting that all

incumbents with the means to do so are striving to occupy the lions share of what sites remain (Duke, 1989). Clearly other forms of expansion and development are possible, such as take-over and merger, as evidenced by the takeover of Wm Low by Tesco.

However, the development of the two-stage investment game may affect the level of price competition between the players. Each player realises the importance of rapid site acquisition. A new superstore costs around £25 million. Thus, each player wishes to maximise short-term profits in order to fund the investment. It is in each players interest to play a carefully tempered pricing game as second-period competition, such that they can compete in the race for site acquisition. The high margins achieved by the incumbent retail firms relative both to manufacturers and to retailers on the continent is perhaps evidence of this tempered pricing game.

In the 1980s net margins were wide for the U.K. and also attractive by international standards. This very success weakened an entry barrier. European grocery retailers accustomed to margins of 2 and 3 percent found U.K. margins of 6 and 7 percent a very tempting prospect (McMurdo, 1990, p.22-23). The high margins were also reflected in high share prices. Whereas share prices for the food manufacturing sector underperformed the All Share Index by 6.4 percent in January 1993, those for retailers performed significantly better than the market. In January 1993 they were 17.8 percent above the FT All Share Index (Diederichs, 1993). The high margins achieved also attracted new entry by foreign discounting retail chains. The new entry of these discounters is considered in more detail below in section 3.2.5.

Currently high margins are earned to fund large strategic investments in new superstore sites. However, this form of two-stage strategic investment game will soon reach a hiatus. This is because the remaining new superstore sites are running out. Thus the multiples will not be able to compete for market share through this form of expansion and it is most likely that the sector will begin to compete through other investment strategies. In turn it is likely that the new areas of

competition will tend to increase the sunk costs of entry and hence should help prevent margins slipping. For example, in terms of the two-stage game framework, the role of advertising may increase as a Stage 1 strategic investment strategy in response to the exogenous constraint on site acquisition as an investment strategy. Thus, the rapid increase in advertising outlays by retailers may demonstrate the long run dynamic nature of two-stage competition. Advertising has played an increasingly large part in the multiples growth strategy. In 1989 food retailers spent some £75 million on mass media advertising. Tesco alone spent £26 million on TV and press advertisements in 1990. Table 3.2 shows how rapidly advertising expenditure has increased.

Table 3.2: *Advertising Expenditure at Current Prices by Operator, 1988-1993 (£'000)*

Operator	1988	1989	1990	1991	1992	1993
J Sainsbury	9,536	9,868	10,036	14,581	17,178	24,741
Tesco	6,244	13,374	24,640	23,782	26,836	27,350
Safeway	7,516	7,238	7,493	12,640	15,578	18,688
Asda	8,927	9,826	14,471	13,644	11,196	17,404
Somerfield	11,846	5,479	3,256	3,934	1,670	7,790
Kwik Save	2,331	3,179	3,881	3,712	2,742	5,420
Iceland	3,725	3,585	3,787	4,051	4,540	6,362
Wm Morrison	1,363	1,898	1,454	1,562	854	1,128
Wm Low	641	329	480	384	355	717
Spar	1,598	2,038	2,343	2,746	1,650	2,027
Aldi*	-	-	-	256	983	876
Co-ops (All Societies)	13,527	12,489	13,595	10,834	7,575	7,834
TOTAL	67,254	69,303	85,436	92,326	91,157	120,337

*Aldi did not enter the UK until the end of 1990.
Source: IGD (1994)

The initial development of concentration in U.K. retailing has been linked to the price discounts available to large buyers. This initial concentration may have allowed firms to become large enough, relative to the size of the market, to perceive an increase in the effectiveness of their advertising. This can lead to a competitive escalation in advertising outlays, conceptualized as Stage 1 competition within a two-stage strategic investment game.

Following Sutton (1991), advertising becomes profitable only when a certain minimal market size is reached; importantly this size varies with the level of concentration. The ratio of setup cost to overall market size determines the lower bound of equilibrium levels of concentration when the ratio is below this advertising intensive threshold. However, when this threshold is breached, concentration becomes independent of setup cost, because increases in market size are accompanied by an indefinite increase in advertising outlays. In the case of the multiples, it is therefore possible that increases in concentration, due to buying power, have allowed the industry to move into an advertising intensive two-stage game. As such, increases in market size are no longer related to decreases in concentration. This is so because the sunk costs of entry to the industry become endogenous to the game. In turn the lower bound to equilibrium levels of concentration becomes independent of the ratio of setup cost to market size. This is so because the advertising outlay becomes an endogenous sunk cost on entry to the industry.

This explanation of the concentration in retailing and the observed escalation in advertising outlays differs crucially from that of Sutton (1991). For the food industries studied by Sutton, scale economies and advertising play a role in the process. The two effects emerge as part of a single integrated mechanism. The relationship between exogenous setup cost and market size determine whether an industry moves into the advertising regime. If it does, setup costs become endogenous due to the necessary advertising expenditure on entry. The sunk cost then becomes critical in defining the lower bound to the equilibrium level of concentration.

For the retail sector however, another explanation is possible. Increases in the market size of the multiples were due to their market share gains over independents. This in turn was due in part to their lower prices, a result of their greater buying power, and in part due to the demographic changes of consumers. These shifts may have led the multiple sector into the region where both concentration and market size were large enough to lead to a competitive escalation in advertising outlays as players became aware of the increased effectiveness of advertising. In this situation the endogenous nature of advertising as a Stage 1 sunk cost became important in raising the lower bound to equilibrium concentration. However, this competitive escalation may have been tempered by strategic under-investment in advertising by the discount sector, so that consumers could observe the extra cost of such advertising.

3.2.5 New Entry and the Discount Sector

The 1990s have seen new entry of firms and the re-emergence of price competition in the form of the discount supermarket. These stores such as Aldi, Shop Rite and Kwik Save offer very cheap groceries at the expense of in-store environment and product range.

Within the two-stage game format, under-investment in first-period advertising can also lead to strategic advantage in the second period. This would appear to be the strategy of the rapidly growing discount sector. The growth and expected growth of this sector is shown in Table 3.3. By saving on advertising and other Stage 1 investment variables the discount sector can play a more aggressive pricing strategy in later rounds of the game. The very low prices in this sector indicates by how much incumbent supermarket leaders have managed to shift away from price competition in their selling markets.

The new entry of strategic low advertisers may have invalidated the link between a competitive escalation in advertising outlays with its necessity as a sunk entry cost. Consequently the implications for concentration of the two-stage advertising

game framework, as applied to retailing, appear to be ambiguous. This ambiguity stems directly from the polarisation of consumer incomes in society. For the high income group of consumers, advertising, quality and in-store environment all have their place. For the low income group Stage 2 competition on prices is paramount, and so effectively this group ensures that the entire multiple sector does not become dominated by high advertisers, with high margins.

Table 3.3: *Growth of Discount Grocery Outlets in the UK, 1989-1997, Number of Outlets*

	1989	1991	1993	1994[1]	1995[2]	1997[2]
Aldi	0	37	88	95	160	210
Netto	0	20	62	68	130	180
Shoprite	0	11	72	80	120	170
Kwik Save	643	745	830	848	890	950
Lo Cost	353	298	287	283	280	300
Solo	0	0	31	50	50	50
Food Giant	0	15	24	26	33	40
Dales	0	0	4	7	20	29
Discount Giant	0	1	10	10	16	16
Pioneer	0	7	16	25	N/A	N/A
Normans	22	19	19	21	25	30
Discount Superstore	0	0	5	5	N/A	N/A
Ed	0	0	5	8	N/A	N/A
Penny Market	0	0	9	11	N/A	N/A

[1] 31 March 1994
[2] estimates
Source: IGD Stores Database

It is possible that some form of dual market structure will develop as a consequence of the polarisation in consumer incomes. The high advertising sector will be more concentrated due to the endogenous sunk entry costs of advertising

and in-store environment. For the discount sector scale still matters in order that price concessions are won from manufacturers, but this may be achieved through buying alliances[16]. Also the European entrants tend to favour lesser known brands rather than major brands or own-label, partially side-stepping the economy of scale barrier. As prices are more important than advertising for this sector's consumers, the endogenous sunk cost of advertising is likely to remain low. This means increases in market size can be filled by new entrants and so the discount sector is likely to remain less concentrated than the high advertising sector.

The "wheel of retailing" hypothesis states that retailers in a sector offer more and more services with rising costs, leaving a gap in the market for low cost, low price retailers to enter (Ray, 1994a, p.20). The rapid growth of the discount sector not only illustrates the hypothesis, but is also a reflection of the polarisation of consumer incomes in society. There is a clear difference in strategy between these new entrants and the incumbent firms. Typical operating margins of discount chains are 2 per cent or less and profits are made by selling large volumes of goods with low overheads from cheap sites using few staff and little investment in technology and fittings. Prices may be up to 20 percent less in the discount sector. However, while a typical Sainsbury store would exceed 10,000 items, Kwik Save might carry only 1,000 items and Aldi half that figure. A discount store may turn around its entire stock in less than 20 days, often selling stock before suppliers have been paid. The U.K. trend may follow that in Europe where discounters hold higher market shares of up to 23 per cent (Germany) and 20 per cent (Belgium). The market share of discounters in the U.K. is estimated to be 8 per cent, but it is predicted this will grow to 15 per cent by 1996 (Key Note, 1993).

The new entrants into the U.K. market may provide alternative buyers for manufacturers, as these stores prefer manufacturers brands over own-label. On the other hand, they may intensify competition between retailers, inducing them to attempt to lower prices yet more. However, to what extent these foreign

---

[16]Considered in more detail below.

competitors redress the balance of power remains to be seen. The foreign competitors largely source from their home countries possibly due to difficulties sourcing supplies in the U.K.. Therefore they do very little to inhibit the buying power of the incumbent supermarkets in the home market, and indeed threaten home producers and processors with greater imports of European products (Ritchie, 1991). Furthermore, it has been alleged that incumbent retailers may be using their monopsonistic power in an attempt to expel new entrants. Aldi has repeatedly accused U.K. retailers of pressurizing food manufacturers into refusing them supplies (Duke, 1989). If there is any basis to these allegations, they should be treated very seriously by the competition authorities. New entry to the retail sector is essential, as in any other industry, in maintaining effective competition between the firms.

3.2.6 The Own-Label Strategy

The high level of concentration in food retailing in the U.K. has had important consequences for the entire food chain, even as far back as input suppliers to agriculture. Retailers increasingly inform the food industry what to make and how to produce it. The power of the retailers means that the demands made by retailers at manufacturer level will be passed on to the suppliers of raw materials (Ritchie, 1991). If anything, recent years have seen the balance of power swing even further towards the retailers; in one poll, 84 percent of suppliers asserted that retailers were getting even stronger (*Marketing*, 1990, p.7). In terms of Table 3.1, the shift in innovation and consumer patronage towards retailers through development of own-label has meant a further clear shift in the balance of power towards retailers.

At the same time, new technology such as electronic point of sale (E.P.O.S.) systems provide retailers with up-to-date information and hence increased power. Tesco now uses electronic data interchange (E.D.I.) to order supplies from about half of its 800 suppliers. Such systems give retailers another way to exploit the power they have over manufacturers. By employing "just-in-time" (J.I.T.) re-

ordering systems, manufacturers effectively manage stock control and hold inventory for the retailers (Duke, 1992).

Thus, whereas in most European countries, food manufacturers have been the driving force behind the growth in new food product introductions through the 1980s and 1990s, in the U.K. the major supermarket chains have been the principal stimulus. Marks & Spencer introduces 600 new food and beverage products per year (under its St.Michael label) in its 2,500 food product range. J Sainsbury, the grocery market leader in the U.K., offers close to 20,000 products in a typical out of town store. As shown in Table 3.4 over half these products (54.9 percent in 1993) are own-label and account for two-thirds of total store sales. In 1993 Sainsbury's launched 1,300 new grocery products under its own-label.

Hughes (1994b) connects the growth of own-label with the development of retail concentration:

> Research evidence shows that there is a strong relationship between own-label share of the grocery markets and retail concentration... and as own-label share of the grocery market goes up, then, so do profits for the retailer (Hughes, 1994b, p.2-3).

His first assertion would lend support to the endogenous sunk cost argument outlined here. However, the second correlation may simply reflect that the largest companies can develop the most own-label products. This link can be seen in Table 3.4 which shows the own-label share of the packaged grocery turnover by operator. The order of operators by percentage of own-label sales closely parallels their order by market share, shown in Table 3.5.

Table 3.4: *Own-Label Share of Packaged Grocery Turnover by Operator, 1993, Percent*

Total Grocers	33.5
Multiples	37.2
Sainsbury	54.9
Savacentre	48.9
Tesco	45.5
Asda	31.7
Somerfield	33.2
Other Gateway	32.0
Solo	28.4
Food Giant	28.9
Safeway	38.3
Presto	26.2
Lo Cost	2.5
Waitrose	41.0
Morrison	30.6
Wm Low	21.6
Co-op	22.4
Spar	23.1
Mace	8.1
V.G.	19.0
Londis	14.2
Kwik Save	6.2

Source: AGB Superpanel Retailer Share Track

Table 3.4 also demonstrates that different retail companies have different strategies as regards the percentage of own-label goods they sell. However, all have enjoyed the advantages of scale in seeking discounts in their input prices. Therefore, the direct link is between the buying power economies and market concentration, with

the growth of own-label being an associated, but not central factor in retail concentration.

Table 3.5: *IGD Retail Market Shares, 1989-1993, Percent*

	1989	1990	1991	1992	1993
Sainsbury[1]	9.6	10.3	10.7	11.6	11.8
Tesco	8.4	9.1	9.4	9.8	9.9
Argyll[2]	6.3	6.6	6.9	7.0	7.2
Asda[3]	5.0	6.4	6.1	6.1	6.2
Gateway[4]	5.8	4.8	4.4	4.1	4.1
M&S[5]	3.2	3.2	3.1	3.0	3.0
Kwik Save[6]	2.2	2.6	3.1	3.7	3.9
Morrisons[6]	1.2	1.3	1.6	1.7	1.8
Waitrose[6]	1.6	1.6	1.6	1.6	1.6
Iceland	1.1	1.1	1.2	1.4	1.5
Wm Low	0.5	0.6	0.6	0.6	0.6
Co-ops	7.7	7.8	7.6	7.4	7.4
C_5	35.1	37.2	37.5	38.6	39.3

[1] Facias included Sainsbury's and Savacentre
[2] Facias included Safeway, Lo-Cost and Presto
[3] Facias included Asda and Dales
[4] Facias included Gateway, Somerfield, Food Giant and Solo
[5] UK food sales
[6] Estimates
Source: IGD, 1994

Any theoretical link between own-label development and retail concentration would require to be through the "competitive escalation in advertising" hypothesis of Sutton (1991). However the increase in own-label share in itself raises the consumer patronage enjoyed by the retailer. Thus, own-label can have the same effect as advertising because it can increase the consumers willingness-to-pay. Indeed retailers do tend to take higher margins on own-label goods (van Dijk and Mackel, 1991) in turn suggesting that they accrue the benefit of consumer patronage on own-label products. In terms of the two-stage game framework, new

product development (NPD) in own-label by retailers can also be seen as a Stage 1 strategic investment. In turn this will influence both the Stage 2 pricing subgame. This has been manifested by the shift in the focus of competition from price towards developing a quality image for own-label, i.e. from Stage 2 price competition to Stage 1 strategic investment competition.

Increases in the own-label share may also raise the effectiveness of advertising for retailers. This is so because the effect of advertising on consumers willingness-to-pay may be spread over a greater range of own-label products. This may make a competitive escalation in advertising outlays an even more profitable strategy. Thus, own-label may have a secondary effect on the level of Stage 1 of outlays through further stimulating advertising. In turn the higher Stage 1 outlays constitute higher endogenous sunk costs, raising the theoretical lower bound to equilibrium levels of concentration.

3.3 Retailer/Manufacturer Relationships

Resulting from the strategic shifts outlined other changes have occurred in the manufacturer/retailer relationship. In turn these developments have influenced the balance of power between trading partners in themselves and so also affected the levels of concentration in both sectors. These issues are explained below.

3.3.1 Vertical Partnerships

The phenomenon of retailer-driven vertical partnerships between retailers, manufacturers and, increasingly, farmers and growers is well developed in the U.K.. In addition to seeking differentiation in the market place through the use of a premium own-label corporate strategy, other factors help explain the prevalence of vertical partnerships in the U.K. food industry. Hughes (1994a) lists these factors:

- The UK Food Safety Act 1990 which requires that those engaged in the handling of food must be proactive in their efforts to ensure that food in their possession conforms to the provisions of the act.

- Direct consumer pressure on retailers to ensure food safety, nutrition, and animal welfare.

- The growth in demand for chilled, fresh food products with a short shelf life.

- Increasingly sophisticated consumer demands coupled with new retailer scanning data means that retailers can respond quickly with new own-label products. This calls for a cooperative environment with suppliers, not one characterised by confrontation.

- The need to counteract criminal tampering.

- Slow growth in the market causing manufacturers and retailers to seek product flow strategies that create greater efficiencies and economies as a means of increasing margins.

- The internationalisation of raw material supply, and year round availability of fresh produce which requires a greater degree of coordination. This leads buyers to seek more stable relationships with suppliers who can fulfil forward contracts, and necessitates that domestic producers seek to enter such contracts to prevent import penetration.

- Farmer-led initiatives to link-in with a supply chain that is becoming increasingly concentrated. The more progressive farmer-owned business are becoming pro-active in providing manufacturers and retailers with comprehensive product sourcing services and seek to become a "preferred supplier" for major customers.

Hughes (1994a) believes vertical partnerships to be a growing strategy of retailers to overcome these problems. Through negotiation joint initiatives can be developed up and down the food chain to bridge the initial gap. The realization of mutual objectives (the gains from trade) provides the incentive for the necessary communication. The characterization of such close links may be seen in the unacceptability of the traditional auction market system for beef and lamb procurement, to the major supermarkets. Also, traceability of milk will be a major factor in the design of the new milk marketing arrangements.

The policy towards forming trading partnerships, however, appears to vary across companies. Tesco, Safeway and Asda have attempted to work more closely with suppliers. Safeway created the new appointment of "supplier partnership manager". Tesco launched a trading code of practice - a 10-point plan detailing ways in which the store can work more closely with suppliers, particularly farmers. Sainsbury, however, appear to have no policy towards forming partnerships. Manufacturers tend to regard partnerships with some suspicion. They say the call for partnerships tends to surface when supermarkets margins are squeezed. However, during boom periods the multiples drive for such close links with suppliers may all but disappear (*SuperMarketing*, 1994). The implications of such partnerships for producer cooperatives are considered later in this thesis.

3.3.2 The Growth of Buying Alliances

Retailers of all kinds are rapidly joining together in buying "alliances" to make Europe wide agreements with food processors. One large group, ERA/AMS, in 1992 negotiated on behalf of ten chains, together having 13,111 stores across Europe. One result is retailers can stock own-label products from other chains in the alliance, expanding sales for processors with own-label business (Ray, 1994a). Secondly, retailers can procure year-round suppliers of fresh produce through buying alliances and as such they are particularly prevalent in the fruit and vegetables sector (van Dijk and Mackel, 1991). The growth of such buying alliances also suggests the validity of the hypothesis put forward here, that it is the

effects of scale upon input supply through buying power which has facilitated the concentration of retailing.

The evidence regarding the discounts available to large distributors is scant and the main source of information available are the Monopolies and Mergers Commission (M.M.C.) reports on investigations into allegations of abuses of buying power. The size of discounts granted to large buyers in the M.M.C. investigations is listed in Table 3.6 in Section 3.3.4 and demonstrates the scale of discounts which have been granted to large buyers.

The growth of the buying alliances substantiate Galbraith's (1952) theory of countervailing market power and points to the economies derived by large scale in procurement. However, buying alliances to some extent circumvent the need for concentration in retailing, by yielding the advantages of scale in negotiations with suppliers, without recourse to mergers and acquisition.

3.3.3 Vertical Integration

Vertical integration in the food chain appears to be decreasing. Express and Unigate have in the past divested from the retail sector. The Cooperative Wholesale Society (CWS) have divested from the processing sector to concentrate on their retailing[17]. The supermarkets also, who once invested in processing activities are now apparently selling out of upstream activities and concentrating on retailing, where their expertise lies. Thus, a trading relationship is likely to persist between these two sectors.

Why has an apparent reversal in vertical integration occurred? One reason may be that they have learned to remain in the domain where they have expertise. Secondly, when vertical integration occurs, the firm's position is compromised.

---

[17]However, CWS do maintain a degree of vertical integration and also retain a presence in milk production (Scottish Farmer, June 1st, 1996).

The firm must decide at which price to transfer the good, an how to divide the profit between stages in the chain. Another reason for this reversal may also relate to the growing power of the retailers. Supermarkets may wish to achieve partial vertical integration so as to threaten increased internal production of a good, if the upstream industry acted oligopolistically. This strategy, known as upstream tapered integration, can break the pricing regime of oligopolistic suppliers, because the buyer can credibly threaten to expand internal production or processing of the product (Scherer and Ross, 1990). In turn the reason vertical integration has declined may be because the strategy of upstream tapered integration is no longer required, due to the inherent buying power of the large chains. Thus, by breaking upstream oligopoly through the own-label strategy or through encouraging the new entry of processing firms, upstream tapered integration by supermarkets may have become a redundant strategy.

3.3.4 Vertical Restraints

As the negotiations between retailers and manufacturers take place in private, information on the manner in which they bargain, and the types of contracts they form, is especially difficult to acquire. Vertical restraints are allegedly widely used in food markets, though have received little attention from agricultural economists. The term includes the use of discounts (in various forms), slotting allowances, exclusive dealerships and exclusive territories, among others (McCorriston, 1994).

Non-linear contracts typically involve the transfer of a franchise fee between the trading partners. Various forms of discounts fit into this framework including overriders (ex-post rebates), aggregate rebates and discounts related to the total size of the customers account. Slotting allowances can also be included in this framework (e.g. provision of shelf space, freezers etc.) and other promotional expenditure. Tying is another means of deviating from the simple linearly-priced contract which involves the manufacturers selling a bundle of products to the retailer at prices lower than buying the products separately.

McCorriston (1994) cites three reasons why such instruments are employed. The first is the maintenance (or creation) of dominant positions in upstream or downstream stages. The second is to capture rent from subsequent stages of the vertical chain. The third may be due to new products competing for increasingly scarce shelf-space. However, building a trading relationship for a highly specified product involves some sunk costs by both parties involved. At which stage the price of the product is mutually agreed is important as the parties are in different bargaining positions at different stages of the process. Therefore, it may be the sunk cost element in developing trade in a new product, and to counter the potential for opportunistic recontracting as bargaining positions shift, which has led companies to adopt various forms of non-linear contracts.

For example, a supermarket buyer may have identified a market niche for which it requires a specific product. The supermarket, in the beginning holds the information. It is in the manufacturer's interests to offer to make the product for a low price in order to secure the contract to supply the product. Having reached an agreement, both parties then incur sunk costs to develop the product. The supermarket provides information, and the manufacturer combines this information with its expertise in product development, and must invest in production facilities for the product. By the time the product is ready to enter the store the bargaining positions have shifted. The supermarkets bargaining position has diminished, because it has now revealed its information to the manufacturer. The manufacturer's bargaining position has strengthened because it now holds the information, the technology and the production capacity to make the new product. Potentially the manufacturer can ask for a higher price than originally stated, or threaten to sell the new product to another supermarket chain. Clearly then some form of commitment by the upstream trading partner to the buyer is necessary. Due to the sunk cost, information sharing, and the subsequent shift in bargaining positions both parties may opt for some form of non-linear contract which ties them together from the outset. In this example the retailer may demand a lump sum payment at the beginning of negotiations which comes back to the manufacturer once trade begins through an add-on to the price of the product. In

this way the parties may be tied together from the outset of the new product development process.

Frank and Henderson (1992) modeled various transactions costs as determinants of vertical coordination for U.S. food industries. A vertical coordination index was regressed against a variety of transactions costs variables. The empirical results supported the hypothesis that transactions costs are a primary motivation to vertically coordinate via non-market arrangements. They included R&D as an *idiosyncratic investment* and argued that a firm at one stage may be able to appropriate quasi-rents from another firm with idiosyncratic investments[18]. In order to attenuate *opportunistic behaviour*, firms increasingly use non-market vertical coordination. Significantly, in the regression of transaction cost variables on vertical coordination, Frank and Henderson (1992) found that the R&D variable had by far the largest regression coefficient of all eleven variables included in the equation. The fact that R&D is the most important variable in explaining vertical coordination may be significant in supporting the "shift in bargaining positions" argument previously.

For manufacturer branded products, van Dijk and Mackel (1991, p.353) note that in some countries the food manufacturers pay for the right to introduce their own (manufacturer) brands into the retail outlets. This is explicable in terms of the "shift in bargaining positions theory" in relation to risk bearing. The manufacturer has sunk costs into R&D and advertising. He is in a weak bargaining position before trade begins relative to the multiple who can take or leave his new product. Moreover, without a payment, the retailer would bear some risk in devoting shelf space to a new product which might not sell in any quantity. Therefore such lump sum payments may be to compensate the retailer for the risk in accepting the new product. The manufacturer effectively must bear all the risk in the introduction of his new product. However should successful trade in the product be established he

---

[18]This relation between R&D and the ability to appropriate quasi-rents also supports the hypothesis that consumer patronage is linked to bargaining power, discussed fully in Chapter 7.

will be in a stronger bargaining position with the retailer over the price of the product. It may therefore be worthwhile for him to bear the initial lump sum payment and all of the risk.

The theoretical literature on non-linear contracts reveals no clear consensus concerning consumer benefits. In some cases consumers benefit as retail prices fall, in others they lose as retail prices rise. Further, the franchise fees can be paid to either the manufacturers or to the retailers. Hence there is no consensus on who gets the rent from such vertical restraints. Another feature common to all models is that it is the manufacturers who "write" the contract; they choose the manufacturing price which affects the game at the retail stage (McCorriston, 1994). If the "shift in bargaining positions" argument is correct, the direction of the lump sum payment is clear and is the same whether the product is an own-label or a manufacturer brand. In addition, the "writer" of the contract would be the party which owns the brand label and instigated the trade, i.e. the supermarket for an own-label product or the manufacturer for a branded product.

Following McCorriston (1994) the most useful sources of information are the competition authorities' reports following investigations. Table 3.6 summarizes information from thirteen of the eighteen investigations into the food industries between 1976 and 1994. These thirteen are listed as they give the "size of the largest discount" which provides a picture of size of discounts available to powerful buyers in the U.K. food industries. Averaging the largest discounts across all the sectors in the table gives an average discount to a large buyer of around 17.7 per cent. If the M.M.C. reports are representative of a broader picture of discounts to large buyers, clearly the relative advantages of scale in buying are hugely significant to the development of the retail market structure.

Table 3.6: *Characteristics of U.K. Legislation on Vertical Restraints relating to the Food Sector*[1]

Industry	Year	Principal Restraint	Size of Largest Discount	Discount as a % of Turnover	Bargaining Power of Retailers?	Served Public Interest?
Frozen Food	1976	Quantity Discount	17.5 %	7.4 %	Yes	No
Flour and Bread	1977	Quantity Discount	35 %	NR	Yes	Yes
Cat and Dog Food	1977	Quantity Discount	13.5 %	0.7 %	Yes	Yes
Cigarettes[2]	1978	Quantity Discount	15 %	NR	No	Yes
Biscuits	1979	Over-riders	7.5 %	14 %	Yes	Potentially
Ice-Cream	1979	Retrospective Bonus	20 %	36 %	Yes	No
Beer	1981	Special Prices	15 %	5.3 %	No	Yes
Biscuits	1981	Special Prices,	14 %	8.6 %	Yes	Yes
Baked Beans	1981	NR	25 %	NR	Yes	Yes
Bread	1981	NR	14 %	NR	Yes	Yes
Salt	1986	Quantity Discount	17.5 %	NR	Yes	No
Beer	1989	Quantity Discount	30 %	NR	No	No
Ice-Cream	1994	Over-riders, Equip.	6 %	NR	No	Yes

[1]All decisions by Monopolies and Mergers Commission unless otherwise noted
[2]Investigated by the Price Commission
NR Not Reported
Source: Compiled from Monopolies and Mergers Commission Reports (various) and Price Commission Reports (various). Compiled by: McCorriston (1994)

3.4 Summary

The arguments developed in this chapter have explained the evolution of market structure in U.K. food retailing in terms of bilateral oligopoly behaviour drawing on the principles of game theory. The removal of R.P.M. by law in 1964, and the permissive U.K. law on price discrimination, meant that large retailers could achieve discounts from the manufacturing oligopoly. The difference between U.K. law and U.S. law on price discrimination may largely explain the difference in the overall level of concentration in retailing between the two countries. Had price discrimination been illegal in the U.K. the advantages to large buyers would have been less, and the consequent level of retail concentration may have been consequently lower.

That large buyers can break the oligopolistic power of large sellers has meant in turn, that retailing has become concentrated as these bargaining power economies have been realized. The resultant concentration in retailing has led to other possibilities in terms of strategy when retailers act as sellers. Thus, retailers have developed own-label products shifting consumer patronage away from manufacturers, and hence improving their bargaining position yet more.

The concentration of retailing also appears to have given rise to forms of two-stage competition in the sector. Thus, supermarkets appear to be competing in a strategic commitment game for the remaining superstore sites. This two-stage competition apparently gives players a mutual incentive to shift competition away from prices in order to fund large capital investments. In turn the high margins achieved may be responsible for the new entry of foreign discounters into the market, but the rise of the discount chains is also accounted for by the polarisation of consumer incomes. Two-stage competition is also evident in advertising strategies. Advertising outlays by all the major players has increased rapidly in recent years. This may represent a competitive escalation in advertising outlays, in turn raising the theoretical lower bound to equilibrium levels of concentration because the sunk costs of entry are raised by the endogenously determined advertising outlay.

The demise of vertical integration between the retail and the manufacturing stages in the food chain is regarded as due to the redundancy of the strategy of upstream tapered integration by retailers. This strategy has been made redundant by the bargaining power of the large chains, a result of the increase in buyer size and the subsequent shift in consumer patronage towards retailers. At the same time the increased use of non-linear contracts is explained in terms of the shift in bargaining positions between buyer and seller as a new product is developed. This argument is supported by the evidence that R&D expenditure is a major determinant of vertical coordination.

The checklist for the potential for manufacturer power (Davies, 1993) provides a set of factors which affect the balance of power between manufacturers and retailers. The approach taken here links each point as a series of events, in terms of the optimal game strategies of the players in the retail sector. The approach shows how the influence of firm size on bilaterally oligopolistic relationships led to increased concentration in the retail sector, facilitated by a legal framework which permitted price discrimination. In turn the initial concentration led to the evolution of large players as sellers, and the appearance of two-stage competition in terms of strategic investment in superstore sites and high advertising. These strategic developments may have had the effect of further reinforcing the trend towards concentration in U.K. food retailing.

Chapter 4

BILATERAL OLIGOPOLY AND CONCENTRATION:
THE FOOD MANUFACTURERS

4.1   Introduction

This chapter is concerned with the effects of bargaining relationships upon the configuration of the food manufacturing industries. The previous chapter concluded that one of the main forces causing higher levels of concentration in food retailing relates to the effects of scale upon the bargaining relationship that supermarkets enjoy with suppliers. Here the focus shifts to considering the effects of this same relationship upon the sellers, namely the food manufacturers. The analysis demonstrates the ambiguous effect of retail concentration and strategy on concentration levels in upstream industries.

Section **4.2** reviews the two-stage game model outlined by Sutton (1991). Section **4.3** provides a possible explanation for the contradiction within the two strands of the existing literature; one which states that buying power should increase upstream concentration (Mackenzie, 1988), and the other which states that downstream buying power will check increases in upstream concentration (Venturini, 1993; Connor, Rogers and Bhagavan, 1994). Section **4.4** uses four case studies to demonstrate how the effect of retail concentration and strategy depends upon the initial determinants of concentration in upstream industries. However, the main purpose of the chapter is to develop an understanding of concentration dynamics and vertical market interaction, which reveals the two-dimensional character of competition. The framework developed forms the basis of the analysis of producer marketing and market power in subsequent chapters.

4.2   Sunk Cost and Market Structure

The analysis again draws on the theoretical framework of Sutton (1991), to the extent that it draws a distinction between industries where advertising costs are

negligible, and so sunk costs may be treated as exogenous, and those where advertising costs are substantial, such that sunk costs may be treated as endogenous. Sutton treated "the toughness of price competition" as an exogenous factor, dependent upon the degree of product homogeneity, and/or the institutional or policy framework. At the same time, Sutton treated advertising as an endogenous factor, a result of the game played between large firms in the sector. In the U.K. both the "toughness of price competition" and the level of advertising of many food products have been affected by the strategies of the increasingly concentrated retail sector. Thus the focus of this chapter, is to consider the implications of this downstream concentration upon the concentration dynamics of the various sectors of food manufacturing. Accordingly attention centres on how the rise of retail concentration and the high level of retailers own-labels in the U.K. may be affecting the equilibrium level of concentration in the various sectors of the food manufacturing industry.

Sutton (1991) referred to the impact of supermarkets strategy in his cross-sectional analysis. His model analyzed concentration across the food industries of six developed economies. He acknowledged the possible impact of a concentrated retail sector, where retailers' "own brand" and advertising are significant, on the equilibrium configuration of an upstream manufacturing sector. Sutton, however, made no reference to the possible effect of very large buyers on the "toughness of price competition". Nevertheless, the quote below forms a useful starting point for the subsequent analysis of U.K. experience:

> Another respect in which the six countries differ relates to the degree of success achieved by retailers in developing their own brands ("private label" products) in competition with the manufacturers of leading branded products. This appears to vary in line with the degree of concentration in the retail sector. The retail sector is relatively concentrated in the United Kingdom, France, and Germany, but is relatively fragmented in the United States, Japan, and Italy.

The degree of success of retailers' own brands has been greatest in the United Kingdom, where they accounted for 28 percent of total retail sales in 1985[19]. The degree of penetration by category varies widely, being greatest when brands are least strong (canned vegetables and frozen food) and weakest where brands are strongest (pet foods and RTE cereals)[20]. Some leading retailers in the United Kingdom, notably Sainsbury and Tesco, now advertise their own brands quite heavily. In the United States, on the other hand, the impact of retailers' own brands has been extremely weak.....In the United Kingdom, for example, the strength of the retailers' own brands appears to have grown to the point when it may be more costly for manufacturers to achieve a given market share by dint of advertising support for a new brand (Sutton, 1991, p.89-90).

This point is discussed in more detail below in relation to the validity of the hypothesized effect on manufacturer strategy, and hence the inferences for concentration.

Another important aspect of the Sutton model is the concept of equilibrium. In homogenous goods industries, where advertising is negligible, and so sunk costs are exogenous, increases in market size will tend to raise profits and so induce entry. The entry decisions of firms in the two-stage game model depend upon the interplay between the level of set-up cost incurred at Stage 1 and the intensity of price competition that firms face at Stage 2. Thus, increases in market size will reduce the intensity of price competition at Stage 2, and so will tend to make entry more attractive at Stage 1.

Therefore concentration declines indefinitely as market size increases. However, very few products are strictly homogenous by nature. Even for commodity

---

[19]Retailers own brands accounted for 30 percent of the retail grocery sales in the UK in 1993 (Boston Consulting Group, 1995, p.8).

[20]Brands are "strong" in the sense that individual brand products have high market sector shares.

products the existence of transport costs is sufficient to introduce a degree of differentiation between producers. Were firms restricted to produce only one product, increases in market size would still be accompanied by new entry and deconcentration. However, once firms are permitted to produce more than one product, multiple equilibria are endemic. For a given level of set-up cost and market size both fragmented equilibria, in which a large number of firms each offer one product, and concentrated equilibria, in which a small number of firms offer several products are possible (Sutton, 1991, p.27-40). Thus, the theory predicts only the lower bound to equilibrium structure, and this lower bound in the exogenous sunk cost case is defined by the ratio of set-up cost to market size.

Within the two-stage game framework, concentration is fixed in the Stage 2 sub-game, as it is inherited from the entry or exit decisions made in Stage 1. Within the Stage 2 sub-game lies the traditional Bain hypothesis that prices (and unit margins) decline as concentration falls (Bain, 1956). This notion is embodied in the form of a *function* linking concentration to prices or unit margins (Sutton, 1991). Thus, the height of the lower bound to equilibrium concentration is affected by the nature of competition at Stage 2 of the game.

An industry is out of equilibrium when profits are insufficient to recoup the initial capital investment. One way this situation could arise is through a shift in the institutional framework, which effectively increased the "toughness of price competition". In the analysis of vertical market interaction below, the increasing bargaining power of the retailers is regarded as an exogenous increase in the "toughness of price competition" in the upstream food manufacturing industry. In such a situation, repeated attempts at price coordination by the firms fail. It is worthwhile for some deviant firm to cut price, at the existing level of concentration. Short run prices cannot be sustained at a level consistent with the recovery of normal profits, because at such price levels it will become worthwhile for deviant firms to undercut market prices, given the degree of fragmentation of market structure. As a result, the usual outcome is some form of industry consolidation. Either consolidation of ownership will bring a rise in margins, or

the failure to recover sunk costs will lead to an unwillingness to renew plant as it becomes obsolete, leading to increased concentration as firms exit. Concentration increases to the degree that deviant behaviour is no longer optimal for a potential deviant firm. This is because the rewards of coordination begin to outweigh the rewards of undercutting rivals, as firms become larger and fewer. Thus, a level of price coordination can be maintained at equilibrium, such that adequate profits are realized. This is true whether the original deviant firm gained market share or was forced out of the market. Once the number of players are reduced, the incentive to undercut rivals will eventually be outweighed by the gains from cooperation.

Sutton demonstrated the manner in which the "toughness of price competition" affected equilibrium structure through the example of the historical development of the U.K. salt industry. During the 1800s the industry was highly fragmented with many small producers evaporating brine by the open pan method. A decline in world demand for British salt around 1875 led to a period of intense price competition which led to a wave of bankruptcies. Attempts to stabilize the situation began in 1882, when a pooling arrangement was established. A new and higher price was established, but the arrangement collapsed within a year, as a result of a substantial new producer. The crisis precipitated an attempt to consolidate ownership in the industry. Sixty-four salt producers were brought together, and the Salt Union was formed. Despite initially accounting for 90 percent of total capacity, the Salt Union ran into difficulties as the fringe of competing producers grew to supply the greater part of total sales. Again intense price competition led to the formation of the British Salt Association to maintain higher prices. However, once again the agreement collapsed when it was discovered that some partners were not only exceeding their quotas, but were in some cases installing additional capacity. A new venture emerged to attempt to support prices, however this also foundered in 1911 due to competition from the growing chemical concern of Chance Hunt, which established capacity outside the new group. Throughout the postwar period, further consolidations occurred, culminating in the current duopoly in which ICI and British Salt dominate the market (Sutton, 1991, p.142-145).

The preceding account demonstrates the manner in which structure develops from an underlying game situation. The highly homogenous nature of the product made firms vulnerable to price cutting by rivals. Attempts to achieve some kind of price coordination within the fragmented industry meet with repeated failures, which in turn lead to the formation of an extremely concentrated market structure. The highly concentrated structure enables the industry to avoid future price wars.

In endogenous sunk cost industries, however, the theoretical lower bound to equilibrium concentration is further constrained by the sunk cost of advertising. If by incurring higher advertising outlays at Stage 1 of the game, a firm can enhance the demand for its product at Stage 2, then it is fairly obvious that the game played at Stage 1 might involve a competitive escalation of outlays by firms and so lead to higher sunk costs being incurred at equilibrium. It is also fairly obvious that as market size increases, and with it the profits achievable at Stage 2, the greater might be the sunk costs incurred at equilibrium (Sutton, 1991, p.11), i.e. at a stable configuration of firms.

This mechanism can be observed in the experience of the U.S. frozen food sector. By 1959 the leading two firms spent 6.1 percent of their combined brand label sales on advertising (Federal Trade Commission, 1962, p.99). The largest six firms had a ratio of advertising to sales of 5.2 percent, while the next twelve had only a 2.2 percent ratio. As the role of advertising changed the shape of the retail market, a clear difference in pattern emerged vis-a-vis the non-retail segment. In the retail segment the four-firm concentration ratio was 39 percent in 1959. However the non-retail segment remained more fragmented, and the smaller firms specializing in non-retail sales remained relatively profitable compared to similar sized businesses in the retail segment, where profit rates were strongly correlated with firm size (Sutton, 1991, p.182).

This suggests that increases in market size do not lead to an indefinite fall in the equilibrium level of concentration in advertising intensive industries. This is because increases in market size are accompanied by an indefinite increase in

advertising outlays. The endogenous nature of advertising as a sunk entry cost, prevents a trend towards deconcentration as market size increases. Put another way, as market size increases, advertising outlays escalate, and so sunk costs rise along with increases in market size. This prevents a process of deconcentration as the market size increases.

Again the theory only predicts a lower bound to equilibrium levels of concentration. In endogenous sunk cost industries equilibrium levels of concentration are further bounded (above the ratio of set up cost to market size) by the competitive escalation in advertising outlays. Any level of concentration above this theoretical lower bound is also an equilibrium. As stated in Chapter 2, repeated game theory models inherently have multiple equilibria. However, this is regarded as a realistic feature of the models, in the sense that real situations may have many possible equilibrium solutions. The usefulness of the equilibrium concept in this context is returned to in Chapter 7.

Another important aspect of Sutton's theory is that the level of set-up costs and the level of advertising, while both relevant, are not independent. Thus, exogenous changes in technology that have raised the minimum efficient scale (MES), and so the level of set-up cost, may initially lead to an increase in the advertising-sales ratio, but whether the positive relationship continues to hold as set-up costs become higher depends upon the details of the model - and no general prediction is possible. Accordingly the extent to which set-up costs affect equilibrium levels of concentration will depend upon the impact that changes in set-up costs exert on endogenous advertising outlays, and this effect will depend on various industry specific features. For example, the chocolate confectionary industry shares a similar market to the sugar confectionary industry. However, set-up costs are higher for chocolate confectionary. Notably for the six countries covered by Sutton's analysis[21] the advertising to sales ratio was consistently higher for

---

[21]These are France, Germany (F.R.), Italy, Japan, United Kingdom and the United States.

chocolate than for sugar confectionary (Sutton, 1991, p.272-273). Another useful comparison is that between instant and R&G (roast and ground) coffee. Again the industry with higher set-up cost (instant coffee) also tends to have higher advertising intensity in most of the countries studied (Sutton, 1991, p.276-283).

4.3 Contradicting Views on Concentration Dynamics

Research in vertical competition concentration dynamics[22] in the food industries is limited. However, within the small amount of literature on the issue, there appears to be two contradictory opinions regarding the influence of increased buying power upon equilibrium levels of concentration in food manufacturing. A primary aim of this chapter is to attempt to reconcile this contradiction.

The first viewpoint is represented by the work of Venturini and Connor. Venturini (1993) developed a formal model explaining concentration change in the food manufacturing industries. Venturini extended Sutton's theory to include the effect of "vertical competition" between food distributors and food manufacturers. Venturini hypothesized that industries experiencing an increase buying power from downstream will experience de-concentration. A critical feature of Venturini's model is the assumption that the share of own-label products in total product category sales forms a reasonable proxy for countervailing market power of retailers (Connor, Rogers and Bhagavan, 1994). Thus, the hypothesized link is between countervailing market power and downstream de-concentration.

Connor et al (1994) cite the Venturini view that increased retailer power should check increases in manufacturing concentration. Connor et al also credit Galbraith (1952) for hypothesizing this relationship:

---

[22]The term "vertical competition concentration dynamics" is coined here in reference to the effect of upstream or, in this case, downstream concentration and strategy upon the level of concentration in a sector. Thus, the term refers to the effect of bilateral oligopolistic relations on concentration change.

Thus, according to Galbraith, countervailing power is an autonomous regulator of competition, which operates much like Adam Smith's invisible hand to check increases in seller concentration (Connor et al, 1994, p.3).

However, this is an extrapolation of Galbraith's theory of countervailing market power which may not be correct. Nowhere in his book does Galbraith state that countervailing market power will reduce or inhibit seller concentration. Galbraith (1952) states that the countervailing market power of large buyers will restrain upstream market power of large sellers. However, he does not make inferences about the effects on concentration.

Moreover, both Venturini (1993) and Connor et al (1994) seem to have misinterpreted Sutton's (1991) theory in believing that countervailing market power should reduce concentration in the selling industry. On the contrary, increased countervailing market power, or simply greater buying power, may act as an exogenous increase in the "toughness of price competition" between oligopolistic sellers, and as such is quite likely to drive the industry towards higher, not lower, levels of concentration.

Traill (1994) mentions the potential two-way influence of the bargaining power of the retail sector on concentration in manufacturing. Utilising Sutton (1991), he hypothesises that retailer power should keep manufacturers' profits low and encourage the continuing trend towards concentration of food manufacturing. However, Traill also credits Venturini (1993) for the opposite view that the development of the own-label strategy by food retailers allows the opportunity for small manufacturers to compete through the avoidance of promotion costs.

An alternative view on the influence of increased buying power on concentration is represented by the work of Mackenzie. Mackenzie (1988) argues many reasons for the high level of merger activity in the food manufacturing sector. However, as a general point, this has been a response to the major restructuring by the

retailers. Thus, in his view[23], increased concentration and buying power in food retailing is driving the food manufacturing sector towards *higher*, not lower, levels of concentration. However, if this argument is valid then why did Venturini (1993) find a significant statistical relationship between an increased own-label share and a slowing in the rate of change in concentration? Indeed, within the framework of Sutton (1991) this result should cause no surprise. However, this is not because retailer own-label share of the market is a valid proxy variable for the countervailing power of large buyers when the dependent variable is upstream concentration. The lower bound to equilibrium concentration in an advertising intensive industry is partly a result of the endogeneity of advertising as a sunk cost. It is this competitive escalation in advertising levels, as Stage 1 sunk costs, which prevents the fragmentation of industry structure with increases in the overall market size. Therefore, if a product class, previously dominated by branded products, becomes partly supplied by the retailer own-label segment, this endogenous sunk cost is removed for new entrants supplying the supermarkets. Indeed supermarkets can and do encourage new entrants to their supplying industries[24].

Therefore an important constraint on equilibrium structure may be removed with increases in the own-label share. However, the resultant fragmentation in no way relates to the increased buying power of retailers. It is important then to be clear about what is meant by countervailing market power. On the one hand, it may mean greater buying power due to the increased size of buyers in the chain. This is the original concept as expounded by Galbraith and that followed here. On the other hand, Venturini and Connor have adopted a separate idea of countervailing market power, or vertical competition, which depends upon the undermining of manufacturer branding by the retailers' development of own-label products. This view sees countervailing power as reducing the ability of manufacturers to "talk

---

[23]Mackenzie was the Director General of the Food and Drink Federation at this time.

[24]Discussed in more detail below.

over the heads of the retailers" and so diminishes an important element of their market power. Retailer countervailing power is also enhanced by own-label because the number of potential suppliers for an own-label product is greater, in contrast to a branded product which has only one supplier. However, the two influences, own-label and price pressure, may be theoretically opposite in terms of their effect on the equilibrium structure of the food manufacturing industries.

Sutton (1991) stated that retailers' own brands may have grown to the point where it may be more costly, in terms of Stage 1 endogenous sunk costs, for manufacturers to achieve a given market share by dint of advertising support for a new brand. This may imply that own-label penetration stimulates further advertising support in the branded sector, so raising endogenous sunk costs, and hence raising equilibrium concentration in food manufacturing. However, the alternative view is that increased own-label penetration results in the diminished effectiveness of advertising overall in the food manufacturing sector. Thus, the advertising barrier is diminished, and so increases in the market size may be accompanied by a decrease in the level of concentration.

Another possibility is that in the early stages of own-label penetration, manufacturer advertising is stimulated in an attempt to defend market share. However, once own-label constitutes a high percentage of the market, manufacturer advertising losses its cost effectiveness, and so manufacturers are forced to reduce advertising and supply the own-label sector. If this were the case, concentration in manufacturing might increase and then decrease again as own-label enters and then dominates the market. However, such a general influence would be likely to be outweighed by characteristics specific to individual market sectors.

However, as already stated, the increased price pressure of large buyers has also forced merger and consolidation in areas of the food manufacturing industries (Mackenzie, 1988). It remains to describe by what mechanism large buyers could have an effect upon the "toughness of price competition" in the upstream

manufacturing industry. This can be explained with reference to the potential effect of a large buyer on an oligopolistic game between suppliers. Due to the size of his orders, the large buyer effectively makes deviant behaviour more profitable in the upstream supplying industry, at the given level of concentration. The suppliers may find it more difficult to adhere to a cooperative agreement because the rewards of deviant behaviour are much greater when the buyers' orders are "lumpy". Cheating on a tacit cartel will be more likely, if it entails winning a very large contract. Punishment of a deviant firm would also be much more difficult due to the lumpiness of orders. Thus, the greater incentive to cheat and the lower threat of punishment would tend to make cooperative equilibria between suppliers less stable and competitive behaviour more likely. It is through this mechanism that it is assumed that an increasingly concentrated downstream industry could affect the "toughness of price competition" in its upstream supplying industry. In turn, the size of the buyers to an industry can have an impact upon the level of concentration required to achieve an acceptable Nash equilibrium between the players in the upstream industry at which an adequate return on investment is recouped.

The case studies which follow, and those in Appendix I, attempt to demonstrate the two-way influence of retail strategy on equilibrium concentration in manufacturing. Thus, the analysis which follows seeks to identify in which product classes countervailing market power may be increasing concentration, and in which the growth of retailers' own-label may be allowing for some fragmentation. It is also possible that both effects are operating in the same product class. In this way price pressure on branded manufacturers may cause consolidation, while at the same time new entrants may arise to procure private label products. Thus, there is the possibility of the development of a dual market structure. Firms producing highly advertised branded goods may be large relative to their minimum efficient scale (MES), while the segment supplying the supermarkets own-label products may be composed of a periphery of many smaller firms. Whether or not the large brand manufacturers supply the own-label segment, the endogenous element of sunk cost upon entry has been diminished or removed, and so an important

constraint on equilibrium market structure has likewise been diminished or removed.

4.4   Analysis of Manufacturing Sectors

In terms of the theory outlined above we would expect a trend towards concentration in sectors where retailers' own-label penetration is low or where advertising never became significant in raising equilibrium concentration, and where supermarket buying power has been prominent in raising the "toughness of price competition". In sectors where manufacturer advertising was high and is declining due to an increase in the share of own-label, we might expect some fragmentation, and the existence of new entrants. Alternatively, both influences may operate, where the large brand manufacturers in a sector are forced to become more concentrated due to the price pressure from retailers, while at the same time smaller new entrants may meet some of the own-label supply. Thus, it is useful to consider not only the level of concentration, but also net changes in the number of small firms in the sector:

H3: In sectors where advertising never was important in raising concentration, the increased buying power of the multiples would be expected to lead to increased concentration in upstream industries.

H4: In sectors where advertising may have been responsible for raising the lower bound to equilibrium concentration levels, but where supermarket own-label penetration has remained low, increased buying power may dominate and so lead to higher levels of concentration in upstream industries.

H5: In sectors where advertising expenditure was high and was significant in raising the level of concentration in food manufacturing, and which have subsequently been penetrated by supermarket own-labels leading to a lower advertising spend by the brand manufacturers, market fragmentation of the upstream industry would be a possibility. However, as the theory only predicts a lower bound to equilibrium concentration, any existing level of concentration above this lower bound is still constitutes an equilibrium. Therefore an observed fall in concentration may or may not occur.

These three hypotheses are summarized in Table 4.1 below.

Table 4.1: *Hypothesized Effects of Retail Multiples on Manufacturing Sectors*

Hypothesis Classification	Expected change in concentration
H3: Advertising never was significant.	Increasing concentration due to increases in the "toughness of price competition" from retailer buying power.
H4: Advertising significant but not undermined by own-label penetration.	Increasing concentration due to increases in "toughness of price competition" and a maintained high advertising spend.
H5: Advertising was significant but subsequently undermined by own-label.	Fragmentation or curtailed concentration may be possible due to the diminishing role of advertising as a constraint on market structure.

It is useful to consider both changes in the overall level of concentration and changes in the number of small firms, which may indicate new entry to the sector. Accordingly, reference is made throughout the analysis to Table 4.2 and Table 4.3 below which show the five firm concentration ratio (C_5) and the number of firms in the 1-99 employee size group between 1980 and 1992.

An individual case study approach is adopted in the following section. The sectors were chosen to demonstrate the three categories of the hypothesis in terms of industry experience, through brief case histories of U.K. food sectors. The four

sectors studied below are slaughtering and meat processing, soft drinks, pet foods and frozen food. Tables 4.2 and 4.3 give figures for fish processing which includes frozen fish products, a sub-sector of frozen food. Thus, developments in the fish processing sector are also included below. Brief descriptions of the other food industry sectors in terms of the theory may be found in Appendix I. A rich variety of industry specific factors contribute to shape market structure in each case, and so an empirical model is less likely to reveal firm relationships and be less fruitful than a consideration of each sector in terms of the theory.

The main purpose of the exercise is not to test a new theory of vertical competition and countervailing market power. Rather it is hoped that the exercise allows the reader to grasp the forces at play in vertical market competition and concentration dynamics, and these in turn form the basis for the discussion of producer market power in Chapter 5 and 6.

Table 4.2: *Market Share of Top Five Firms Measured as Percentage of Gross Output*

	1980	1982	1984	1986	1988	1990	1992
Slaughtering and Meat Processing	na	23	15	20.3	21.4	21.7	19.7
Soft Drinks	52	49	45	37	50.6	55.1	63.1
Animal Feedingstuffs	46	45	36	49.8	49.1	47.9	54.1
Fish Processing	64	69	69	63	64	52.7	49

Source: Business Series Monitor, PA1002 Various
*Figures for Sugar and By-Products approximate

The variables of importance to the theory are drawn together in Table 4.4. Thus, the share of each sectors outputs delivered to final demand, the share of retail sales by the multiples, the advertising to sales ratio and finally the percentage of own-label penetration must be taken into consideration in an analysis of the effects of retail concentration and strategy on equilibrium concentration in food manufacturing.

Table 4.3: *Number of Enterprises in the 1-99 Employee Size Group*

	1984	1986	1988	1990	1992
Slaughtering and Meat Processing	1618	1560	1655	1230	1140
Soft Drinks	211	197	183	168	162
Animal Feedingstuffs	517	522	452	429	393
Fish Processing	258	251	258	249	241

Source: Series Business Monitor, PA1002 various
na: Not Available

Table 4.4: *Key Aspects of Sectors to be Studied*

	Share of Total Output delivered to final demand[a]	Multiple Share of Retail Sales[b]	Advertising to Sales ratio[c]	Own-Label Penetration[b]	Summary of Categories
Slaughtering and Meat Processing	78%	60% 1994	low	nr	Low brand advertising
Soft Drinks	high	less than 40%	1.2	varies widely by sub-sector[d]	Low sales through multiples
Pet Foods	high	~70%	4.3	7% to 30%	Low own-label
Fish Products (Frozen)	high	68% 1992	decreasing		high branding and own-label
Frozen Foods	high	~80%	2.6	42% 1990	high advertising increasing own-label

high: Figure not available, but assumed to be a very high proportion of total output.
~ Authors own estimates
[a] Source: CSO "Input Output Tables for the United Kingdom 1990" in *The U.K. Food and Drink Industry*, Strak and Morgan (eds), 1995.
[b] Source: Economist Intelligence Unit, Retail Business Market Reports and Surveys (various).
[c] Source: Figures given are for 1986. Source Sutton (1991), p.107, except for cheese.
[d] See Table 4.7 below.
nr - Not Relevant

4.4.1 <u>Advertising Insignificant - Slaughtering and Meat Processing</u>

In the slaughtering and meat processing industry advertising has not played a significant role in the development of market structure. It has a low concentration ratio relative to others in the food industry, at around 20 percent, and has a very high number of small enterprises (Tables 4.2 and 4.3). However, the figures in Tables 4.2 and 4.3 relate to first-stage processing such as abattoirs and meat products. Seventy-eight percent of the output of this sector were delivered to final demand and a rapidly increasing proportion of this is through the retail multiples (Table 4.4). While a large degree of restructuring has taken place, a significant rise in concentration is not apparent. The sector is predominantly composed of small family firms organised as limited companies often operating on a single-plant basis. For abattoirs there has, however, been a significant rise in average throughput from around 10 thousand cattle units in 1980 to almost 20 thousand in 1993. This increase in concentration in slaughtering is linked to both the rise in proportion of meat sold to the retail multiples relative to butchers shops and to new E.U. regulations. Both of these developments are documented below. Table 4.5 shows there has also been a considerable degree of rationalisation in the further processing sector.

Table 4.5: *U.K. Meat Processing Sector, No. of Enterprises, 1989-1992*

	1989	1990	1991	1992
Bacon Curing & Red Meat Processing	722	655	617	605
Slaughterhouses	514	514	526	491
Poultry Slaughtering & Processing	128	123	115	na

Source: CSO in Gunthorpe, Ingham and Palmer (1995).
NB. An enterprise is one or more businesses under common ownership.

First, changes in concentration in the abattoir sector have undoubtedly been precipitated by European Community regulations. All plants are required to

achieve E.U. approved status by 1996, whether they trade on a national or an international basis. While making the necessary structural changes, plants can seek a temporary derogation from these requirements and very low throughput plants can obtain permanent derogations. These derogations apply only to the structural requirements of the legislation, all plants must meet EU hygiene standards (Gunthorpe, Ingham and Palmer, 1995).

Second, since the mid-eighties there has been a sharp rise in the share of the supermarkets in retail meat sales. In 1986/87 supermarkets and butchers held an equal 36 percent of sales. By 1994, 60 percent of all meat was sold through the multiples (MLC, 1994). This rapid change in distribution has had a discernable impact on the organisation of the meat processing trade. Alongside the plant rationalisation, the sector has become more integrated, with the large abattoirs tending to process their product ready for the supermarket shelf[25], as opposed to selling sides of beef or lamb as they once did. Thus, the abattoirs and wholesalers have become largely integrated. Where separate wholesalers still remain it is likely they are supplying the independent butchers.

Gunthorpe et al (1995) also noted that the concentration of retailer power has been a spur to restructuring of the industry, partly because processors have sought the commercial strength to match the buying muscle of the retail chains. The processors have tried to limit their vulnerability by broadening their customer base. Thus, attention has turned back towards independent retail, catering, secondary wholesaling and further processing/manufacturing outlets and exports. However, the Meat and Livestock Commission (MLC) estimates imply that even after any foreseeable restructuring, the processing sector will still be too fragmented for individual companies to negotiate on an equal basis with supermarket chains.

---

[25]Some of the multiple retailers give pre-packed meat shorter shelf life than other discount stores. This leads to the situation where meat, past its sell-by date in one store, is returned to the meat packer and repacked for the discount store. Thus, it may be possible to see a cut of meat in a supermarket one day, and see it again in a discount store a couple of days later (trade source).

Undoubtedly increased supermarket buying power has caused an increase in the toughness of price competition for slaughterers and meat processors. The resultant price pressure is likely to drive the upstream sector towards higher levels of concentration. Furthermore, in the case of meat processing it appears that increased price pressure from downstream may also have precipitated increased vertical integration in the upstream trade[26]. Some of the multiples have even formed vertical partnerships with meat processors to procure regular supplies of packaged fresh meat ready for the shelf. Often these partnerships involve forward contracted prices, and some processors have experienced difficulty when live auction market prices rise. Such difficulties are likely to lead to further concentration in meat processing. Vertical partnerships and forward contracting are discussed in more detail in Chapter 5.

4.4.2 Advertising Intensive Industries with Low Own-Label Penetration - Soft Drinks and Pet Foods

Sutton (1991) maintains that for advertising intensive industries, increases in market size cannot lead to the emergence of a fragmented market structure. Thus, the theory implies that some small set of firms must at some point emerge as high advertisers, whose combined market share exceeds some lower bound, however large the market becomes. A remaining fringe consisting of an indefinite number of firms that do little or no advertising may coexist with the market leaders at equilibrium (Sutton, 1991, p.174). In the U.K. context, the hypothesis also means that where a high percentage of the sectors' products are distributed by the supermarket sector, and where a high proportion of these have been penetrated by own-label, some fragmentation of market structure would be expected. However, where the sectors' products are not primarily sold through the multiples (such as soft drinks), or where the multiples have been unsuccessful in developing a high percentage of own-label in the product mix (such as in pet foods), a trend towards

---

[26]Therefore, supermarkets can source pre-packed portions of meat from suppliers which are ready for the supermarket shelf.

de-concentration would not be expected, because the endogenous sunk cost constraint on market structure would not have been undermined by the strategies of the concentrated retail sector. An example of such a sector is that of soft drinks.

This sector encompasses both the non-carbonated dilutable soft drinks and the carbonated sector. Within the latter sub-sector are the highly advertised colas, the lemonades and other non mixers. There have been significant shifts between the various sub-sectors of the soft drinks market over the period 1984 to 1994 and Table 4.6 shows how the shares of total consumption of soft drinks has shifted towards carbonates and away from dilutables. Own-label penetration also varies widely across these subsectors, as shown in Table 4.7.

The soft drinks industry underwent a period of restructuring in the early half of the 1980s. This was connected with intensifying price competition, in turn a result of over-capacity, which had arisen due to the introduction of new plastic bottle technology. This over-capacity in turn gave the retailers a powerful bargaining weapon in pressing the manufacturing sector for price concessions, and so had its influence on the restructuring (Sutton, 1991).

Table 4.6: *Breakdown of U.K. Soft Drink Consumption*

	1984	1994
Total Consumption	5,695 million litres	9,145 million litres
Carbonates	46%	51%
Dilutables	40%	29%
Fruit Juice	10%	9%
Fruit Drinks	3%	4%
Bottled Water	1%	7%

Source: Zenith International, "The 1995 Sucralose Soft Drinks Report" in Gunthorpe, Morgan and Strak (1995).

Table 4.7: *Own-Label Penetration in Soft Drinks, 1992*ₐ

	Volume	Value
Colas	12	6
Lemonades	58	60
Non-Mixers	24	16
Non-Carbonated	na	25[b]

ᵃ Sales through grocery outlets only
ᵇ 1991
Source: Barracloughs Soft Drinks Market Report. EIU Retail Business Market Surveys. November 1993, No. 429.

Carbonated soft drinks are by far the biggest component of the soft drinks market, with over 60 percent of soft drinks sales. Of the carbonated drinks grocers' shops distributed about 44 percent by volume in 1992. For non-carbonated soft drinks, the multiples distribute over half. In this latter sector own-label penetration has declined from 35 percent in 1988 to 25 percent in 1991. However, there appear to be supply side reasons for this reduction in own-label, as it has occurred alongside a steady fall in advertising on dilutables. However, advertising on the ready-to-drink segment has been increasing, and the restructuring of this sector is likely to significantly outweigh any shifts in the dilutable sector and so be responsible for the observed increasing concentration in Table 4.2.

In the case of soft drinks the evidence suggests that the effect of concentration in retailing was to promote further concentration in the upstream food manufacturing sector. A Coca-Cola company review indicated that its usual franchising system was ill suited to a market in which retailing was dominated by a handful of major supermarket chains, with whom it was essential to deal on a national basis. This evidence runs counter to Venturini (1993) and Connor et al (1994) who argued that the effect of powerful downstream buyers might constrain increases in manufacturing concentration. The result, however, remains consistent with the hypothesis put forward here that an increase in the toughness of price competition,

due to retail concentration and buying power, would be expected to result in higher levels of concentration in upstream manufacturing.

Had the sector been previously highly concentrated due to an endogenously determined advertising barrier, and had own-label penetration subsequently became significant, smaller companies could have entered to supply the supermarkets without high outlays on advertising. In this situation the effect of the own-label strategy upon the upstream food manufacturing sector would be towards fragmentation. However, the soft drink sector continued to concentrate throughout the period (Table 4.2), and a variety of factors are responsible for this. Firstly, the U.K. market remained relatively fragmented up until the early 1980s. Secondly, for the carbonated sector, E.C. regulations allowed cheap Coca-Cola imports in from Europe, and as the Coca-Cola price was a benchmark price for the rest of the industry, prices across the board had been falling (Sutton, 1991). Thirdly, sales through supermarkets took up less than half of total sales of the carbonated soft drinks, as the confectioners, tobacconists and newsagents (CTNs), the licensed trade and the leisure industry also accounted for a large proportion of sales. Therefore, while own-label has formed a significant proportion of sales through grocers as a whole, own-label penetration has not undermined the high advertising outlays of the industry.

Thus, the recent entry of Virgin to the carbonated sector cannot be explained by a decrease in the advertising barrier of the cola sector due to own-label. In 1992 Coca-Cola had a 65 percent market share, Pepsi Cola 21 percent and own-label an 8 percent market share[27]. Clearly own-label has not caused a significant fall in the branded sector market shares. Therefore new entry must be possible by another route. The answer may be that a company, like Virgin, carries with it a reputation, an image and a consumer loyalty from other products and industries. Thus, Virgin would have a smaller advertising barrier to surmount, due to its already

---

[27]Sales through grocery outlets only. Source: Barracloughs Soft Drink Market Report, in E.I.U. Retail Business Market Surveys, November 1993, No. 429.

appreciable reputation. In addition Virgin would incur low R&D expenditure for the new product as it sourced the concentrate for its new cola from an existing Canadian manufacturer.

The pet food sector provides a similar story. The market for pet foods remains dominated by two companies, Pedigree Petfoods and Spillers Foods, although other companies such as Quaker and Friskies Petcare are gaining ground. Advertising expenditure is high, equivalent to between 3 and 4 percent of the total retail value. Own-label penetration varies by product category as shown in Table 4.8.

Table 4.8: *Own-Label Penetration in Pet Foods, 1993, Percent*

Canned Dog Food	9
Dog Biscuits	12
Dog Mixer	30
Canned Cat Food	7[a]

[a] 12 months to May 1994

Source: EIU Retail Business and trade estimates. Retail Business Surveys, September, 1994, No.349.

With more than 90 percent of all petfoods sold through grocers, the dominance of the multiples might be expected to have an impact on the equilibrium level of concentration in pet foods. However, the branded sector is particularly strong in pet foods and (apart from dog mixers) own-label penetration remains low in the sector. This suggests that pet foods are one of the few areas where the balance of power may lie with the manufacturer rather than the retailer. Supermarkets may not have been as successful as they have in other product groups in developing a quality image for their own-label products. The weakness of the own-label sector may also reflect the willingness of consumers to pay more for a premium product.

On the other hand, strong price pressure does appear responsible for driving the sector towards high levels of concentration. The high degree of product proliferation in pet foods means that they require a large amount of retailer shelf

space. In turn this may give retailers increased power in influencing the direction in which the market develops and increased influence over the structure of the industry.

4.4.3 Advertising Intensive Industries with High Own-Label Penetration - Frozen Foods and Fish Processing

As stated earlier, in advertising intensive industries high own-label penetration may lead to some fragmentation of market structure. This is so because the fringe of smaller firms compete on price, whereas the larger firms maintain market share by high advertising support. Because the smaller firms compete on price they are more likely to supply the growing own-label sector. Therefore it is possible that the fringe of smaller firms can gain market share from the high advertising firms as the own-label sector expands, and so concentration in the sector declines, as shown by the frozen food and fish processing sectors.

The frozen food sector is significant in its relevance to the theory, in that supermarket strategies appear to have had a discernable impact on the observed fragmentation of the industry. During the 1960s Birds Eye dominated the market, with Ross and Findus constituting the main threat to the market leader. The asymmetry between the leader and Ross and Findus, meant that a competitive escalation in advertising revenues was somewhat muted. Birds Eye devoted around 2 percent of its sales revenue to advertising in the early 1970s, and due to its domination of the market this meant an overall advertising spend far in excess of that possible by its rivals. Also, because Ross had a lower share of the retail market this reduced the incentive to escalate advertising expenditure (Sutton, 1991, p.192). Ross and Findus also suffered from the first mover advantage enjoyed by Birds Eye. The low profitability of Ross Foods and Findus is due, in part, to the cost advantages derived by Birds Eye from economies of scale in distribution, advertising and selling expenses (MMC, 1976, p.60). Ross and Findus closely followed Birds Eye's price changes.

While Ross and Findus had their own well developed distribution systems, they faced problems in securing display space in retail outlets. For this reason both companies developed strategies to supply retailers with refrigerators, either provided free or on loan. Perhaps more importantly in the long run development of the sector, both companies attempted to build an up a significant presence in own-label sales. This strategy was necessary partly because retailers would often stock only two brands, and Birds Eye was almost invariably one of the two. As such, the introduction of own-label would endanger the carrying of Ross or Findus.

The major trend that shaped the market between the mid-1970s and the mid-1980s was the rise of retailers' own-labels. Own-label sales of frozen food accounted for a mere 6 percent of retail sales in 1972; by the mid-1980s, it accounted for 35 percent. This meant that the leading retailer, Sainsbury, had sales equivalent to those of the leading manufacturer, and outsold both Ross and Findus (Sutton, 1991). However, throughout this period Birds Eye maintained high advertising levels in an attempt to preserve its brand image, and attempted to constantly introduce new products, particularly in the high-value-added niche markets. Nevertheless, as Table 4.9 shows, own-label made significant in-roads.

Table 4.9: *Retail Sales in Quick Frozen Foods, Market Shares*

	1972	1987	1990*
Birds Eye	60	25	20
Ross	8	8	14
Findus	18	4	8
Own-Label	6	35	42
Others	8	28	16

Forecast from EIU Retail Business No.362 April 1988
Source:EEC 1976 and Sutton (1991).

However, the erosion of concentration is less linked to countervailing market power than it was to the shift of advertising effectiveness. The enjoyed by the major retailers in terms of their huge clientele meant that they could increase the market share of own-label without recourse to the escalation of advertising expenditures route.

During the 1980s the encroachment of own-label brought a variety of reactions from the brand manufacturers. Birds Eye attempted to constantly introduce new products, in particular aiming at higher value niche markets. To this end it appears to have enjoyed some success. In prepared meals Birds Eye gained 37 percent of the market by 1987, against an own-label share of 20 percent. This contrasts with the lower value sector of frozen vegetables, where Birds Eye's share fell to 21 percent by 1987 and own-label accounted for 49 percent[28].

Birds Eye attempted to maintain its high advertising-sales ratio. However, as its sales declined so its total advertising spend fell. Findus reacted to a substantial decline in market share by attempting to maintain a high advertising spend. Findus however left the sector completely in the early 1980s. Ross Foods however retained a major presence in the catering segment. As a result by 1993 own-label penetration in frozen foods stood at around 44 percent (AGB Superpanel, 1994). This high level of own-label penetration diminished the ability of incumbents in manufacturing to maintain market share by high advertising. Thus, a fringe of smaller firms were able to grow by supplying own-label products to the supermarkets leading to the observed de-concentration of the sector.

In the frozen vegetables sub-sector this trend has proceeded even further. The sub-sector has become dominated by the large retailers own brands. Own-label penetration has increased from 50 percent in 1987 to 60 percent in 1993 and the market share of the main brand manufacturers has declined over this period (Table 4.10). This underlines that own-label penetration tends to be higher in low value

---

[28]Source: Unilever, in Sutton (1991), p.196.

commodity sub-sectors such as frozen vegetables. Brand shares tend to remain higher in prepared meals and other more high value-added products. Thus, it appears a main strategy of the brand manufacturers is to constantly develop new products in order to maintain market share over own-label. Thus market shares may be defended increasingly by R&D expenditure rather than advertising support.

Table 4.10: *Market Share for Frozen Vegetables, % of value of market, 1987-93*

	1987	1988	1989	1990	1991	1992	1993
Ross Young	8	9	7	7	7	7	7
BEW[a]	21	20	19	19	18	17	17
Own-Label	50	52	55	57	59	60	60
Other	21	20	19	17	16	16	16
Total	100	100	100	100	100	100	100

Source: Datamonitor (1994), in Simpson, Farley and Hallam (1995), p.274.
a Birds Eye Walls

The fish processing sector, which includes fresh fish processing as well as frozen fish and other fish products, also illustrates operation of the hypothesis. Some of the sectors outputs may be advertising intensive, however, the main component fish processing is fresh fish processing, which is not advertising intensive. Table 4.11, however, shows how advertising on fish has declined between 1988 and 1992, especially in the frozen fish products sector.

Table 4.11: *Advertising Expenditure on Fish, 1988-92*
(£'000)

	1988	1989	1990	1991	1992
SFIA	3415	571	1249	1291	1282
Welsh Fish	66	88	-	-	-
Scotch Salmon	383	209	365	-	-
Scotch Salmon Association	-	79	-	-	-
Lochinvar Salmon	-	-	418	224	223
Frozen Fish Products	6924	6039	6908	4747	3402
Total	10788	6986	8904	6262	4907

Source: Register-MEAL, in EIU No.419.

While multiple distribution is increasing, constituting 32.9 percent of fresh and chilled fish distribution in 1992 compared to 14.4 percent in 1986, over half of fresh fish distribution continues to be sold through the traditional fishmongers. Nevertheless, the multiples have had some impact on the sector. The quality guidelines laid down by them have resulted in merchants having difficulty in disposing of the remainder of the catch. This reduces the quality of fish through other outlets such as the wholesale markets.

Overall concentration in fish processing has been decreasing (Table 4.2) yet the number of small firms also appears to have been decreasing (Table 4.3). The number of firms in the upper-middle size group (200-499 employees) has increased throughout the decade from 4 firms in 1980 to 11 firms in 1992, while the number of large firms (500 and over employees) has remained constant. Among the major companies supplying processed fish are Birds Eye, Ross Young and Findus. These companies originally maintained high market shares through advertising support. With the multiple retailers having increased their share of distribution by

developing own-label products and by allocating increasing amounts of space to the retailing of frozen fish products, it is likely that the fish processing sector has become less concentrated due to the diminishing role of advertising as a sunk cost. Table 4.11 shows how advertising has declined most in the frozen fish products sector. Thus, the de-concentration experienced by the fish processing sector may be partly the result of an overlap with the frozen food sector.

However, as noted, the de-concentration has paradoxically been associated with a decrease in the number of small firms. This may also be explicable in terms of the theory. The diminishing role of advertising may have reduced the ability of large firms to defend market share and hence lowered concentration. However the reduction in advertising and the increased buying power of the large retailers may also have increased the necessity to achieve scale economies upstream. Thus, large firms may lose market share through a decline in the effectiveness of their advertising, whilst small firms must get bigger due to the increase in the intensity of price competition and the need to achieve greater scale economies. As such, the changes in the constraints on equilibrium structure may have had perceptible impacts on the configuration of the market structure.

4.5 Summary

The effect of a concentrated supermarket sector upon the upstream food manufacturing industry depends upon a combination of two sets of factors. The first set relates to the factors which initially determined concentration in food manufacturing. The ratio of set-up cost to market size, the toughness of price competition and the level of advertising intensity combine to produce a lower-bound to equilibrium levels of concentration. The second set relates to the success of the multiple retail sector in developing own-label products, and the manner in which they have increased the toughness of price competition in food manufacturing.

Hypotheses H3, H4 and H5 would appear to be reasonably supported by Table 4.4 and the case studies in sections 4.4.1 to 4.4.3 and in Appendix I. The sectors which have experienced some de-concentration tended to be advertising-intensive ones which have subsequently been penetrated by the multiples' own-label products. The non-advertising-intensive sectors which have experienced de-concentration, covered in Appendix I, such as grain milling and bread could be regarded as having been in a high initial state of concentration, higher than would be expected on the basis of the Sutton (1991) model. Other anomalous sectors such as ice cream, chocolate and sugar confectionary, are still largely distributed through the CTN (confectioners, tobacconists and newsagents) sector. As such the effect of the multiples on equilibrium concentration is not likely to be large.

In sectors such as frozen food, margarine, and fish processing (frozen) where manufacturer branding and advertising was high, and own-label penetration subsequently undermined some or all of this advertising barrier, the effect of the multiples can lead to some de-concentration. This point was also made in a different way by Mackenzie (1988) who contended that the large buyers can encourage new entrants in order to maintain their strategic bargaining advantage:

> Retailers also impact on competition in manufacturing by influencing market entry through their decisions on stocking. For existing manufacturers this refers to their ability to get new products and varieties of existing products accepted by retailers. For new companies attempting to break into the market, this means achieving acceptability and satisfying rigorous requirements in relation to such factors as distribution, hygiene and quality, packaging and product specification. These might prove difficult to achieve for a fledgling company, even in the case of products which are already shown to sell. In addition a new entrant would need to satisfy a minimum volume of production which usually requires a substantial initial investment up-front. However, some retailers do encourage new suppliers, especially of own-label lines, by underwriting a volume of production sufficient to secure the viability of investment. In so

doing they increase their future options for supplies, and stimulate competition in particular markets. Thus, retailers can and do have a strong hand in controlling market entry by new manufacturers (Mackenzie, 1988, p.50-51).

De-concentration has occurred in the fish processing sector, and the organic oils and fats sector. Of these, the sub-sectors of frozen fish products and margarine have experienced declines in advertising intensity due to own-label penetration. Therefore, the experience of these sectors would tend to lend weight to the hypothesis. However, it appears that in the majority of product sectors, the increased price pressure of the multiples causes consolidation in manufacturing. Higher levels of concentration in manufacturing may enable sellers to maintain margins in the face of very large buyers, such that adequate returns on capital are achieved.

The link between relative concentration levels and bargaining power was highlighted by the Monopolies and Mergers Commission in its report on Linfood Holdings and Fitch Lovell (MMC, 1983) in which it said the following in referring to a Sainsbury study on concentration in manufacturing:

> Although this suggested a considerably greater degree of concentration among food manufacturers than among food retailers, this does not necessarily provide a guide to their relative bargaining strength. Up to the early 1970s the largest suppliers were often of more importance to an individual retailer than he was to them. However the increased concentration in retailing and the consequent reduction in the number of buying points led to a situation where a manufacturers' three largest customers might typically account for over half of his sales, whereas any one manufacturer would be unlikely to account for more than 5 percent of a retailers' total purchases. Also the power to reduce or cease purchasing is much more potent and more difficult to counter than is the power to reduce or cease supplying (M.M.C., 1983, p.14).

There are of course other reasons for increasing concentration in food manufacturing apart from the pressing need to consolidate and rationalise and as a response to retail mergers. Firstly, companies will wish to acquire additional brands both tried and with potential, without the risk and delay of new product development. Secondly, acquisitions can be motivated by a desire to maximise financial gain by breaking up an existing group of food companies and selling them off to other manufacturers. A further impetus to mergers is the growth in the importance of international markets for food manufacturers. This is necessary to achieve the scale of operation to compete effectively in international markets (Mackenzie, 1988).

Whether a manufacturing sector experiences further concentration or fragmentation due to increasing concentration in retailing depends upon the strategies of both sectors and upon consumers. Fragmentation of manufacturing can occur where the level of concentration is unconstrained by the ratio of set-up costs to market size, and the market sector becomes commodity-like such that consumers stop believing that any brand could hold any added value over the basic product. This is what appears to have occurred in many segments of the frozen food sector, and as own-label spreads into each new segment of the frozen food sector, this trend may well continue.

In turn the optimal strategies of the manufacturing sector regarding supplying own-label may depend upon consumers' beliefs. If consumer beliefs about added value of branded products cannot be maintained by advertising, the manufacturing sector may have little choice than to switch to supplying own-label. Secondly, foreign entrants can gain a foothold in a national market by supplying own-label, and so incumbents may be forced to compete in the own-label market to maintain market share. Again, the necessity of whether to move into own-label may depend upon consumer beliefs regarding the added value of the branded sector (Davies, 1993).

Manufacturers may decide to supply both the branded and own-label sectors. This strategy is more likely in sectors where demand is declining or static, and under-

capacity utilisation is a problem. In such a situation manufacturers will have a stronger incentive to increase production, even at the lower prices of own-label products.

Thirdly, manufacturers can decide not to supply own-label. Examples include Kelloggs in RTE cereals and Nestlé in coffee. Many have even run advertising campaigns to inform consumers that the own-labels are not made by the leading brand suppliers. This strategy is more likely in growth sectors, such as the U.K. coffee market, otherwise growth must be based on expansion into other European markets. However, pan-European brands can have problems in that some names do not travel - such as the Danish chocolate brand Plopp, or the Spanish soft drink Revoltosa. Secondly, the advantages of pan-European branding may be short lived as pan-European retail alliances have been formed with a view to the development of own-label on a wider scale (Davies, 1993).

Thus, while increases in buyer concentration are a response to seller concentration, so further increases in seller concentration can be the response to high buyer concentration. Mackenzie (1988) notes:

> In completely free market conditions, the most likely outcome over a period of time of the pressure on food manufacturers from the buying power of retailers would be a much greater degree of concentration of food manufacturing through mergers. It is likely that as a response to further retail concentration there will be further concentration in food manufacturing (Mackenzie, 1988, p.58).

In other instances seller fragmentation can occur, where advertising barriers are undermined due to own-label, and where the large buyers encourage new entrants, as a strategic choice in maintaining a number of suppliers. A shift of focus is perhaps still required in competition policy, from an intra-sectoral consideration of competition, to a broader inter-sectoral vision of vertical market competition, bilateral oligopoly and the factors determining concentration dynamics.

Upstream firms may attempt to defend market share by shifting from advertising competition to new product development (NPD) competition. It seems plausible that Stage 1 strategies shift as firms perceive a decrease in the effectiveness of their advertising. Large retailers also appear to be increasing their NPD activity. Thus, the interaction of the retail and food processing stages of the food chain can be seen as a vertical game for market share between large brand manufacturers and own-label. The strategies continually adapt such that the determinants of market structure in food manufacturing are continually developing changing. These ideas are developed further in Chapter 7 of this thesis.

In future the rise of "virtual" home shopping, as a facet of retail horizontal competition, is likely to revolutionize both the structure of retailing and manufacturing. The cost of entry into the virtual shopping market will be critical in determining future bargaining relationships and structures. Prices are likely to be more easily comparable with home shopping. However product characteristics will be less comparable than in "real" shopping. Thus, the presentation of the products in a virtual realm would be crucial. Accordingly, it may be important for manufacturers in the future to be involved in any virtual market which develops, because not to do so may allow retailers much greater power in the game for consumer patronage and hence even greater bargaining strength.

This chapter utilised the main principles of the strategic investment game which were outlined in Chapter 2 of this thesis. The idea of strategic investment is embodied within the two-stage sunk cost model. The market structure of the food manufacturing sector has been described in terms of this two-stage game framework. Thus Stage 1 strategic investment decisions, regarding set-up costs and advertising, combine with Stage 2 price competition to describe the structure of the market. This chapter extended this framework to consider how the concentrated food retail sector affects this game, and hence how it affects the market structures in food manufacturing. The analysis above shows how this influence is not a simple positive or negative effect, but depends upon the original determinants of

structure within food manufacturing and the retailers ability to shift consumer patronage towards own-label products.

The picture of vertical market interaction and concentration dynamics developed above forms the theoretical basis for the consideration of producer market power which is the subject of Chapters 5 and 6.

Chapter 5

MARKET POWER AND PRODUCER COOPERATIVES
FREE MARKET SITUATIONS

5.1   Introduction

Chapters 3 and 4 developed theories to describe the manner in which market structures develop in the food chain. Briefly stated, vertical relationships in the market affect horizontal relationships between players and so have an impact upon the equilibrium structure of the various sectors. This view of the dynamics of vertical market interaction and concentration forms a basis for a consideration of agricultural marketing structures and vertical competition in the food chain. Specifically, the argument previously outlined that the cycle of causality runs through bargaining power relationships to equilibrium market structures is maintained. However, this theoretical framework is now applied to the next upstream stage of the food chain, namely the relationship between buyers (be they manufacturers, merchants or retailers) and the producers of agricultural commodities.

The traditional view of countervailing market power as applied to agricultural marketing is reviewed in section **5.2**. Section **5.3** moves on to consider the difference between seller and buyer market power to show that the idea of countervailing market power does not simply transpose from one context to the other. Section **5.4** considers the differences between cooperatives and firms in terms of their bargaining position. This leads to an appraisal of the differences in the market power/market structure relationship at the different levels of the food chain to show how seller market power does not stem from scale of operation. Section **5.5** then makes an appraisal of various forms producer marketing in terms of their market power implications on the basis of the arguments developed.

A main implication of the approach throws into question the validity of an age old assumption regarding producer cooperation in the food chain: that the

concentration of agricultural marketing structure, in itself, gives producers "countervailing" power in the market and hence yields higher prices than a fragmented selling structure. For this reason the main focus of the chapter is on cooperative marketing within the wide spectrum of structures which represent agricultural marketing.

For the purpose of the analysis, cooperatives which are not integrated downstream into food processing are termed "marketing-only" cooperatives. In terms of the hypothesis these are distinct from "downstream integrated" or "processing" cooperatives by the manner in which they may be supposed to have an impact on producer prices. Requisite cooperatives, which act as group purchasers, are not considered as part of the analysis. They are concerned with procurement of farm inputs, and because they are a collection of buyers they do not suffer from possible deviant behaviour of non-members. This is so, because requisite cooperatives can normally obtain lower input prices than an individual producer can, and so they do not suffer from the problem of deviancy (or undercutting) of individuals operating outside the cooperative.

5.2 The Traditional View of Countervailing Power

It is widely assumed that the consolidation of selling activities in the form of marketing-only cooperatives gives the producer a form of power, usually termed countervailing market power. Galbraith (1952) first described the concept primarily in reference to the manner in which large buyers could constrain the pricing power of large and powerful sellers. However, he also referred to the labour unions and agricultural cooperatives as examples of the development of countervailing market power of inherently weak sellers in the face of large and powerful buyers. The aim here is to look at the rationale behind this assumption.

Baron (1978) already recognized the lack of a rationale for the countervailing market power assumption in agricultural cooperation. Baron could find little empirical support for the supposed increased bargaining strength of cooperatives.

Thus, he alluded to a later paper by Galbraith (1954), which emphasized the role of cooperatives as the "minimization of social tensions". However, despite Baron's conclusions that cooperative marketing yielded very slight, if any, real gains, cooperative marketing continued to be justified on the grounds that they give the producer countervailing market power.

The countervailing market power assumption appears to be of particular importance to the rationale for agricultural marketing cooperation in the U.K.. Oustapassidis (1988) notes the relatively small minimum efficient size (an asset size of no more than £500,000) is probably a reflection of the nature of British cooperative activity, which does not engage in what might be loosely termed manufacturing activity. CEAS Consultants (Wye) Ltd (1988) also noted that the U.K. promotion of federalisation was for marketing and not for investment in downstream plant and resources. CEAS also advised that U.K. cooperatives should remain concerned with procurement and primary produce marketing:

> Not only is the demand for added value increasing, but also the process of adding value provides opportunities for avoiding the many difficulties and constraints which face those selling on commodity markets. In particular there is the opportunity of developing a demand for a product and consolidating the position in the market through branding or through developing the relationships with multiples to provide their own-label products. It is clear that, in general, the cooperative sector in the U.K. has made very few advances in this area. Indeed, cooperatives here have tended to focus on the production and marketing of fresh, unprocessed products and their investments in marketing activities have been restricted to areas of relatively low value adding such as storing, grading and packing. The participation of cooperatives in a manufacturing food industry is extremely limited (CEAS, 1988, p.1).

This is in sharp contrast to the development of cooperatives in many other European countries, where examples of successful, cooperatively owned

organisations with a substantial stake in the food manufacturing industry can be found (e.g. COBERCO and FRIESLAND FRICO DOMO in the Netherlands, SODIAAL and UNICOPA in France, NORDMILCH and MILCHWERKE in Germany, and KERRY and AVONMORE in Ireland[29]).

In the U.K. the creation of the statutory Marketing Boards for a range of commodities obviated the need for marketing cooperatives. In consequence government encouragement for cooperative marketing did not really get going until the 1960s in the U.K., whereas France and the Netherlands had witnessed a more or less uninterrupted evolution of cooperative structure since the 1890s (CEAS, 1988, p.vii).

However, while acknowledging the lack of vertically integrated producer cooperatives in the U.K. relative to other European states, CEAS remained unconvinced about the merits of vertical integration in the producer marketing structure:

> Those cooperatives in France and the Netherlands which have entered this arena have done so at the expense of their original objectives. It remains debateable whether or not their producer members have gained an economic advantage from this downstream diversification (CEAS, 1988, p.xv).

Thus, the CEAS consultants concluded that:

> ...farmer cooperatives should remain in that domain where they can demonstrate clear member advantage and in which they have a competitive advantage in relation to merchant alternatives. Thus, cooperatives should continue to be predominantly concerned with procurement and primary

---

[29]The Irish cooperatives have largely turned to raise capital on the stock exchange and are thus often public limited companies (PLCs). However in general the cooperative shareholders retain a majority stake in the company.

produce marketing. Value-added activities should be restricted to those activities which improve the efficiency of primary produce marketing, eg, storage, distribution and packhouse activities (CEAS, 1988, p.xv).

CEAS do not refer to the countervailing market power of marketing cooperatives. Rather they refer to their competitive advantage over merchant alternatives (CEAS, 1988, p.xv). This infers that when such marketing cooperatives can provide an extra service to the downstream food industry, they will also reap the reward of that improvement in terms of price from the buyers. CEAS also considered the philosophy of farmer cooperation and the objective of its development into the agri-food business. This they envisaged as either an *aggressive* development to expand economic activity off the farm, or as a *defensive* mechanism to safeguard the market outlet for farm produce (CEAS, 1988, p.108-111). They went no further to consider the implications for producers market power. Moreover, the CEAS consultants did not turn to consider the philosophy or rationale for their own concluding advice, namely that cooperatives should remain in the domain of primary produce marketing[30].

Many other authors have alluded to the countervailing market power hypothesis. These include Barker (1989), Foxall (1981) and Lamont (1992), who specifically refers to the potential countervailing force of horizontal integration in producer marketing.

---

[30]Moreover, CEAS consultants recommended that farmers' involvement in food processing activity should be as participants in the companies' equity (CEAS, 1988, p.xv). However this can lead to a conflict of interest between the farmer as raw material supplier and as shareholder. The example of Dairy Crest demonstrates this point. Dairy Crest was the processing arm of the England and Wales Milk Marketing Board. However, the company had to be "hived off" after a Touche Ross investigation into the industry. Thus Dairy Crest became a private company owned by dairy producers. Dairy Crest went on to form a Joint Partnership agreement with Yoplait, a French dairy company, to market high value added dairy desserts in the U.K. sourcing both milk and processing technology from France.

The following section explores the rationale for the countervailing market power assumption in terms of the precepts of game theory industrial organisation/bargaining power developed in Chapters 3 and 4. In this way the theory of bargaining strategy previously developed is further extended.

5.3   Asymmetry between Buyers and Sellers

Chapter 1 introduced the idea that buyers and sellers are not symmetric in the marketplace. Here this idea is developed further with reference to the analysis of buying power of retailers and the effects upon the manufacturing sector as sellers in Chapters 3 and 4.

Seller market power, in general, rests on a different set of premises than buyer market power, such that the concept of countervailing market power does not simply transpose to apply to the concentration of selling structures. Whether countervailing market power applies to the sellers' side of the market or not, it appears to rest on a separate set of premises to the theory of countervailing market power of large buyers. Thus, the game theory approach to the buying power of the multiple retailers does not rest upon cooperation between buyers. While small buyers may form alliances to increase their buying power, this is only necessary to increase their scale as buyers. However, collusion across large buyers does not appear to have been necessary to force price concessions from the concentrated food processing industry. Thus, a concentrated downstream sector can exercise "countervailing" market power without recourse to collusion to constrain demand. Therefore, retail multiples are not an oligopsony in the conventional sense, in that coordination between firms may not be required to achieve lower prices in their input markets.

In agricultural markets, however, where goods are often perishable and costly to transport, spatial oligopsony power becomes a possibility. Sexton (1990) for example, developed a conjectural variations model of agricultural buyers. In this model a level of perceived interdependence between buyers is assumed by Sexton,

who considers tacit collusion between buyers a possibility in many agricultural markets in the United States. The Sexton model is considered in more detail below and the situation where buyers are potentially oligopsonised is dealt with fully in Chapter 6 in the analysis of the U.K. dairy industry. For the present however, collusion does not appear necessary between large downstream buyers in the U.K. food chain.

This is distinct from the game theory model of food manufacturers described in Chapter 4, where increases in the exogenous "toughness of price competition" can force the manufacturing sector towards higher levels of concentration. This consolidation occurs because at the existing level of concentration, players can no longer maintain an acceptable Nash equilibrium. The structure of players is too fragmented under the exogenous "toughness of price competition" to achieve a level of coordination necessary to recoup an adequate return on investment. Thus, the result of an exogenous increase in the "toughness of price competition" is consolidation, in order to achieve a game equilibrium at which an acceptable level of profit is recouped by the players when they act as sellers.

Therefore a fundamental asymmetry between the market power of the buyers and sellers in the food chain is that even large sellers require some form of tacit coordination to exercise their market power, while large buyers do not. Carrying this argument over to the concept of countervailing market power implies that a large buyer's countervailing market power is fundamentally different to a large seller's countervailing market power. The buyer's countervailing power stems from size alone; the seller's countervailing power stems from the cooperation enjoyed with other sellers. Indeed the large buyer's market power rests on the impact on the level of coordination achievable in the upstream game between sellers.

The large seller's market power rests upon the ability to coordinate with the other firms in the sector to restrain excessive price competition. Consolidation occurs at least up until the point that deviant behaviour is no longer an optimal strategy for any player. However, the large buyer's countervailing market power requires

no such coordination between players. Rather, size alone as a buyer has an impact upon the game played between suppliers. Due to the size of orders, the large buyer effectively makes deviant behaviour more profitable in the upstream supplying industry. The suppliers may find it more difficult to adhere to a cooperative agreement because the rewards of deviant behaviour are much greater when the buyer's orders are "lumpy". Thus, the size of the buyers to an industry can have an impact upon the level of concentration required to achieve a Nash equilibrium between the sellers in the upstream industry at which an adequate return on investment is recouped.

However there may be a second reason for the difference in the effect of the large and the small buyer on an upstream oligopoly. The large buyer can threaten the domestic oligopoly with turning to imports, such that even if the selling cartel was coordinated enough to hold out against a powerful buyer, they might all lose the game together to a foreign competitor. This can be seen in the manner in which both the retailers and the manufacturers across Europe are coordinating their activities. Retailers can threaten manufacturers more easily with imports when they have horizontal links across countries. Multinational food processors also have access to a variety of markets. This allows them to obtain a broad spectrum of prices and so may find it easier to hold out against a powerful buyer, or may credibly threaten to relocate production[31]. The asymmetry between buying and selling is also apparent in the forms of international links employed. For the buyers, retail alliances appear sufficient for the present. The sellers in general appear to require stronger forms of bonding, usually merged, under common ownership.

Thus, in summary, for large buyers collusion is not required; size alone is sufficient to force price concessions between few rival suppliers. For sellers, the level of concentration must be sufficient to achieve a degree of coordination

---

[31]This strategy can also be used in the manufacturers input market relationship with agricultural producers.

between the players. Buyers only require to be large enough to break coordination between the sellers, either through the increased rewards to deviant behaviour, or through the threat to import. However, the apparent asymmetry may be due to the current relationship between upstream supply of agricultural produce and downstream demand for food products. Agricultural policy and technical innovation have created an oversupply situation across Europe, while populations, and the demand for food have remained fairly static. Clearly sellers in the chain have less threat of alternative markets for their produce than the large buyers threat of alternative suppliers. Nevertheless the supply/demand balance across most industries and developed economies are also well supplied, as a general observation. Therefore it may be that the asymmetry between large buyer strategies and those required by large sellers applies as a broader principle in market economies and not only European food markets.

Regulated Market Case

The asymmetry between the strategies required by large buyers and large sellers may become reversed when supply is constrained. In this case the necessity to coordinate horizontally between players shifts to the buyers. They cannot threaten to acquire cheap supplies elsewhere, and so they must temper competition between them in order to dampen demand. This argument is followed in the analysis of the dairy industry in Chapter 6.

Due to differences in transportability, perishability and length of growing season between different agricultural products, generalisations about optimal marketing strategies and structures are difficult. Clearly milk producers must base their market power on different premises than a grain producer who has the choice to store produce. Peas and beans on the other hand are generally grown to contract and processors play a large part in deciding upon the timing of harvesting. This may be because of the very short maturity season of these crops and the sparsity of potential buyers for the crop. However, the broad principles applying to agricultural marketing have been the subject of many authors. In the next section

the aim is elucidate the conditions under which some of these broad principles apply and under which they do not.

5.4   Distinguishing between the Firm and the Agricultural Cooperative

In comparing the bargaining/structure relationship between retailers and manufacturers with that between farmers and their buyers, it is necessary to elucidate the difference between the bargaining situation of the firm and that of the producers' cooperative. Cooperative principles are fundamentally different to those of the firm. Firstly the primary objective of the cooperative is to provide benefits to the members which use the cooperative. The firm in contrast, is concerned to provide the maximum return on investment to its owners. For cooperatives the return on share and other capital must not exceed a moderate rate[32]. In terms of bargaining power, Galbraith (1952) notes the difference between each type of organisation:

> The cooperative is a loose association of individuals. It rarely includes all the producers of a product. It cannot control the production of its members and, in practice, it has less than absolute control over their decision to sell. All these over its own production are possessed, as a matter of course, by the corporation. A strong bargaining position requires the ability to wait - to hold some or all of the product. The cooperative cannot make non-members wait; they are at liberty to sell when they please and, unlike the members, they have the advantage of selling all they please. In practice, the cooperative cannot fully control even its own members. They are under constant pressure to break away and sell their full production (Galbraith, 1952, p.166-167).

---

[32]From the Registrar of Friendly Societies, in Morley, J., *British Agricultural Cooperatives*, 1975.

The cooperative, for Galbraith, is not in full control of its outputs, and so suffers through its inability to hold back production in the bargaining process. This explanation however is insufficient. Why does the ability to wait affect bargaining? To be effective in bargaining, the credible threat of a genuine alternative option is required. Waiting, while it is not a credible threat in itself, does allow for the possibility that a better offer might come along in the future. Thus, the ability to wait, in the agricultural selling context, threatens the buyers with the possibility that an alternative competing buyer may be found at a later date. While waiting is not a credible threat in itself, it does introduce the positive probability that a credible alternative may turn up in the future.

Galbraith (1952) notes that the cooperative is not in complete control of its outputs. Consequently, cooperatives required the force of legislation to overcome the inherent problem of free riders. Indeed cooperatives do tend to have legislative backing in many countries. However, Dutch cooperatives also often allow members to sell a stipulated proportion of their output out-with the organisation. He also credits the non-members of the cooperative with undermining its bargaining position through their non-compliance in "waiting", in comparison with the firm. In other words, Galbraith believes the cooperative is more likely to be undermined by the fringe of small firms, or non-member producers. While large firms in the majority of food processing industries also co-exist with a tail of smaller firms, there may be important differences in the way the large and small relate.

The difference in the relationship to the fringe of small producers causes the firm's bargaining position to diverge from that of the cooperative. In many food manufacturing sectors the largest firms defend their market share through advertising support, while the tail of smaller producers often sell on price. Thus, the large firms maintain a stronger position by "talking over the heads of the retailers" directly to the consumer. Smaller firms compete on price often supplying the own-label sector. In this way the large and small firms co-exist as an equilibrium.

While some marketing only cooperatives have successfully developed a brand image, in the main, U.K. agricultural cooperatives do not maintain high advertising or brand strategies. Thus, the ability to differentiate the product and enhance its perceived quality though advertising is important to the manner in which the large firms and the fringe of smaller firms relate. While this strategy has been attempted in some sectors, in many, cooperatives sell commodities which are highly homogeneous. As a result, the large cooperative cannot in general gain higher margins or defend market share through the same method used by the large brand manufacturer. Therefore the marketing-only cooperatives' position is more likely to be undermined by the tail of non-members.

In certain sectors this situation can be exacerbated by the fact that the largest and most efficient agricultural producers have the least incentive to join the cooperative[33]. They have the most to gain by remaining outside the cooperative, not only due to their lower costs but often also due to their higher quality produce. Therefore if the large efficient producer knows his produce is among the best in the market he has a lower incentive to pool his output with others to drag up the average quality of the cooperative output. In contrast the smallest and the least efficient producers have the greatest incentive to join the cooperative. They may tend to gain most by pooling their produce, and have less incentive to default on the cooperative because they have higher costs. Thus, the cooperatives bargaining position can be fundamentally different from that of the large manufacturing firm due to each organisations relationship to the fringe of small producers it co-exists with.

However, the converse is also possible. Where a marketing group or cooperative has very tight produce quality regulations, it may only be the large and most efficient producers who are able to become members. In this instance the

---

[33]This appears to have been the case in the U.K. raw milk market after deregulation in 1994, where the largest and best placed milk producers tended to remain outside the voluntary cooperatives which replaced the Milk Marketing Boards.

cooperative is less likely to be undermined by the tail because the tail is unlikely to be able to compete in the same market (often direct supply contracts with supermarkets) due to the stringent quality guidelines of that particular buyer or set of buyers.

Galbraith (1952) believed the producer cooperative required legislation to prevent deviant behaviour. Indeed the U.K. Agricultural Marketing Acts of the 1920s and 1930s would lend support to this view in that this legislation prevented producers from selling to any buyer other than the Marketing Board. Thus, the legislation prevented deviant behaviour. However, the U.K. legislative solution to producer cooperation suffered from other problems in relation to their downstream industries. This eventually led to the dismantling of the virtually all the U.K. Marketing Boards. This subject is returned to in Chapter 6 in relation to milk marketing.

The Dutch cooperative model is backed by legislation through the Bedrijfschappen and the Produktschappen. These bodies have legislative powers to issue orders or regulations to the horizontal and vertical players in an industry respectively. However, Dutch producers generally retain the choice of whether to join a particular cooperative or to sell in the market as an individual. This separates them from the U.K. Agricultural Marketing Boards. However, while marketing-only cooperatives exist in the Netherlands, the Dutch system and philosophy of agricultural cooperation differ due to the co-existence of vertical integration in the cooperative structure.

5.5   Forms of Agricultural Marketing

U.K. agricultural marketing, as a whole, is made up of a variety of structures, including auctions, electronic auctions, Marketing Boards, or bodies which replace them, various forms of cooperatives, which may be integrated, or which may enter into so called vertical partnerships. The various forms of marketing, and the overall structure or co-existence of these various forms is likely to affect the

bargaining relationship which producers have with their buyers. Section 5.5.1 considers different forms of cooperative strategy in terms of their implications for bargaining strength. Section 5.5.2 then considers the implications of vertical partnerships for producer market power.

5.5.1 Agricultural Cooperatives

Murray (1983), identified two basic types of agricultural cooperative. This system of classification is based on their financial structure and the means by which corporate financing is pursued. Murray believes that an understanding of the philosophical stance taken by the officials and members of a cooperative towards capital accumulation is crucial, and that different cooperatives will have varying demands for finance dependent on the services they offer their members. Thus, Murray segregates Capital Accumulative Cooperatives (CACs) and Capital Specific Cooperatives (CSCs).

CACs may be defined as:

> Those organisations which seek over time to increase the fixed and other assets financed and controlled by the collective membership in order to command an increased market share in the manufacture, distribution and sale of farm requisites, the marketing of agricultural produce, and the processing of foodstuffs under the direct control of the cooperative.

CSCs on the other hand are defined as:

> Those organisations which seek to provide specialist commercial and/or production-related services financed by members *pro rata* to use, while keeping to a minimum the level of costs for the necessary operation and maintenance of service(s).

The Capital Specific Cooperatives are further sub-divided into Capital Intensive Cooperatives (CICs) and Capital Extensive Cooperatives (CECs). An illustration of some of the major differences between these cooperative types is given in Table 5.1.

Table 5.1: *Generalised Differences of CAC and CSC Organisations*

	CAC	CSC
Profit/Surplus	Profit/Surplus made and then redistributed to members and/or reserves	Small profit/surplus carried forward, unimportant source of funding
Patronage Rebates	Frequently used	Rarely used
Members Shareholding	Important source of capital	Unimportant source of capital
Turnover Levy	Rarely used	Important source of capital
Size of Membership	From one to several thousand	Usually under 250
Recruitment Policy	Open	Can be open or closed
Trading activities	Diversified	Usually specialist
Trading Relationships	Usually principal	Usually acting as agents
Interest in Vertical Integration	High	Low
Non-Members' Trade	Important	Limited
Inter Cooperative Cooperation	With other CACs	With other CSCs

Source: Murray, 1983

Thus, CACs are more concerned to exert an influence on the market through the development of some form of vertical integration. CSCs on the other hand tend to

be hostile to the expansionist logic of the CAC[34]. Accordingly, Murray (1983) backs the view taken here, that there are important differences between different types of cooperative. However, the primary interest here is with the cooperative function and how that relates to its strategic bargaining situation. Thus CSCs are analogous to marketing-only cooperatives, and CACs relate to vertically integrated or processing cooperatives.

Marketing-only Cooperatives

While cooperative marketing may have other benefits to producers, such as the relief of social tensions (Baron, 1978), here the concern is only with the effects upon the bargaining relationship to downstream buyers. In addition cooperative marketing may have benefits for the buyers or for the efficiency of the food chain as a whole. However, whether buyers are prepared to pay more for the extra service they receive depends upon the bargaining strength of the cooperative. Here a view is taken with regards to the rationale of the activity for those who undertake it, the agricultural producers. This is regarded as fundamental because any structure or organisation, which does not benefit those who own or run it, will in the long term be unsustainable. This approach suggests that the "relief of social tensions" justification for cooperation (Baron, 1978) is not sufficient to sustain an organisation in the long term.

Pickard (1982) addressed the same issue, but from a different perspective, by considering the question of "what is an improvement in marketing?" in the U.K. food chain. His analysis revealed to some extent the manner in which "marketing" is often considered separately from the issue of "market power", when the selling of farm produce is considered. The argument set out here is that the separate

---

[34]The contemporary concern for primary produce marketing, and the Central Council for Agricultural and Horticultural Co-operation's (CCAHC's) preference for the CSC type organisation (exerted through its control of a discretionary grant scheme), have served to erode the historic position of primacy of the large CACs (Murray, 1983).

treatment of "marketing" and "market power" in this context is not justified. The industrial market structures of the retailers, processors and manufacturers in the food chain have evolved through the market power game being played both horizontally and vertically. The manner in which this occurred has been described in Chapters 3 and 4 of this thesis. However, often in agriculture, analyses focus on what might represent an improvement in marketing, whereas a more natural course of progression might be to consider what marketing structures producers could develop to improve their market power.

Pickard (1982) refers to the demands of the supermarket sector that farmers should improve their marketing. However, he goes on to point out that:

> The list of customers prepared to pay the farmer a price which would make it economic for him to operate to Marks and Spencer's standards is strictly a limited one; indeed from time to time it does not even include Marks and Spencer (Pickard, 1982, p.362).

It appears that producers may have been advised and cajoled in the past to improve the marketing of their produce. This may have been done on the basis of the countervailing market power assumption. Pickard (1982) also typifies the Central Council for Agricultural and Horticultural Co-operation (CCAHC) as an organisation with the wrong terms of reference. Rather the promotion and development of cooperatives is not an end in itself, but one of the means to an end.

However, a condition for the development of agricultural marketing structures must be its rationality for those who undertake it. The successful evolution of improved agricultural marketing structures must entail as a pre-condition, an improvement in the market power of those who utilise and develop those structures. Clearly the efficiency of the food chain as a whole is important for consumers and the international competitiveness of food manufacturers and retailers. However, it would appear likely that if the evolution of a particular

agricultural marketing structure is profitable for producers, it must also have benefits for the downstream buyers, and hence have benefits for consumers and the international competitiveness of the industry as a whole. Tennbakk (1995) states that while Governments seem to share the belief that cooperatives ensure the producers better terms and greater security, they are also believed to improve the overall market performance. A substantial body of literature by agricultural economists also advocates this view (LeVay, 1983; Staatz, 1987; Helmberger, 1964).

The concentration of selling structures, in the form of marketing-only cooperatives, may have an impact on prices where buyers are oligopsonised because it expands the spatial dimensions of competition between large buyers. This is returned to in Chapter 6. Also purely horizontal cooperation may enable producers to export their produce, or threaten to export, where they could not do so as individuals. However, for the export threat to work a very high degree of coordination would be required between producers. Without the solidarity of a very high proportion of producers the buyer will have the choice to source from the fringe of non-members, and the export threat is rendered useless. Secondly, Lamont (1992) has indicated that a high degree of vertical integration in the cooperative marketing structure is important for export success. Lamont (1992) suggested that vertical integration is the key to the success of the Dutch seed potato cooperatives:

> In particular, the high degree of vertical integration of production and marketing functions in the Dutch industry enables Dutch traders to enter into advance contracts with buyers; it enables them to be sure of procuring large core supplies of product from their growers; it gives them total control over varietal selection, harvesting, and grading specifications; and it enables them to meet increasingly early delivery requirements (Lamont, 1992, p.13).

Also van Dijk and Mackel (1991) note that historically Dutch cooperatives were created to provide countervailing market power. However, they also note that the

dominance of cooperatives in potatoes, dairy products and sugar may be due to the economies of scale in *processing*, and this clearly points to the importance of vertical integration within Dutch agricultural marketing philosophy.

For an undifferentiated product marketing-only cooperative, a comparable equilibrium for market structure in a homogeneous good manufacturing sector would appear to require a very high level of concentration. The sugar and salt industries are examples of the effect of price competition on equilibrium market structures in high set-up cost homogenous goods industries. Because the product is highly homogeneous competition tends to fall on prices and this in turn puts pressure on the least efficient (often smaller) firms. Accordingly, the process towards concentration tends to continue until the fringe of small producers is eradicated. Repeated attempts at price coordination by the firms fail when market structures are too fragmented and so consolidation continues until the level of concentration allows for a degree of price coordination. Thus, only few, very large producers are left in the market allowing a degree of coordination to be achieved.

The point which may come out of this comparison is that for marketing-only cooperatives in commodity sectors to have success in exercising "countervailing" market power, they would require to operate in an environment without the existence of a tail of individual producers. Moreover they would require to be concentrated enough to achieve a degree of coordination between themselves.

A second point of comparison with the manufacturer/retailer relationship, is that even the largest food manufacturer is competing for only a share of the whole range of products on offer in a multiple superstore. For an individual retailer the percentage share, which the sales of products from even the largest of his suppliers represents of his total sales, is relatively small. For the manufacturer, however, an individual multiple customer is likely to account for a high percentage of his total sales of a particular product (Mackenzie, 1988). For cooperatives dealing direct with multiple customers, it would seem unlikely that they gain any additional bargaining strength from their extra size. However, buyers may still be willing to

pay more, relative to other existing marketing arrangements, for certain services offered by the cooperative.

There are instances where the multiple customers pay the highest prices for the farmers' output to marketing cooperatives. Strawberries are one example of this. Retailers may be willing to pay more for a consistent supply of high quality produce. Secondly, the retailers increasingly require to be able to trace the produce back to its source and so may pay a premium for this service. Thus, marketing cooperatives can and do gain higher prices when they can provide an extra service to the buyer. Because of the higher quality standards of the cooperative, the buyer has a reduced list of sellers to choose from at that quality standard, and so in a sense the cooperative has gained some market power. Also producers must provide a higher quality of product and service to gain the higher price.

However, the possibility also exists that the large cooperative has less bargaining strength, as the members may have lost the choice to supply to small local markets because it is likely to have entered a forward contract[35]. Consequently the large cooperative possibly has fewer alternatives than the individual producer, and in Galbraith's terms may have a lower ability to wait in the bargaining process. The seller may be under more pressure to appease the buyer when orders are very large. Thus, the concentration of selling structure may allow buyers to concentrate their orders into large "lumps" encouraging the seller to cut his price[36].

---

[35]Opportunistic recontracting is discussed under Vertical Partnerships below. This problem can arise when market prices deviate substantially from the forward contract price.

[36]This chapter considers producer market power under the assumption that buyers are not cartelized. **Chapter 6** goes on to consider the case if buyers do form cartel agreements. However, the general conclusion remains the same in that the concentration of selling structure, in the form of marketing only cooperatives, can actually facilitate the operation of a cartel between buyers. Therefore producer cooperation could potentially weaken the bargaining position of producers when buyers are cartelized.

Marketing-only cooperatives are however likely to hold an informational advantage over individual producers in the market. Such information may include world market supply and demand data, retail and wholesale prices for finished or intermediate food products, changes in European agricultural support, etc. Such information could yield the sellers a feel for the costs and revenues of the buyers and so produce an informational advantage which may allow the cooperative to bargain more effectively than the individual producer in the market place. However, this informational advantage may not be large and to be of net gain these advantages must outweigh the extra costs of operating the cooperative.

Another factor complicates the analysis of marketing structures in agriculture. It is possible that the marketing only cooperative can achieve a price differential over other methods of selling while depressing prices in the alternative markets. Suppose a large buyer guarantees a cooperative a percentage premium over the average market price. Thus, an absolute quantity of produce is removed and a steady element of demand is removed from the traditional market. Fluctuations in supply and demand are compounded in the traditional market and so prices are likely to be more erratic. Also, the highest quality produce is most likely to be marketed through the cooperative. Therefore the average quality of produce in the traditional market may have diminished. This decline in average quality will be reflected in lower prices. Thus, the cooperative may be guaranteeing its producers a premium price over a depressed average market price with no net gain to producers overall. Pickard (1982) notes that as the produce which is bypassing markets is not a representative selection from the whole range of qualities available, but tends to be limited to a particular level of quality, by definition as more produce bypasses markets then the market price becomes less and less representative. This issue is returned to in the section below relating to vertical partnerships.

Vertically Integrated Cooperatives

Vertically integrated cooperatives have a different mechanism by which to threaten the buyers of agricultural produce and so may not require highly concentrated marketing structures in order to attempt to impact upon prices. They can credibly threaten to expand their internal processing of the farm produce, as non-members can join the cooperative if returns are significantly above the market average. Therefore, this strategy not only strengthens the position of the cooperative, but can also enhance the bargaining position of all the producers of a product. A second reason for the enhanced strength of the processing cooperative over the marketing-only cooperative, is that the output of the processing cooperative is more likely to entail a degree of differentiation. This allows the cooperative to reach consumers directly, "talking over the heads of the retailers", developing its own brand awareness, and so capturing some bargaining strength by this route.

For these reasons the vertically integrated cooperative strategy may be conceived as the counterpart of the large industrial buyers strategy of upstream tapered integration. Under this strategy an industrial buyer may undertake to produce a proportion of his own input. This may even occur where the scale economies of doing so are not optimal. The industrial buyer may prefer to accept higher cost internal production of the input, rather than risk being squeezed by a more efficient, but monopolistic supplier. The strategy gives the buyer a feel for costs in the upstream industry, but more importantly allows him to threaten expansion of internal production of the input (Scherer and Ross, 1990, p.530). Upstream tapered integration is evident in the U.S. food chain, where the retail chains produce a proportion of their own inputs. In the U.S. retailing is less concentrated than the U.K. and their relative bargaining position with manufacturers appears to be less strong. This may explain why upstream tapered integration is still employed as a strategy in the U.S. and not in the U.K. (see Chapter 3).

This strategy may be turned around and used against potentially powerful buyers. The open membership processing cooperative is effectively operating tapered

integration into downstream activities. The open membership cooperative credibly threatens expansion of processing activities through the possibility that new members will join, increasing supply to the cooperative, if the prices paid are higher than from alternative buyers. Processing adds value to the product and allows the producer cooperative a feel for the revenues and costs of their other downstream buyers. It may also allow the cooperative to "talk over the heads of the retailers" directly to the consumers in the manner that brand manufacturers do.

Vertically integrated cooperatives also enable information to flow more effectively between the buyers and the suppliers of a product. Information may flow more effectively because producers have a greater incentive to take an interest in the factors affecting the profitability of the processing facility. These factors will include the particular demands of the buyer alongside the raw input attributes which will minimize the processing cost. This in turn may allow quantity or quality guarantees to be made at a lower cost and so increase returns to the producer.

The vertically integrated or partially integrated cooperative can co-exist with a tail of individual producers as an equilibrium, and as stated may also indirectly benefit the non-members. Full coordination is not required between all producers, in order to face the buyers, because the producers can credibly threaten to take over an increasing proportion of the processors activities. If the vertically integrated cooperative can hold prices above those offered by other buyers, non-members will be tempted to join the cooperative. Therefore the other buyers of agricultural output must compete with the processing cooperative for input supply. The strategy can therefore be termed *downstream tapered integration.*

Regarding situations where buyers are oligopsonised, Sexton (1990) focused upon the hypothesis that cooperatives might have a pro-competitive effect on the behaviour of rival non-coop processors. Sexton's model characterizes formally the pricing behaviour of for-profit processors (i.e., processors that are not cooperatives) in oligopsonistic spatial markets in the absence and presence of

cooperative processors. The results are derived from a conjectural variations model of oligopsony competition in which the key consideration is the for-profit processor's rational conjecture of a cooperative's behaviour, in contrast to the conjectures it might plausibly entertain for the behaviour of a rival for-profit processor. In other words private processors, in the absence of a cooperative processor, may be able to act as oligopsonists in a particular locality by tempering their demands for raw input and hence increase their profitability. However, in the presence of a cooperatively owned processor, the private processor cannot assume that the cooperative processor will wish to temper raw input demand as it may prefer to pay high prices to producers, rather than maximise the profitability of the processing function.

For the cooperative to have a pro-competitive effect in the manner described by Sexton it must be vertically integrated and so must carry out a processing function. Also, the cooperative must have open membership, because a cooperative that fixes membership allows the rival for-profit processor to act like a monopsonist within its market area. This is so, because when membership of the cooperative is fixed, the producer's threat of expanding internal processing of the farm produce through new membership is lost, and so the for-profit processors can behave as in oligopsony. In other words, when the cooperative does not have open membership, the overall strategy of producers is no longer one of downstream tapered integration. Thus, Sexton's model formally expresses the same chain of logic described above, that open membership, vertically integrated cooperatives can enhance the returns to agricultural producers.

However, it needs to be noted that Sexton's model does not in any way relate to the conventional U.K. perception of "countervailing market power". It is not the concentration of selling which is beneficial for producers, but the threat of further downstream integration, through new membership of the cooperative. Therefore, while Sexton (1990) is not explicit about the strategy, it is effectively downstream tapered integration which causes for-profit processors to behave more competitively in their input markets. Secondly it is impossible to make any

inferences regarding the impact of marketing-only cooperatives from the Sexton model.

5.5.2 Vertical Partnerships

Vertical partnerships are an increasing method of trading in the food industries. These agreements are likely to affect the relative bargaining position of buyers and sellers and so it is necessary to consider such arrangements within the context of the theory. In particular the focus of attention is on the impact of vertical partnerships on the distribution of market power within. Buyers gain an obvious advantage in the guaranteed volume, quality and grade which a vertical partnership can yield. Producers may or may not require to coordinate their activities to fulfil such a vertical partnership. But how does their bargaining position relate to auction systems and cooperatives? Before considering this question it is necessary to state the reasons behind increasing use of vertical partnerships.

Reasons for Increasing use of Vertical Partnerships

Hughes (1994b) believes that vertical partnerships will become the marketing channel of the future:

> Clearly, the implication of concentration in the food industry for the farmer, with the growing importance of alliances and partnerships, is that the individual farm business must position itself such that it can access a marketing group that has the commercial clout and track-record to make "preferred supplier" status with major buyers[37]. It is the prerogative of the individual farmer to select the specific type of marketing group that

---

[37]This sentence would seem to imply that marketing groups require to have financial resources behind them and a history of marketing good produce to be able to enter contracts with the major buyers. It does not infer that such groups will gain prices high enough to compensate for the higher marketing cost, and so makes no inference about countervailing market power.

provides the best commercial advantage - whether it be a cooperative, private company, or, for example, direct contract with a market intermediary. Farmers must position themselves with partners that can assist in providing, amongst other things: consistency, quality, and volume; an integrated system linking the point of production with the point of final sale; production of premium grade produce; year-round supply; a market view of the competitive environment; and focus on specific markets and specific accounts to develop long-term commercial relationships with key customers (Hughes, 1994b, p.7).

Hughes notes the key factors influencing a successful partnership. Among these are: i) clear benefits for all partners, although not necessarily equal benefits; and ii) a fair share of commercial good fortune. However, how are the clear benefits to each partner determined?

Pickard (1982) noted the difficulties of pricing within a vertical partnership:

...it has been a feature of the marketing system for a number of years now that increasing quantities of produce bypass our market places. There are perfectly good operational reasons why this should be so. A supermarket cannot pick up its daily order of hundreds of tons of potatoes of a very highly specific quality by visiting a market and selecting or rejecting individual sacks. We have therefore set up pack houses in the country, either under the control of cooperatives or of merchants, so to sort out produce of the appropriate quality and so send it direct to the supermarket.

This development has been very proper and logical, but it does lead to very considerable problems in pricing, and I can speak for these on the basis of personal experience. On a number of occasions I have been asked to devise a system for determining what price the producer should receive for produce which moves direct to the buyer without going through a market. I know of no very satisfactory method of achieving this, except by relating

it in some way or another to the market price. As the produce which is bypassing markets is not a representative selection from the whole range of qualities available, but tends to be limited to a particular level of quality, by definition as produce bypasses markets then so does the market price become less and less representative (Pickard, 1982, p.365).

Pickard (1982) saw electronic auctions as the future of agricultural marketing and he predicted in 1982 that in ten years time all significant buyers and sellers of agricultural produce will be the owners of terminals linked to centralised computers into which they can feed their offers and demands. However, by 1995 this development still appears to be in its infancy. Indeed, vertical partnerships, where producers agree to supply on a forward contract may be becoming more commonplace than supposed by Pickard (1982). Forward contract prices only begin to cause problems for buyer or seller when "market" prices deviate substantially from the forward price. In such circumstances one party may wish to reject the forward contract and enter the market. This is termed "opportunistic recontracting" and is returned to below.

Hughes (1994a) listed the factors driving the food industries towards greater coordination in the supply chain. These were recounted in Chapter 3 (p.98-99) in reference to the retailer/manufacturer relationship and so this section confines itself to the relative market power between retailers and primary producers in such vertical partnerships.

Theory of the Distribution of Market Power within Vertical Partnerships

Ray (1994b) noted that a partnership often results in a change in the amount and distribution of market power. Instead of the power lying with impersonal market forces, it becomes shared between partners. A firm will be more willing to enter an agreement if it obtains what it considers to be a fair share of this power to influence the terms of the exchange. In the case of a joint venture, a partnership creates a new centre of power in the market channel, and each firm gives up some

of its independence; the junior partner more, the senior partner less (Ray, 1994b, p.52).

Ray (1994b) considered partnerships in the context of the market failure approach (Coase, 1937; Williamson, 1975). In this case the firm is viewed as a web of contracts between workers, managers, suppliers and customers. The web grows in size so long as the cost of striking a bargain within the structure of a single firm is less than the cost of using the open market. The costs of bargaining are termed *transactions costs*.

Transactions costs are the "deal making" costs, and can be split into three (Hobbs, 1992):

A.   Assessing value for money (information costs). There are two elements in information costs: (1) finding out prices (price discovery costs), and (2) evaluating the quality of the item being exchanged (measurement costs).

B.   Physically making the transaction (negotiation costs).

C.   Ensuring the contract is adhered to (monitoring and enforcement costs).

The theory predicts that the market will fail and be replaced by one vertically integrated firm if the transactions costs, the sum of A1, A2, B and C, of a partnership exceeds the cost of internalising the exchange within a single firm. In other words, when the open market fails to provide an efficient means of exchange, the firm internalises the exchange. The process may be accomplished by:

   i. the organic growth of one firm upstream or downstream;

   ii. the take-over of another firm; or

iii. the merging of two firms.

However, Ray added two further ways of internalising an exchange which do not involve complete integration within one firm:

iv. the creation of an intermediary, such as a joint venture; or,

v. a contract which has the effect of making the transaction "as good as" internal, whilst leaving the two firms independent of each other (ie. the partnership option).

Thus, the firm will use either the open market or whichever of the other five methods of exchange involves the lowest costs of exchange. However, the expectation is that options i, ii, and iii are more likely when the transactions are repeated through time; there are specific investments related to the transaction; and there is a great deal of uncertainty surrounding the transaction. Uncertainty is higher for options iv and v because of the possibility of opportunistic recontracting (Ray, 1994b, p.58). This refers to the possibility of a contracted buyer or seller reneging on the agreement. The rational desire to maintain a long-term contractual relationship is bounded by the information available on the other, maybe more profitable, short-term opportunities. Ray (1994b) gives some examples of situations where such opportunistic recontracting arises. The circumstances in which the buyer or seller will be tempted to break the contract are outlined below.

Buyer breaks contract

1. Although the farmer produces the stipulated quality, even better quality is available from elsewhere.

2. At the time of the exchange, the open market price is temporarily higher than expected. At this price, the buyer does not think it is profitable to handle the

product[38], given the level of demand, so the buyer reneges on the price agreement and offers to buy the product only at a discounted price.

3. Demand for the product, which looked good at the time the contract was made, falls away by the time the exchange becomes due. The buyer breaks the volume agreement, offers to take less, delays accepting delivery, or invokes higher quality standards.

Seller breaks contract

4. The farmer produces a higher quality than expected, and thinks he or she can sell elsewhere at a higher price.

5. For personal reasons the farmer needs cash, and sells the product before the contract delivery date.

6. Subsequent to the contract, another buyer approaches the farmer offering a better deal (gazumping).

Firms may prefer internalising the contract if opportunistic recontracting is a possibility. Thus, the danger of one partner breaking the contract in light of a better opportunity is avoided. However, as firm size and scope increase, management costs tend to rise. The firm will move away from its core business, entering areas where it has less experience and has to manage new staff with new skills. In these circumstances, the possibility of managerial diseconomies may work against integration and in favour of options iv and v (Ray, 1994b). For example, a multiple retailer wishing to source fresh meat may consider upstream

---

[38] Thus it must be assumed that the forward contract price is tied to open market prices. As such the contract price will be higher than expected. As retail prices tend to be stable in comparison with agricultural prices the retailer may not wish to raise prices and so would prefer not to handle the product at all. The reasons for price stability at the retail level are returned to below.

integration into meat processing. The managerial diseconomies may be outweighed by lower transactions costs. However, the managerial diseconomies involved in the retailer becoming integrated into livestock production would be so large as to prevent upstream integration into farming. Thus the partnership option would be preferred to options i, ii or iii.

The model can be extended to link the costs of foregone opportunism and managerial diseconomies with transactions costs, as follows:

Cost of Exchange = Transactions costs (A1+A2+B+C) + cost of opportunistic behaviour by partner (D1) + cost of forgone opportunism by self (D2) + Managerial diseconomies (E).

For the various levels of integration the various cost levels are summarized in Table 5.2. From this it can be seen that while partnerships have lower transactions costs than the open market, and lower managerial diseconomies than full vertical integration, they do entail positive opportunistic recontracting costs.

Table 5.2: *Costs Associated with Vertical Market Structure*

	Transactions Costs	Opportunism Costs	Managerial Diseconomies
The Open Market	*High*	*Zero*	*Zero*
Internalising within the firm	*Low*	*Zero*	
Partnerships and Joint Ventures	*Medium*	*Positive*	*Zero*

Source: Adapted from Ray (1994b).

However opportunistic recontracting costs are not independent from transactions costs. Transactions costs include information gathering costs (prices and qualities), negotiation costs, and monitoring and enforcement costs. Where information costs are high, opportunism may be less likely. Also the perceived risk of opportunistic recontracting by partner (or the perceived gains of opportunistic recontracting for

self) will affect the level of transactions costs. The higher the risk or gains of opportunistic recontracting, the more expense and effort each partner will wish to put into information gathering, monitoring and enforcement.

The relative ability of each partner to recontract clearly affects the distribution of market power within the vertical partnership. However, such opportunistic recontracting lies at the centre of the problem of forward contracting. Because the exact grade and quality of agricultural produce can be difficult to monitor, a forward agreement can be reneged upon by either party on quality grounds. For example, suppose a milling company enters a forward contract with a grain producer. If the market price subsequently proves to be lower than expected, it may be possible for the buyer to reject the forward contract for grain on quality grounds, in order to capitalise on lower open market prices. On the other hand, if the market price turns out higher than expected, it may be in the producer's interest to send a bad sample to the contract buyer such that it is rejected. This will enable the producer to make higher prices on the open market. Overall the extent and nature of opportunistic recontracting is by its nature difficult, if not impossible to assess. This suggests an obvious area for further research. What is apparent, however, is that the level and accuracy of independent quality monitoring is likely to affect the probability that such recontracting will occur.

Another way the risk of opportunistic recontracting is lowered, is to tie the forward contract price to market prices. This however re-introduces the price uncertainty of producing without the forward contract. The buyer is likely to have to offer a premium over market prices, but gains in terms of the quantity and quality guarantees given by producers. With bonuses and penalties for product quality tied into the contract the buyer passes risk in terms of product quality back to the producer.

Another point, which has already been noted, is that average market prices may be depressed because a volume of high quality produce, and the demand for it, will have been removed from the open market by the existence of forward

contracts. Thus, forward contracts which are tied to market prices are likely to make very little overall difference to farmers' market power. They may however stimulate production of higher quality standards in agriculture, and producers on such contracts may obtain higher prices due to tighter quality control on the farm.

Ray (1994b, p.64) states that:

> ...partnerships between farmers and processors can be viewed as making the upstream production business more powerful relative to the downstream power of retailers, and incidentally making the overall food system more competitive.

However, Ray does not explain his rationale for this statement. The reasoning may be because the producer/processor vertical partnership is likely to entail branding and product differentiation, thus enabling the upstream parties to develop consumer patronage and "talk over the heads of the retailers". Nevertheless, there appears little reason for the processor to share any extra rewards of such branding with his producers. Alternatively where the producer/processor partnership produces a retailers own-label, there may be slight gains in upstream market power stemming from the higher quality assurance the partnership can offer the retailer. Thus the retailer will have fewer alternative suppliers at the higher guaranteed quality standard.

Palmer and Morris (1994) use the example of a vertical partnership between Sainsbury the retailer, Lloyd Maunder Ltd. a meat processor, and contracted lamb producers. The producer price in this agreement was tied to market prices, however, when market prices rose in early 1993, the supermarket was unwilling to pay more for the product. Palmer and Morris (1994, p.134) note that the rise in lamb prices was not fully reflected in retail prices because of competitive

pressures. The abattoir had to pay producers the market price to source lambs, and so the processor's operating margins were reduced to an unprofitable level[39].

Thus, Palmer and Morris (1994, p.136) conceded that:

> Open pricing clearly has its limitations, particularly in times of major economic change. The idea of a fixed price for extended periods would likely have appeal to a retailer and some of the farmers involved in the partnership have expressed serious interest in the idea. However, past experience indicates that farmers, in particular, are often reluctant to remain bound to a contract when alternative markets offer a higher return.

They go on to note that more work needs to be done on alternative pricing arrangements, price linkages and sharing of price risk. These are precisely the market power issues which should be addressed before advice to agricultural producers is handed out.

Theory of Diminishing Price Volatility in the Food Chain

The difficulty with vertical market price linkages stems from the manner in which prices tend to fluctuate to a greater extent in the upstream markets, while exhibiting more price stability downstream. This has traditionally been explained in terms of supply and demand elasticities, however, an alternative explanation deriving from game theory is also possible. Downstream games between retailers, tend to be games with few players, and so prices tend to be sticky. Prices are stable because of the difficulty in maintaining a cooperative equilibrium when prices are variable. Thus, for example, butchers may prefer not to vary prices in

---

[39]A parallel situation, described by Houston (1962), entailed retail butchers accepting a seasonally variable margin. Thus, while beef animal auction prices fluctuated throughout the year butchers kept retail prices fairly constant over time. The reason for the existence of this variable margin can also be explained with reference to the game theory of vertical markets, returned to below.

line with auction market prices, as any confusion over the reason for the price change may lead to an aggressive reaction by rivals in the market. Therefore the meat retailer may prefer to hold prices constant and accept a variable margin. The downstream game is more localised, and so in terms of spatial oligopoly it has a reduced number of players. This means that cooperation can be very profitable, and conversely that excessive competition can be destructive. Therefore prices tend to be more stable in the downstream game. Stability allows any tacit cartel to monitor and police the actions of rivals. If retail prices varied in line with upstream price changes, a retail tacit cartel would be very complex to monitor by individual players. A misinterpretation over the source of a price change could lead to the triggering of a punishment phase (price war) due to imperfect information. Thus the risk of an unnecessary and costly price war may be enough to persuade retailers to take a variable margin, and keep retail prices stable.

On the other hand the upstream agricultural output markets are games with many players. Thus, the idea of the game equilibrium is less useful as collusive equilibria are unlikely, as are the competitive price war equilibria which could support a collusive outcome. Accordingly, prices fluctuate more freely in line with supply and demand. For example, fatstock auction prices are the outcome of a game with many more players than the local retail game and prices can fluctuate considerably. Therefore, the variable margin perceived in the beef chain can be explained in terms of the interaction between two separate games in the marketing chain. The upstream game has a large number of players and more freely variable prices. Consequently, the problem for vertical partnerships is one of designing a vertical price linkage formula which will not suffer from opportunistic recontracting or financial difficulty for processors when upstream prices are in the extreme of their range.

Such a solution may be possible through the use of non-linear contracts as are increasingly commonplace in the relationship between retailers and manufacturers. Frank and Henderson (1992) noted that one reason a retailer and manufacturer may enter non-linear contracts would be to reduce the risk of opportunistic

recontracting. However, in Chapter 3 it was argued that opportunistic recontracting was a distinct danger when bargaining positions shift during the development of a new product, so that this was one of the main reasons behind non-linear contracts. If this was the case it would not follow that non-linear contracts could circumvent the problems associated with opportunistic recontracting in upstream relationships with producers or producer cooperatives. Rather, non-linear contracts only discourage opportunistic recontracting when there is a foreseeable shift in bargaining positions through time as trade in a new product develops. Thus, in the agricultural context the problem still remains that it is unknown in advance which party might have the incentive to recontract after trade begins. Therefore the existence of a suitable non-linear contract which would negate the incentive for opportunistic recontracting by either party remains in doubt.

The payment of a "loyalty bonus", now commonplace in the dairy sector, is a form of non-linear contract which helps dissuade short term opportunistic recontracting. Such "loyalty bonus" schemes are a form of non-linear contract, where the non-linear element of the contract is paid retrospectively, at the end of a specified period of time. However, such schemes only help prevent opportunistic recontracting by the producer, and do nothing to prevent recontracting by the buyer at times when demand is weak.

Vertical Partnerships and Market Power

Vertical partnerships in themselves do not constitute any real gain in market power. Any apparent gains may only be relative to non-partnership market arrangements. Were the entire produce market forward contracted in partnership arrangements, retailers would once again have a wide choice of suppliers, and the apparent gain in market power would have vanished. An overall gain in market power for producers would still require either ownership and control of processing capacity or some form of consumer patronage in order to have increased bargaining power within the relationship.

Thus, it is difficult to see in what manner forward contracting through vertical partnerships, in itself, can increase the market power of producers. Such relationships may however assist domestic producers in maintaining a domestic outlet for their produce in the face of foreign competition. That retail companies are forming international buying alliances to procure all-year-round delivery for groceries (especially in the fruit and vegetable sector) suggests the importance of this consideration. Moreover, as a greater share of agricultural production will be distributed through the multiple retailers, it is doubtful that farmers have any choice but to form vertical partnerships. In reference to the situation in Holland, van Dijk and Mackel (1991, p.354) note that farmers cannot prevent such developments, but will have to adjust the position of their marketing institution to suit the strategies of these customers.

Hughes and Ray (1994, p.199) in their conclusions suggest that farmers cannot sit back and wait for "somebody" to do "something" about improving agricultural marketing. It is the responsibility of farmers themselves - farmers have the most to gain and the most to lose.

While Hughes and Ray had not managed to show that producers would gain through adopting their advice, in reference to improving marketing performance they state that:

> It is a long term, evolutionary process that requires, amongst other things, a substantial cultural change in the way many U.K. farmers view their business (Hughes and Ray, 1994, p.199).

However, if farmers are to be expected to change their marketing, or methods of production, there must be clear economic signals that it is in their interests to do so. One reason that the producer sector in the U.K. does not respond to the changing demands of the marketplace may be that the European Community agricultural price support policies are likely in some sectors to have a numbing effect on the price differentials between different marketing arrangements.

Another important aspect of vertical partnerships is the fact that they entail contract negotiation. Thus, prices are not decided in an open market, but through a process of negotiations. This change in the mechanism of price determination points to one of the potential advantages of low-cost group marketing. The potential advantage of group marketing in this context relates to the level of market information and negotiating skill which the producer group employs. If prices are to be decided by contract negotiation, then it becomes important for the producer to have a degree of symmetry in the level of market information and negotiation skill relative to his buyer. The advantages of group marketing in this context come not from the scale of the seller but from the market information and negotiating skills employed by the members of the group. Therefore, group marketing may have advantages in vertical partnerships which they do not have when prices are tied to auction prices or when contracts do not involve longer term agreements.

Vertical partnerships may also redistribute the balance of market power in certain circumstances. This possibility exists where a group of producers supply a differentiated product. In cases where the processor expropriates the rewards of producer differentiation, the possibility exists for producers to restructure the organisation of supply contracts in order to retain the rewards of on-farm differentiation. This special case is returned to in Chapter 6.

The extent to which partnerships develop in the food chain is likely to be linked to the way in which retailing develops. In the future, the development of electronic home shopping may reduce search costs for consumers. This may make retailers more price competitive which in turn may cause greater concentration in retailing. These forces are likely to lead to the need for greater supply chain coordination, in terms of quality guarantees and monitoring. On the other hand, the computerisation (or even virtualisation) of agricultural markets may change the spatial dimensions of the marketplace. While the computerisation of auction markets may in future allow retailers to source guaranteed quality standards and to trace the product back to source, there would still appear to be advantages for the retailer in having stable partnerships with producers.

5.6 Summary

This chapter aimed to disprove the "countervailing market power" assumption as applied to agricultural marketing-only cooperatives. The analysis demonstrates that in the absence of oligopsonised buyers there is no advantage to the concentration of selling structure, *ceteris paribus*[40]. This clearly points to an important distinction between two types of agricultural cooperative based on differences in the strategies they employ to affect market prices.

In short, the extra scale of the marketing-only cooperative does not yield higher prices. Marketing-only cooperatives may gain higher prices over other market arrangements only if they provide extra services to the buyer. As higher prices are only a reflection of the extra service provided this does not constitute a gain in market power. Secondly, the possibility exists that such marketing-only cooperatives may depress prices in the traditional auction markets.

On the other hand, vertically integrated cooperatives, or those which can successfully develop a brand image, do have a theoretical basis upon which they may be supposed to enhance the market power of producers. Processing cooperatives transform bulky, perishable farm produce into storable and transportable value-added products. This in itself improves the producers' bargaining position because the product is likely to be more storable and transportable. In addition, because the processing cooperative competes with private processors in the market for raw input supply, and because the cooperative may be willing to forgo profit and pay producers higher prices, this may attract new membership to the cooperative. Thus, private processors' input supply is threatened by the possibility that more producers will join the cooperative and this can have the effect of making private processors more competitive in the market for input supply. This strategy has been termed *downstream tapered integration*,

---

[40]The situation where buyers may be spatially oligopsonised is returned to in Chapter 6.

and it may benefit the market power of all producers of a product, not only the members of the cooperative as formally expressed by Sexton (1990). Producer cooperatives, which can also develop brand strategies and hence consumer patronage, theoretically can enhance market power. The degree of consumer patronage on each side affects the bargaining power the seller has with his buyer. This facet of vertical competition was described in Chapters 3 and 4 and is returned to in Chapters 6 and 7.

Therefore there is a clear distinction between two types of cooperative philosophy as described by Murray (1983). For the vertically-oriented type there is a theoretical basis for the manner in which it may be supposed to affect market power. For the other purely horizontal type, in the absence of oligopsony, a gain in market power cannot be assumed simply by the consolidation of selling structure. However, the idea that there is a distinction between cooperative strategies does not as yet appear to have filtered through to policy makers, and those organisations promoting co-operation in agricultural marketing.

For vertical partnerships there does not appear to be a rationale for the manner in which they may be supposed to redistribute market power towards the upstream production business as asserted by Hughes (1994). For vertical partnerships involving producer branding there may be some justification this claim. More research requires to be carried out on the extent and nature of opportunistic recontracting. This would allow a fuller appraisal of the implications for market power for both buyer and seller in vertical partnerships. Various forms of vertical partnership and the implications for market power are returned to in Chapter 6 in relation to the U.K. dairy sector.

Chapter 6

MARKET POWER AND PRODUCER COOPERATIVES: REGULATED MARKET CONTEXT

6.1 Introduction

This case study of the dairy sector encompasses all the main elements of the theory of vertical market interaction described throughout the rest of the thesis. Milk marketing structures are described in terms of their potential effect on the stability of collusive equilibria in a downstream oligopsony. The evolution of structure in the dairy manufacturing and processing industry is described in terms of the institutional framework which was in place. As this institutional framework tended to reduce the intensity of price competition, market structure was more fragmented than it might have been otherwise. Thus, once the institutional framework was removed the industry entered a period of intense competition for input supply, and a process of consolidation of ownership. As the institutional framework gave rise to an industry typified by low innovation and branding, the rise of supermarket own-label products would not be expected to reduce the lower bound to equilibrium concentration. This is so because advertising expenditures were not important in raising the lower bound to equilibrium levels of concentration. Thus, the increase in retail concentration might be expected to force further concentration in milk processing and dairy manufacturing.

Chapters 3 and 4 conceived of the food retail industry and the various sectors of the food processing industry in terms of a game between sellers. In this way the strategies of downstream buyers could be analyzed in terms of their effect upon the upstream game. The asymmetric view of markets was discussed further in Chapter 5, and the justification for it was based on the general oversupply that exists in food markets. In terms of game theory as applied to vertical markets, the imbalance between supply and demand means that suppliers tend to coordinate their behaviour so as to exercise market power and avoid destructive competition. On the other hand, buyers need not coordinate, but can affect the game between

their upstream suppliers through employing various strategies. Such strategies include the "lumpiness of orders", which encourages deviant behaviour in the upstream game, and own-labelling, which tends to undermine upstream market power through shifting consumer loyalty from the manufacturer to the retailer.

In Chapter 5 it was also noted that this asymmetry is not universal, and in certain circumstances can become reversed. This chapter considers market power in such circumstances. In particular the U.K. dairy industry exhibits the conditions under which such a reversal in game asymmetry can occur, and so is chosen as a case study. Additionally an analysis of the market power of milk producers was thought useful, because the sector has recently undergone deregulation and is currently in a state of flux. The ensuing discussion draws on the arguments developed through Chapters 2 to 5.

6.2   The U.K. Dairy Industry

Throughout most of Europe the dairy industry exhibits a high degree of vertically integration with producer cooperatives in the dairy manufacturing and processing sector. As noted in Chapter 5 this would be a logical response to the problem of enhancing producer market power. However, in the U.K., the formation of the Milk Marketing Boards negated the organic growth of vertically integrated cooperatives in the dairy sector. This has meant that in the U.K. a milk manufacturing and processing industry has developed which is made up largely by public limited companies while cooperatives remain in the domain of primary produce procurement.

As part of the E.C., the U.K. dairy industry operates within the confines of the milk quota policy. This policy puts an effective ceiling on milk production, through the imposition of a super-levy on producers when they exceed a reference volume. As such the U.K. dairy industry exhibits the features of a market where a reversal of game asymmetry can occur. Supply is constrained by the quota policy, and so the buyers of milk must compete for a share of the fixed pool of

raw milk. In this case the necessity to coordinate horizontally shifts from the sellers to the buyers. Buyers rather than sellers can perceive their interdependence in the marketplace, because any increase in one firm's intake must be offset by reductions in the intake of other firms. Expansion, for a dairy processor is only possible through an increase in his share of the fixed raw milk pool[41]. In this situation dairy processors are more likely to perceive their interdependence in input rather than output markets. Thus, the industry potentially exhibits the features described by the model of oligopsony.

Recently the marketing of raw milk has undergone deregulation. The legal framework of the Milk Marketing Scheme, in place since 1933, was removed on 1st November 1994. Therefore a second set of complicating factors must be considered in the analysis. Accordingly, it is necessary to outline the process of price formation and the development of market structure under the Scheme. Then an appraisal can be made of the process of deregulation in terms of competition and market structure. In turn, it is possible to return to the original question addressed in Chapter 5 in this different setting, namely what are the implications for producer market power of the various marketing structures open to them?

Thus, the chapter is divided into three main sections. Section **6.3** describes the formation of industry structure and the product portfolio under the Milk Marketing Scheme. Section **6.4** considers the process of deregulation and the changes which have taken place since November 1994. Section **6.5** then looks at the various ways in which producer milk marketing might develop in the future and the implications for market power.

---

[41]Additionally, milk is transformed into different products, many of which are not substitutes, such as cheese, butter and liquid milk. Thus manufacturers of these different products do not always compete with each other directly in their output markets.

6.3   Market Structure and Supply Seasonality Under the Scheme

Within the context of the two-stage game model described by Sutton (1991), any institutional factors which reduce the intensity of price competition tend to lower the *equilibrium* level of concentration in the industry. Thus, if the Milk Marketing Scheme could be regarded as having reduced the intensity of price competition, and if price competition increased after deregulation, then *equilibrium* concentration might be expected to rise on removal of the Scheme. However, another factor complicating the analysis relates to the product portfolio of the industry. Commodity dairy products such as cheddar cheese tend to have much higher minimum efficient scales than niche products[42]. Therefore, if deregulation of the market resulted in a significant shift away from commodities towards niche products, there might be some scope for a lowering of the overall lower bound to equilibrium concentration. The following section considers the toughness of price competition and industry structure under the Milk Marketing Scheme.

The monopoly powers of the Milk Marketing Boards and the opportunity to dictate the prices of milk sold by the Boards were statutorily curtailed by the establishment of the Joint Committees in each Board area (Meynell, 1990). Within the Joint Committee, the dairy trade could effectively operate a buyers' cartel. The rules under which the Milk Marketing Board (MMB) and the Dairy Trade Federation (DTF) operated were agreed between the two parties, as outlined within "The arrangements for making milk available to buyers" document. This stated that the General Principles were:

---

[42] The MES of plants in dairy manufacture is much larger where the products are commodities in already saturated markets. Plants for cheddar might have an MES in excess of 10,000 tonnes/year. In the liquid milk sector the pressure from supermarkets on processors' margins may also give rise to a high MES relative to market size. By contrast speciality products can be produced on a small scale at less than 500 tonnes/year.

The allocation of milk shall be arranged in conformity with Community and UK legislation in a manner which takes into account:

(a) the interests of the producer

(b) the interests of the buyer

(c) the interests of the consumer

(d) the obligation to achieve reasonable equity between buyers

(e) the need to market milk efficiently

Point (d) meant that the buyers were able to share out the available supplies with regard to a continuity of supply, based on the previous year's intake. The equitable share between buyers did not vary much between years. Thus, the market shares of the main players remained fairly static for many years, and competition in the market for raw milk might therefore be regarded as having been fairly muted.

Barriers to entry to the dairy industry were high under the Milk Marketing Scheme. The entry barriers stemmed from the manner in which milk prices and milk allocations were negotiated. The Joint Committee was the forum in which the MMB and the DTF, representing the processors and manufacturers, negotiated prices and allocations. Within the DTF were two sub-committees which carried out the majority of the negotiations. These were known as the Milk Pricing Sub-Committee (MPSC) and the Milk Allocation Sub-Committee (MASC). In turn these sub-committees were comprised of members of the industry. These members were drawn from the largest companies in the industry. New or potential entrants did not get to sit on the MPSC or the MASC. Accordingly, the milk price and milk allocation to a potential entrant would have been negotiated between the Board and the potential entrant's largest competitors. In these circumstances, it is not surprising that new entry to the U.K. dairy sector was insignificant under the Scheme. At the same time, the manner in which the Board system gave preference of milk supply to the liquid milk market over other products had a profound impact on the overall industry structure. However, the market has also been distorted by Government price control in the liquid sector.

6.3.1 The Liquid Sector

The Milk Marketing Scheme granted a priority of supply of raw milk to liquid milk processors. This priority of supply was largely responsible for shaping the market structures of processors and the overall product mix. Also, the manner in which liquid milk was marketed to the consumer was distorted by the bureaucracy which was in place. Thus, the market no longer represented genuine consumer demand. Each of these issues are considered in more detail below.

Up until the Single European Act of 1993 the U.K. industry enjoyed an effective ban on imports of fresh liquid milk and cream. This was possible through the U.K. legal stance that liquid milk must be sold "as it came from the cow". As other E.C. countries standardized the protein and butterfat levels in the liquid milk they produced, they were prevented from entering the U.K. market. This ban on imports prevented the market from responding to true consumer demand and so could be marketed in the way the industry wished. This was manifested in a preference for doorstep delivery sales.

The Ministry of Agriculture, Fisheries and Food (MAFF) also controlled the price of doorstep delivery milk up until 1985. Thus, price competition in liquid milk sales was muted by the regulation of prices. Because margins were set for the doorstep delivery market, and supermarket business was secondary to the doorstep market, dairy companies had the incentive and ability to be fairly restrained in competing to supply the supermarkets. This made it difficult for the supermarkets to expand the proportion of liquid milk sold through their outlets[43]. In this way the liquid milk sector became distorted by the focus on doorstep delivery. Eventually, however, breakaway dairy companies began competing for the

---

[43]For example, some dairy companies sold liquid milk only in bottles to the supermarkets, or did not offer discounts for large orders, and sometimes included the supermarket delivery as part of their overall delivery round (*pers comm*, Roger Metcalf, Agri-Food Consultants).

supermarket business and so the market began to move slowly away from doorstep delivery.

Other constraints on the market existed. For example up until 1981, companies were not allowed to sell standardized milk, but only whole milk as it came from the cow. Thus, between the M.M.B.[44], who gave priority of supply to the liquid market, M.A.F.F., who set the doorstep retail price of liquid milk, and the industry, the market became distorted from the way in which the consumer would have bought milk in a free market situation. However, for a short period the Milk Marketing Scheme gave the supermarkets a powerful bargaining tool in dealing with the processors, through the "milk follows the trade" condition. This condition meant that if a liquid processor lost a major customer to another processor, the M.M.B. would switch the raw milk it supplied from the losing processor to the new one. This "milk follows the trade" condition meant that once the dairy companies started competing to supply milk to the supermarkets, the multiples quickly learnt that they could effectively play one processor off against another, and this undoubtedly squeezed processing margins for a period. In turn this tended to increase the price differential between doorstep delivery and supermarket sales and so may have prompted the decline in doorstep delivery milk.

The effect of all this can be seen in the structure of the liquid milk sector. Following Sutton (1991), institutional factors which weaken price competition (in the sense that higher unit margins can be sustained at any *given* level of concentration), will cause the *equilibrium* level of concentration to be correspondingly lower. This effect is likely to be in part responsible for the persistence of a very large "tail" of small family-owned businesses in the liquid milk sector (Table 6.1). However those larger processors supplying the

---

[44]The acronym M.M.B. is used to cover all five of the U.K.s Milk Marketing Boards. These were the Milk Marketing Board for England and Wales, the Scottish Milk Marketing Board, the Aberdeen and District Milk Marketing Board, the North of Scotland Milk Marketing Board and the Milk Marketing Board for Northern Ireland.

supermarkets found the "toughness of price competition" fairly stiff due to the "milk follows the trade" policy of the Boards. Thus, the dual effect of the Scheme may be responsible for the development of a dual market structure in liquid milk processing, where a few very large low-cost liquid processors (supplying the supermarkets) coexist with a long tail of small family owned businesses supplying doorstep delivery and local retailers (Table 6.1).

Table 6.1: *Size Distribution of Liquid Milk Processors England & Wales Milk Marketing Board area*

Size Band (Million litres per year)	Number of Organisations 1991-92
Under 0.5	114
0.5 - 0.9	27
1.0 - 4.9	58
5.0 - 9.9	12
10.0 - 19.9	9
20.0 - 29.9	6
30.0 - 99.9	7
100.0 plus	8

Source: UK Dairy Facts and Figures (1993).
*Table is limited to the buyers of milk and excludes any producer retailers who market their own production. In 1991 there were 1,469 producer retailers and 441 producer processors. Thus the table significantly understates the true size of the "tail" of small liquid milk processors.

6.3.2 Dairy Product Sector

The focus on liquid milk subsequently restrained the rest of the market for raw milk. For the manufacturing sector the troughs and peaks in supply were exaggerated because of the priority given to the liquid market. After removing a seasonally flat profile for liquid milk demand, dairy product manufacturing companies had much higher seasonal peaks and troughs to contend with (Figure 4). This discouraged manufacturers from producing high-value fresh products which would require a flatter seasonal profile. It was more economic and less risky

to produce commodities, such as Cheddar cheese, where factories could be run at full capacity or closed down for periods of time depending on the available milk[45].

Figure 4: *U.K. Utilisation of Wholesale Milk by Month, 1991-92*
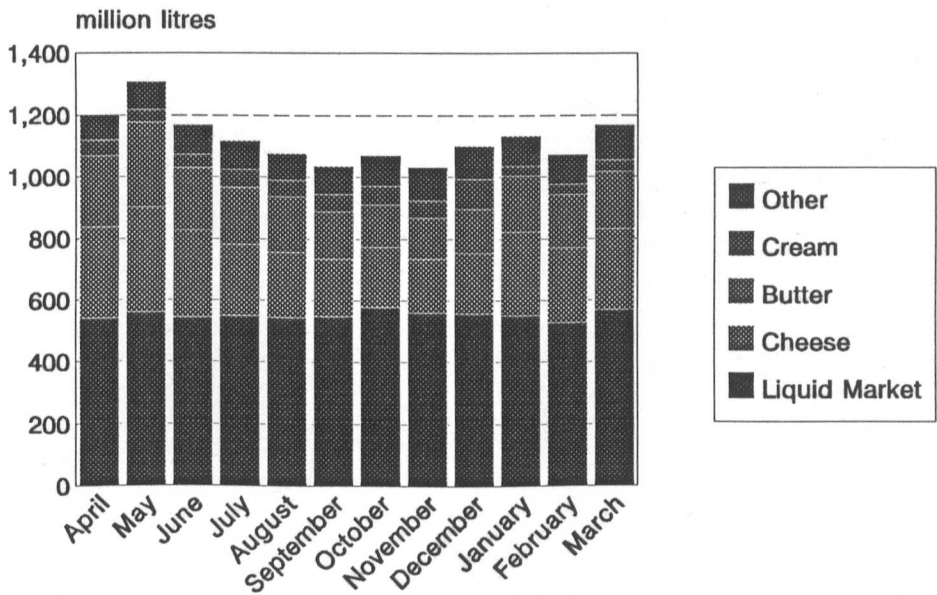
Source: U.K. Dairy Facts and Figures, 1992 edition.

The Milk Marketing Boards operated price discrimination, in that buyers were charged different prices for milk input depending on its end use. Table 6.2 shows the various end-use prices for the 1987-88 milk year[46]. However, while the system was designed to maximise the returns to producers, it did over time cause the industry product portfolio to adjust away from what it would have been without price discrimination. For example in the Netherlands, Germany and France, 11, 6 and 5 percent respectively of milk utilised by dairies went into "other" products

---

[45]However see the sub-section below titled *Seasonality of Milk Production* for the manner in which the emphasis on liquid milk, combined with the Board system affected the seasonality of milk supply under the quota policy.

[46]The last year for which milk-to-end-use prices were published.

in 1993. These "other" products typically include the high value-added end of the market. The U.K. in contrast had virtually no milk going to "other" products (EEC Dairy Facts and Figures, 1993, p.64). It appears that the system of pricing milk to its various end uses created a disincentive to produce new, or higher value fresh products. For the main manufactured products the Common Approach to Financial Information (CATFI) was the method by which raw milk input prices were determined. CATFI was applied to milk-to-butter/powder and was linked to milk-to-Cheddar cheese. Prices under CATFI were determined from panel data and costs, in such a way as to allow processing firms a guaranteed 12.5 percent return on capital. Thus, it could be thought of as a "market-minus" or residual pricing system, as opposed to a "cost-plus" system. For incumbent firms CATFI products represented a safe set of outputs in which to invest.

Table 6.2: *Average Return For Milk, End-Use Prices 1987-88, pence per litre*

	England and Wales	Scottish MMB	United Kingdom
Liquid Market	20.731	21.348	20.876
Speciality Cheeses	17.702	16.518	17.227
Cream	17.153	17.205	17.145
Chocolate Crumb	17.057	17.163	17.083
Condensed Milk	16.636	16.619	16.626
Whole Milk Powder	16.582	-	16.494
Cheese	14.349	15.430	14.424
Butter	13.824	14.474	13.961
Other Products	16.815	19.489	16.858
All Milk	17.667	18.736	17.610

Source: Dairy Facts and Figures, 1989 *Edition.*

Because the supermarkets could not get the high-value products they required from the domestic industry they turned to imports. In particular the retailers turned to continental suppliers for fresh products and a range of high value cheeses. The

inability of the U.K. dairy industry to fulfil the demand for fresh dairy products and speciality cheeses can be seen in the explosion of imports of such products which occurred during the 1980s and early 1990s (Table 6.3).

Table 6.3: *Imports of High Value Products Into the U.K.*

	Other Cheese[a]	Other Fresh Products[b]
1980	32,769	4,146
1982	37,874	9,603
1984	40,831	16,961
1986	46,831	33,591
1988	64,286	42,968
1990	76,361	74,364
1992	91,716	91,900

[a] Other than Cheddar, Processed and Blue Vein.

[b] Other than liquid milk and cream; including natural yogurt, prepared yogurt, kephir, curdled milk, whey, buttermilk and other fermented or acidified milk (Tonnes).

Source: EEC Facts and Figures (various) and U.K. Dairy Facts and Figures (various).

The constraints on NPD are illustrated by the case of Northern Foods. Northern, for a period, did manage to expand its milk supply through re-allocation of ex-farm milk. The E&WMMB system attached individual dairy companies to surrounding farms. The quantity of milk from these farms was known as the dairy's ex-farm quantity. It may have been possible to acquire extra milk over ex-farm allocation through secondary movements of milk. By the agreed "code of practice on re-allocation", companies which used quantities of secondary milk could apply once per year to be re-allocated extra ex-farm milk. In this way Northern proved to the Board that they could use more milk at a higher price than for butter/skim, and so Northern was able to expand. However, the butter/powder plants suffered from the re-allocation of milk. Accordingly, manufacturers of butter/powder began a campaign to end re-allocation, and so in 1987 re-allocation of ex-farm milk to higher value end-uses ceased. This highlights the manner in

which industry structure was ossified under the Scheme which in turn meant that, as the milk supply dwindled under the quota regime, excess capacity developed in the industry. When the poor capacity utilisation was combined with the "market-minus-cost" system of price determination, allowing for a guaranteed return on capital, the ensuing milk-to-cheddar and milk-to-butter/skim prices were correspondingly low.

6.3.3 Seasonality of Milk Production

Milk supply varies by month, and is cheaper to produce in certain seasons than others. This monthly variation is termed the seasonal profile of supply. Short shelf-life products require a flatter seasonal profile of raw milk supply, whereas long life products can rely on cheaper milk supplied with a variable seasonal profile. These differences are of significance to structure of the industry and its overall product portfolio.

Milk production has a natural seasonal pattern which follows grass growth. Traditionally milk production peaks in May with cows calving in March/April and then peaks again in the autumn with cows calving in September/October. This ebb and flow gives the producer the cheapest and most cost-effective pattern with trough production in July/August. Further north in the U.K. spring comes later, and so the peak is less severe in May and the overall seasonal pattern is less marked. Apart from fresh cream, which is mainly derived from the fresh liquid market, fresh yoghurts, fromage frais and other dairy desserts and dips, most other products benefit from a "cheap" milk regime since they compete with imported supplies. In the main these products such as UHT milks, cheese (which uses about 22 percent of milk supplies) and butter (which uses about 16 percent of milk supplies) can accommodate a fluctuating milk supply.

Until the 1980s seasonality of supply was not of great concern to the dairy trade because even in months of trough production there was still adequate milk for the liquid and fresh markets. However, after the introduction of milk quotas in 1984,

the trough production in July/August, on certain days, did not match fresh milk, fresh milk product and short-life product demand. In addition the operation of CATFI meant that there was no incentive for processors to make their operations more seasonally efficient because if they remained "inefficient", i.e. their costs remain high, dairy farmers had to pay the price of inefficiency via lower manufacturing milk prices (Wilson, Traill and Strak, 1995). The MMB decided to take action to flatten out the seasonal profile of supply, and introduced a system of monthly price differentials in order to stimulate production in trough months. Figure 5 shows the impact of the MMB policy in taking out the main peaks and troughs in production. Thus, the combination of the milk quota policy and the MMB system resulted in a shift in the seasonal profile of supply.

Figure 5: *Monthly Milk Sales Through England and Wales M.M.B.*
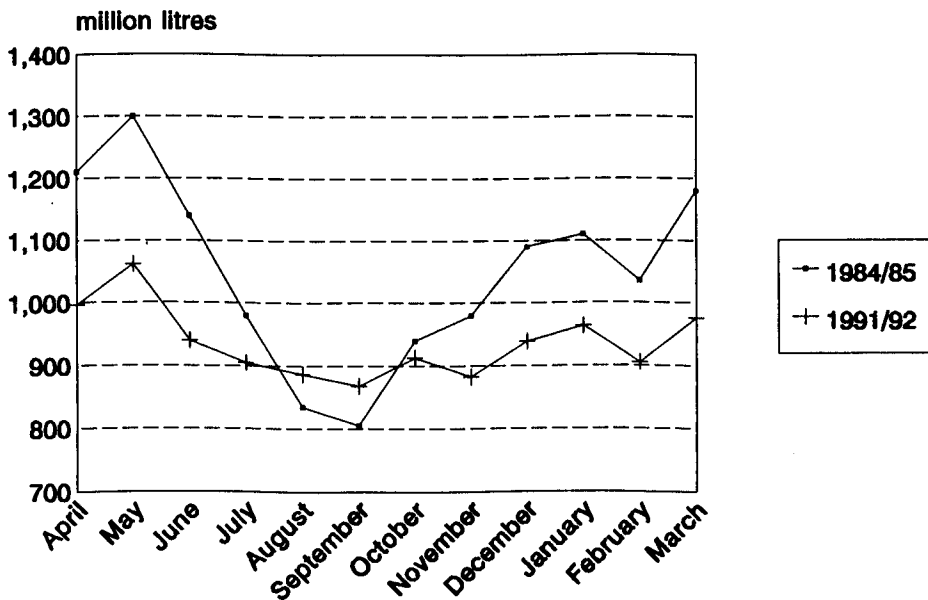
However, the abolition of the Milk Marketing Scheme has changed this situation. The priority of supply to the liquid market has largely disappeared. Other factors

such as a shift towards UHT milk and the development of yoghurts made from butter-oil and SMP have reduced the requirement for a flat seasonal profile.

6.4   Deregulation and the Market Structure

Prices for raw milk paid to the producer increased significantly on removal of the Milk Marketing Scheme. This rise in prices stemmed from a period of fairly intense competition between processors for raw milk input. The factors which contributed to this period of intense competition were (i) the excess capacity in the industry and (ii) the vertical supply curve of raw milk. These factors are now considered in more detail within a game theory framework.

(i) Excess Capacity

The effect of excess capacity on competition and raw milk prices can be conceived in terms of its effect upon the stability of tacit cartel equilibrium between potentially oligopsonistic processors. Low capacity utilisation destabilises cooperative outcomes in a game between oligopsonists. As such dairy companies would be expected to pay a higher price for milk input for a higher percentage capacity utilisation. Such a demand for input makes any particular buyers' tacit cartel less stable, because it increases the rewards of cheating on the cartel. Successful defection on the cartel i.e. bidding above the cartel price, not only wins more milk, but has the dual effect of increasing profitability through a higher percentage of capacity utilisation. Thus, defection from the cartel becomes more likely.

Cartel stability also depends upon the efficacy of punishment strategies. Collusive equilibria are likely to be more stable when punishment of a defector is anticipated to be forceful and effective. However, in the current situation, punishment of the defector is difficult due to the manner in which the milk input has a higher value to the processor when capacity utilisation is high. This is so because punishment of the defector involves all the other firms pushing input prices higher while all

remain at low capacity utilisation. Accordingly, only very weak collusive outcomes can be supported as equilibria in this situation, and the industry enters a phase of competitive milk pricing until such time that capacity becomes reduced to the point where it balances with the restricted supply of milk. Complaints from the dairy trade have predicted such a period of structural change to the industry and job shedding (Scottish Dairy Trade Federation, 1994, p.1). The longer run prediction of the theory would be that the dairy industry will move towards higher levels of concentration, up to the point at which a stable equilibrium is reached. Sutton (1991) used many case studies of food industries to illustrate the workings of the theory. An account of the history of the flour industry in the 1920s and 30s illustrates the point, and at the same time provides a striking parallel to the situation in the dairy industry. In 1921, government control of the flour industry ended and a serious overcapacity problem existed. Severe competition in flour milling led to *(a)* an attempt to coordinate output and prices, *(b)* a buyout scheme for excess capacity and *(c)* acquisition and market concentration. Thus, it might have been anticipated that the firms in the dairy industry would make an attempt to temper input price competition through a similar strategy to coordinate prices. Significantly, the choice of Dutch auction by Scottish Milk[47] may have been due to their anticipation of an industry attempt to temper price competition through coordination. This is so because Dutch auctions are most effective in raising prices when buyer collusion is a possibility (see Appendix II)(Robinson, 1985). In England and Wales the dairy trade even went as far as attempting to set up a milk buying agency to acquire milk from Milk Marque, the newly formed successor to the M.M.B.. However, formation of such an official milk buying cartel was blocked by the Office of Fair Trading (OFT)[48].

The analogy with the flour industry continues in respect of a buyout scheme. Buyout schemes of excess dairy manufacturing capacity have already taken place.

---

[47]Scottish Milk was the voluntary cooperative organisation which replaced the Scottish Milk Marketing Board.

[48]*Pers comm*, Barry Wilson, editor *Dairy Industry Newsletter*.

However, in the case of the dairy industry, milk producers paid for the buyout of excess capacity under ROF-3[49]. Because the CATFI system guaranteed the processors a target rate of profit from manufacturing butter, there was no incentive to close plants as they became less cost effective; the price they paid for milk was simply reduced (Wilson et al, 1995). Finally, as in the flour industry, there has been a process of acquisition and concentration which is likely to continue up until the point at which an acceptable level of competition is restored. Therefore, it may be that the more collusion-proof the auctions and markets for raw milk are, the more concentrated the final equilibrium configuration of the industry will require to be.

(ii) Vertical Supply Curve

The vertical supply curve for raw milk stems from the EC quota policy. This means that the quantity of raw milk produced cannot respond to price increases. This situation can, in equilibrium, reduce the intensity of competition between rival firms. This is so because the high level of perceived interdependence caused by quotas, creates the expectation that rivals will react aggressively to any attempts to increase the share of the fixed milk pool by an expansionary processor. This expectation helps to deter competitive behaviour. In other words, something which makes competitive behaviour more feasible or credible actually promotes collusion. The very competitive behaviour is reserved as a threat to punish those who undermine the tacit collusion. This phenomenon is termed the *topsy-turvy* principle of industrial organisation (Shapiro, 1989).

However, in the short run the threat of severe competition has not been enough to support a tacitly collusive outcome in the dairy industry. The under-capacity

---

[49]In the last "Rationalisation of Facilities" program the MMB(E&W) had to subsidise plant closures (at a cost of £132 million) of mainly butter manufacturing capacity. Dairy Crest closed their cheese factories at Maelor (Clwyd) and Four Crosses (Powys) and Express closed their plant at Ruyton-XI-Towns (Staffs) (Wilson, Traill and Strak, 1995).

utilisation of most firms has caused a reversion to the competitive equilibrium. Thus, in the immediate wake of deregulation the dairy companies could not effectively temper competition between them for raw milk. Instead each firm preferred to attempt to maximise its direct supply milk intake in the immediate post-deregulation environment. After deregulation the dairy companies offered premium prices, up to 26 pence per litre and more, nearly 20 percent higher than milk producers were getting prior to deregulation (Wilson et al, 1995). The high prices offered reflected a trade-off between short-term high input prices and the longer term security of supply offered by direct supply from farms. In a game theory sense, this constituted a reversion to the competitive equilibrium. In future this period of intense competition may be reserved as the threat which could support a tacitly collusive oligopsony.

6.4.1 Changes in Product Portfolio

Another consequence of the Milk Marketing Scheme, prior to deregulation was the development of a distorted product portfolio, in which liquid milk was a high value end-use. The deregulation of the market was to end this. Even prior to the ending of the Scheme the doorstep delivery market suffered an increased rate of decline, as the price differential between doorstep and supermarket milk widened from 2p-3p/pint in 1985 to nearly 10p/pint in 1992 (Wilson et al, 1995). As in other sectors the large retail multiples gained market power over their suppliers and used low liquid milk prices to attract customers[50]. In this way, in the free market, liquid milk became a commodity product with a low value added[51]. This is reflected in the fact that the larger dairy companies tend to have lower profit margins than the

---

[50]The change in the balance of power is demonstrated by an announcement by Tesco in April 1995, that they would no longer purchase packaged milk for retail unless it was in plastic cartons (DIN, 1995).

[51]This can also be seen in the differential between English and Scottish milk prices. Before the Scheme ended Scotland traditionally had higher raw milk prices than the South. However this due to a higher proportion of milk going to the liquid market. Thus, once the Scheme went and liquid milk lost its high value status, the Scottish milk price predictably fell below the prices achieved in England.

sector as a whole (Wilson et al, 1995). In part this is due to specialist creameries producing higher value-added products such as cheese, whereas the larger companies have been involved, partially, in the distribution of fresh milk, which is lower value-added (Wilson et al, 1995, p.203) and CATFI products with their guaranteed 12.5 percent return on capital.

The distorted nature of market, prior to deregulation, can also be seen in the fact that, in the U.K., liquid milk sales bolstered the producer price. This was in contrast to other European countries where it was the high value-added cheeses and fresh products which served this purpose. Thus although liquid consumption was lower in the rest of Europe than in the U.K., raw milk prices paid to the producer were often higher (Table 6.4). Thus, the table shows how the U.K. had a high percentage of milk accounted for by the liquid market, yet had lower producer prices.

Table 6.4: *Percentage of Milk Supplies to Liquid and Producer Prices, 1992*

	Liquid Consumption, Percentage of Total Utilisation of Whole Milk	Producer Prices, 3.7% fat, ex-farm, excluding VAT and co-responsibility levy, ECU/100kg
Germany	14	25.71
France	8	23.65
Italy	18	33.49
Netherlands	4	26.09
Belgium	15	22.78
United Kingdom	49	22.75

a Including some milk separated for butter and cream
Source: EEC Dairy Facts and Figures (1994).

The high level of dependence on liquid sales was mirrored by a lack of product innovation and a dependence on traditional dairy products. Around two-thirds of total U.K. cheese production was made up of Cheddar. Before the withdrawal of the Milk Marketing Scheme Cheddar margins remained buoyant as total sales

steadily increased and manufacturers benefited hugely from very low raw milk prices (Wilson et al, 1995). The Scheme encouraged the production of commodity-type cheddar cheese. Margins were guaranteed for Cheddar under the CATFI system and so, it represented a safe product in which to invest. However, because of its "commodity" nature, the Cheddar market witnessed a high level of own-label penetration which reached around 83 percent in 1993 (EIU, 1994, No.433). Thus, the multiple retailers appear to have dominated the manufacturers in terms of vertical competition for consumer patronage in the Cheddar market. Against this, the multiples have had difficulty in sourcing regional cheeses, and the failure of the industry to supply these may have been due to the security of the CATFI system for cheddar production.

With the abolition of the Scheme the margins on cheddar manufacture were squeezed very tightly due to the combination of higher raw milk prices and the threat of imports of cheap cheddar from Europe. Because supermarket buyers could switch to Belgian or German cheddar producers, the wholesale price of cheddar could not be increased by enough to maintain U.K. cheddar manufacturers margins. With the over-capacity in the sector it would appear that some consolidation in cheddar manufacture will take place. However, due to the high proportion of cheddar cheese and other commodities in the industry's product mix as a legacy of the Scheme, combined with the loss of the high value status given to liquid milk, the U.K. has been left with the problem of producing virtually no value-added products. Even domestic regional cheeses do not have a high value added as they are so similar to cheddar. Also the type of the cheddar produced does not lend itself to branding, as it is generally produced in 40 lb blocks.

In summary, the Milk Marketing Scheme was responsible for many of the current characteristics of the U.K. dairy industry and many of the products which are on offer. The Boards' priority of supply to the fresh pasteurized liquid milk market and doorstep delivery sales kept liquid milk prices high to the consumer and this supported the farmers' price. In turn this meant that a high proportion of the remaining raw milk went for commodity-type cheddar cheese manufacture, which

was a safe bet to produce under the CATFI system. This meant that many of the growth market sectors, such as fromage frais and dairy desserts were fulfilled by imports from other European countries. In the deregulated free market liquid milk will increasingly become a commodity. Thus, it will no longer dominate the market for raw milk.

6.5 Milk Marketing Structures

What options are open to milk producers in terms of marketing their milk? The problem is a new one for the majority of producers who in the past had only one option which was to sell their milk to the M.M.B.. In the deregulated market producers have at least three options to them. These are (i) to sell through the successor bodies to the MMBs, Milk Marque, Scottish Milk etc., (ii) to form vertically integrated cooperatives and, (iii) to create one of the various forms of vertical partnership.

6.5.1 Large Horizontal Marketing-Only Cooperatives

In an earlier chapter the countervailing market power of producer marketing-only cooperatives was considered. It was concluded that countervailing market power had no theoretical basis for its existence in the agricultural marketing context. This section takes a different angle however, and argues that a very large producers' cooperative could actually depress producer prices by precipitating and facilitating oligopsony behaviour among the buyers.

Stigler's (1964) paper outlined the factors which facilitate stable cartels. In brief, a stable cartel requires that each player has accurate information on the other players' actions, and that defectors from the cartel can be punished by the other members. Thus, if members can credibly act to "police" the cartel, no member will have an incentive to "cheat", and so the collusive equilibrium is supported. For a set of potentially oligopsonistic buyers, a highly concentrated producer marketing structure may make collusion between the buyers more easy to monitor

and police. Thus, Geroski (1988, p.110) noted that cooperative arrangements are often observed among buyers facing a monopolist. Accordingly, a defection by one player, outbidding rivals for extra milk, is likely to be quickly detected by the other players when they all buy from one monopoly source. Because the detection of rivalrous behaviour is probable, an oligopsonistic processor may be less ready to "break rank" and may prefer to adhere to a tacit agreement so as to temper competition in the market for raw milk.

The second and perhaps most important aspect of this conformation of bilateral oligopoly is the ease with which a defector can be punished. When an oligopsony buys from a monopoly, a defecting buyer who attempts to expand milk supply by (secretly or otherwise) outbidding rivals, will anticipate that punishment by the cartel will be easily carried out. Punishment of a defecting buyer is more forceful and effective when the cartel buys from a monopolist. Once the defector has been detected, the other members of the cartel can raise their bid prices and easily recapture their "share" of the milk supply. The anticipation of such easily enforced punishment means that more collusive outcomes can persist as stable equilibria. This is an application of the *topsy turvy* principle of Shapiro (1989). Something which might make competitive behaviour more likely or credible can actually promote collusion. The very competitive equilibrium can be reserved as the threat which supports the collusive outcome.

By corollary, if the cartel buys from a more fragmented supplying industry, punishment of an expansionary (defecting) buyer is less simple. A buyer in this situation who succeeds in gaining extra milk by outbidding a rival may be more difficult to punish than if the seller marketing structure were a monopoly. This is so because the extra milk supply won by a defecting oligopsonist cannot be easily recaptured by other players. The seller may have entered a twelve month rolling contract with the buyer. However, if the sellers are organised as one monopoly, the buyers may be able to recapture the defectors extra milk supply at the next round of auctions or tenders. Thus, it is possible that the formation of a very large

monopolistic producer cooperative could support more highly collusive equilibria in the downstream manufacturing and processing sector in their input markets.

However, other factors also bode against such large organisations, in terms of the price they return to producers. For instance, buyers of milk from Milk Marque and Scottish Milk may incur disadvantages not experienced by dairy companies who can source direct from producers. One disadvantage stems from the traceability of the milk they receive. It is difficult for a company sourcing through Milk Marque to trace milk back to its origin, which is useful to sort out hygiene or compositional problems in the raw material[52]. As such, it would appear that Milk Marque does not wish to build long term trading partnerships with buyers. Indeed (Clarke, 1995, p.4)[53] argues that their whole modus operandi is based on keeping farmers and processors apart by "pooling" the returns from buyers irrespective of their market strengths and products.

In addition buyers sourcing through Milk Marque and Scottish Milk have less security of milk supply as they must enter negotiations (or auctions in the case of Scottish Milk) to secure a supply each month. This is clearly a disadvantage over companies with direct supply agreements with producers based on 12-month rolling contracts. Such disadvantages are likely to be reflected in the milk price buyers are willing to pay to the new voluntary cooperatives.

As such it appears likely that the dairy product manufacturers who are prepared to pay a premium for milk will be able to persuade farmers to sign up direct supply contracts. One consequence of this is that the Milk Marque price will be lowered on average as the lower value-added product manufacturers will be left to source milk through the cooperative. Additionally, the milk producers with the largest volumes, and in the most favourable locations are likely to be the first to

---

[52]The Procurement and Planning Director at MD Foods states that "Milk Marque insist on us taking any tanker load of milk from anywhere in the country with any legal fat and protein content (Clarke, 1995, p.3)".

[53]Procurement and Planning Director, MD Foods.

be persuaded to deal direct with dairy companies. This will leave Milk Marque with relatively smaller and more remote farms, which will in turn increase its costs of collection. Thus, it could be that the cooperative will be left with the lower value-adding buyers of milk, and with more expensive milk collection. This in time must reduce the pool price to the remaining Milk Marque producers, which in turn will increase the incentives for further producers to leave it. The same fate may also occur to Scottish Milk.

Certainly, during the first year of deregulation dairy companies competing for direct supply tended to pitch their price offers against those of the Milk Marque and Scottish Milk[54][55]. However, it would appear that by the second year of deregulation dairy companies (in England and Wales) have begun to compete for raw input supply independently of the Milk Marque price (*pers comm*, B. Wilson). In turn, this direct supply competition may then feed back to support the Milk Marque price.

6.5.2 Vertically Integrated Cooperatives

Previously, the manner in which producer owned vertical integration in the marketing channel could increase the producers market power was outlined. At an elementary level, vertical integration in milk marketing means that a bulky and very perishable raw product can be transformed into a storable value added product. This in itself will expand the market power of producers through the strategy of downstream tapered integration. Because a cooperative processor may have different objectives than a private processor in terms of the milk price each pays out, the existence of the cooperative processor may keep private processors

---

[54]Such as Wisemans famous offer of 1 pence per litre more that Scottish Milk.

[55]This factor may also explain why dairy companies stated that they did not want all of their milk sourced direct. While the successor coops maintained high shares of the market, they provided a depressed base price for the dairy companies to "compete" with for direct supply. Thus, the dairy companies were in the ambiguous situation of wanting a secure direct supply while at the same time hoping that the successor coops would continue.

more competitive in the market for raw milk. Also because the product in its processed form is likely to be more transportable and more storable, producers with integrated processing capacity avoid the problem of spatial oligopsony market power in the market for raw milk.

Spatial oligopsony power is of particular relevance to milk marketing because the raw product is costly to transport. Thus, sellers in a particular area are likely to be limited to a small number of potential buyers who may be able to act in an oligopsonistic manner due to the high transport costs of the raw product. Consequently, by investing in processing capacity of a viable dairy product, producers avoid the problems associated with spatial oligopsony power in the market for a bulky perishable commodity.

6.5.3 Vertical Partnerships

The various forms of vertical partnership in existence in the deregulated industry provide useful comparisons of the implications for market power of different producer marketing strategies. These different categories of vertical partnership are considered separately below.

Individual Supply Contracts

The buyers are likely to find dealing direct with farmers has advantages over dealing with Milk Marque and Scottish Milk. These advantages relate to the traceability of milk back to its original source[56], the longer term security of their milk supply, and to the freshness of raw milk on entering the factory[57]. However,

---

[56]Traceability of product is an increasingly important aspect of trade in food industries. As supermarkets are legally responsible for the safety of food, they are demanding that their suppliers can trace the original source of each batch of product. Thus, companies require to be able to locate their original source so that problems (such as bacterial or anti-biotic impurities) can be dealt with efficiently.

[57]Delivery from Milk Marque is likely to take place up to 36 hours after collection from farms (*pers comm*, Roger Metcalf).

for a given set of potentially oligopsonistic buyers, a fragmented selling structure may make collusion between the buyers more difficult. A defection by one oligopsonist, outbidding rivals for extra milk, is more likely to go undetected due to the complexity of bilateral relationships when selling structures are fragmented. Because detection by rivals is less likely, an expansionary oligopsonist will have less disincentive to compete at the margin for extra milk supply.

Nevertheless, when spatial oligopsony power is prevalent sellers may also suffer from insufficient concentration in their marketing structure. Very fragmented selling structures will also suffer from the market power of buyers, although this relates to localised spatial oligopsony power and the credible threats open to individual producers. While an individual farmer may be able to credibly threaten a large buyer with shifting his supply to another buyer, the threat is not a large one for the dairy company. Also the individual producer may not have an alternative processor on hand to make his threats credible. Thus, it appears that, at least in the exceptional circumstances of the U.K. dairy industry, that the optimal structure of producer marketing under oligopsony lies somewhere between the extremes of high concentration (causing buyer collusion) and excessive fragmentation (allowing spatial oligopsony power to operate).

Direct supply contracts are one form of vertical partnership as described in Hughes (1994a) and discussed previously. Hughes however noted that partnerships between farmers and processors can be viewed as making the upstream production business more powerful relative to the downstream power of the retailers (Hughes, 1994a, p.64). In terms of producer market power it would initially appear that direct supply contracts offer farmers a much better option, because the prices they have received have been higher than those returned by the voluntary cooperatives. However, the main element of this price differential is due to the saving made by avoiding the high haulage and administration costs of Milk Marque and Scottish Milk. Dairy companies bear the raw milk haulage cost and appear to be able to do so more efficiently than the successor cooperative. Therefore the higher prices do not reflect a gain in market power by producers. Rather in the immediate post-

deregulation environment dairy companies may prefer to attempt to maximise their direct supply of raw material. Thus, the prices paid during the first year of deregulation are more likely to reflect a trade-off between higher input prices in the short run and the longer term prospect of a secure milk supply.

Accordingly, in the longer term individual direct supply contracts are unlikely to offer the best solution to the problem of producer market power. Firstly, the individual may suffer a lack of credible alternatives, and is likely to suffer more from spatial oligopsony power. Secondly, dairy companies use professional negotiators to deal with milk producers. While some producers may be gifted amateurs in negotiation, they are not likely to be able to match the bargaining skills of a trained professional. Thirdly, individual farmers are not likely to have market information regarding their buyers' revenues and costs. As such the farmer must take the companies word for it if, for example, world prices have slumped, or haulage costs have risen.

Clearly there is an asymmetry in the bargaining position between buyer and seller if farmers sell on an individual basis to dairy companies. This asymmetry stems from the lack of credible alternatives for the small individual producer, the difference in negotiating skills, and the asymmetry in market information between buyer and seller.

Group Marketing

Milk groups were initiated in the wake of deregulation in order to circumvent the problems associated with producers on individual direct supply contracts with dairy companies. There are, however, at least three different types of milk group which have come into being since deregulation. For the purpose of analysis these are termed (1) the Quota-Holding Groups (QHGs), (2) Professional Non-Quota

Holding Groups (PNQHGs), and (3) Non-Quota Holding Groups (NQHGs)[58]. Each of these three types of group work on a different philosophical principle regarding agricultural marketing.

QHGs believe that milk producers must hold and administer their own quota, and control the haulage operation:

> Managing our own fleet of contracted hauliers ensures that the producers have control of this major cost area with efficiency here amounting to significant cost improvements thereby improving returns to producers (Vickers, 1995, p.5).

The cost improvements referred to are presumably in relation to Milk Marque. There is no obvious reason why a producer group should control haulage costs better than an dairy company. In fact there may be factors suggesting that the dairy company could minimize this cost more effectively, such as their buying power in procuring these services and perhaps greater incentive to minimize this cost than the producer group. This may be so because the producer group subtracts the cost of haulage, and other costs, from its gross revenue to determine the net price producers receive. For the dairy company, however, the cost of haulage will directly affect its overall profitability.

One of the less widely purported benefits of the QHGs relative to NQHGs is that they can potentially threaten to switch their milk at short notice from the buyer and hence keep buyers more "competitive". In contrast the NQHGs and PNQHGs, which allow the dairy company to control haulage and administer quota, are committed to fulfilling the rolling contract as negotiated at the outset. The QHG philosophy assumes that the ability to renege on a contract at short notice can gain the producer a higher price in negotiations. Herein lies the traditional,

---

[58]These terms were coined by members of the industry in wake of deregulation. PNQHGs are also known as "Fully-Professional Non-Quota Holding Groups" and "Agency Type Milk Groups".

confrontational U.K. philosophy towards milk marketing. This confrontational attitude towards buyers has been fostered among dairy producers throughout the realm of the MMBs, and indeed predates their existence. Moreover the successor voluntary cooperatives may still retain the incentive to foster this attitude among producers, thereby retaining support for the organisation.

However, there are disadvantages in the confrontational attitude. If one of the benefits of the QHG is the ability to switch, or threaten to switch, milk supply at short notice then such groups do not provide the *security of supply* required by the processor. On the other hand, the Professional Non-Quota Holding Groups (PNQHGs) are concerned to build stable partnerships with the customers (the dairy companies). Accordingly, Taylor (1995)[59] asserts:

> We must get used to negotiating, using a common language based on an equal understanding about how milk production and milk pricing works; what it is about; where the profit centres are. Defuse intimidation by talking to prospective partners; equals who both understand and respect each other's task and apply common criteria (Taylor, 1995, p.3).

The structure of marketing within the PNQHG context is depicted in Figure 6. The PNQHGs allow the dairy companies to administer haulage and quota and so the dairy company has greater security in its milk supply. The PNQHGs are committed to operating within the terms of the agreement to supply contract. Also the minimalist groups appear dedicated to building long term stable partnerships with customers and believe that successful commercial relationships will not come about by a process of confrontation. Only by nurturing a viable food manufacturing industry will there be a secure and competitive market for the farmers produce.

---

[59]Chairman of Camelot Milk Ltd.

Figure 6: *Structure of Non-Quota Holding Group Marketing*
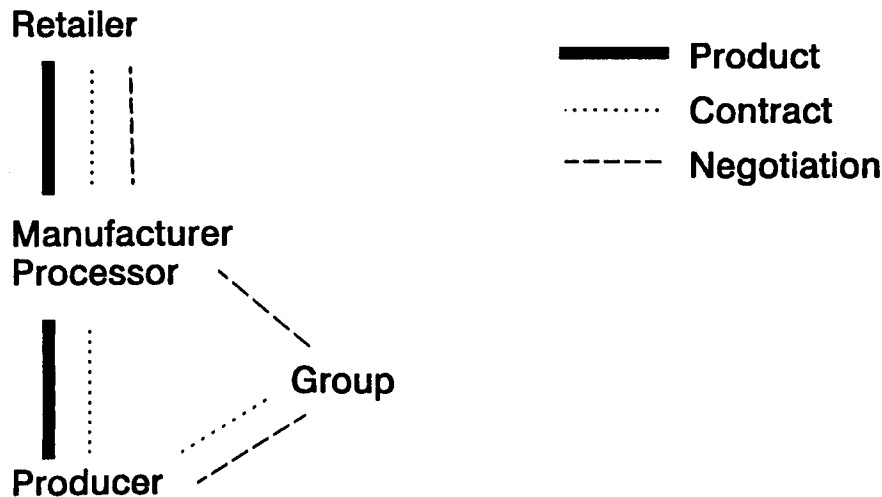
The PNQHGs, however, believe strongly in the importance of well informed and skilful negotiation in dealing with the dairy companies. For the PNQHGs the producer should have equal market information and professional negotiation on his side in dealing with dairy companies. Thus, PNQHGs attempts to create a "level playing field" between the processor and the group of milk producers. By grouping together and employing an industry specialist as a professional negotiator with comprehensive information on the market revenues and costs of the dairy companies, such groups may enhance the returns to milk producers over individuals in the marketplace[60].

The Non-Quota Holding Groups (NQHGs) work on a similar principle to the PNQHGs, but are producer-run and so operate without any outside help in the negotiating process. Such groups retain the threat of switching large volumes of milk between buyers (within the terms of the agreement to supply contract) and so may have an advantage over individuals on direct supply. The NQHG allows the

[60]This has been demonstrated in the case of MD Foods who were paying individuals on direct supply contracts less than producers in the Camelot milk group.

dairy to control haulage and administer quota, and negotiations with buyers are generally carried out by a Chairman who is an elected producer member.

The various types of milk groups discussed, and the marketing rationale behind each, are summarized in Table 6.5.

Table 6.5: *Summary of the Various Methods of Milk Marketing and their Rationale*

	Marketing Rationale	Disadvantages
Successor Coops	Perceived security of outlet for producer	Cost to the producer, distances the producer and the customer, may cause collusion between buyers
Individual direct suppliers	Absence of any group marketing cost, independence	Unequal market information in negotiations, small threat to switch supply
Quota-Holding Groups	Cost less than the successor co-ops	Does not provide security for the customer, sometimes cannot provide traceability
Non-Quota Holding Groups	Retain the threat to switch a large volume in bargaining	Unequal market information and negotiation skills
Professional Non-Quota Holding Groups	Group strength and equal market information and negotiating ability, provides security of supply required by customer	Cost of professional negotiator

Vertical Partnerships with Primary Product Differentiation

Market power in the food chain can be conceptualised as a vertical game for consumer patronage. Manufacturers in general earn higher margins where they retain a strong brand image with consumers. Retailers on the other hand gain market power by developing the breadth and penetration of own-label products. By shifting the brand image to the retailer, the buyer effectively opens up a choice of prospective suppliers for the product. This obviously improves the buyer's

bargaining position. This is in contrast to a manufacturer branded product where the buyer has only one supplier to negotiate with for that particular brand.

This view of vertical market competition for consumer patronage points towards opportunities for certain categories of primary producer. For example, certain categories of milk producers are the potential owners of the inherent properties of the final product. Therefore, the opportunity exists for these producers to enhance their market power considerably through vertical partnerships. Examples of these categories in the milk market would include Ayrshire milk[61], organic milk and Guernsey milk. In these cases the rightful owner of the inherent properties of the brand are the milk producers themselves. By forming into groups and forging vertical partnerships directly with retailers, producers may be able to expropriate a premium from the market, because they retain the return to the differentiated properties of the product.

This arrangement necessitates the producer group to sub-contract the processing of the product into its packaged form. By sub-contracting the producer gains market power, because he retains a choice of processors which could carry out the function. The processor loses market power because none of the extra rewards of branding are captured by the processor. However the properties of the brand stem from the farm and not the processor, and so this mechanism simply prevents the producer from giving away his market power.

The example of Ayrshire milk demonstrates how milk producers in the past have allowed the downstream industries to capture the rewards of branding the product. Marks and Spencers (M&S) sell Ayrshire Milk to consumers at a premium price. The producers of Ayrshire milk within Scotland however sold their milk to Scottish Milk who in turn sold to Scottish Pride to process and package the milk. Thus, the producers received only the pool price paid by Scottish Milk. However,

---

[61]Ayrshire milk denotes milk from Ayrshire cows and not from the Ayrshire region. It is differentiated from the milk of other breeds by the larger size of fat globules.

a vertical partnership between the producers and M&S, would allow the processing function to be sub-contracted, and hence could return a premium price to the producers.

Thus, it is possible to define two separate categories of vertical partnership; one which potentially enhances producer market power and one which does little to enhance the producers' bargaining position. Vertical partnerships which could significantly enhance the producers' market power are those in which the producer is the rightful owner of the properties of the brand. In this circumstance producers have the potential to gain a premium by forming partnerships directly with retail multiples, thereby preventing the processor/manufacturer from reaping the rewards of producer differentiation. On the other hand, vertical partnerships between undifferentiated primary product producers and downstream industries are unlikely to yield a significant comparative advantage for those producers. This is so because the consumer patronage for the final product either lies with the retailer or the processor/manufacturer.

6.6   Summary

This chapter has described the manner in which the Milk Marketing Scheme depressed the producer price and tempered competition in the dairy manufacturing sector. In a sense the market for dairy produce was up-side-down. The price of a low added value commodity, liquid milk, was held high to the consumer to bolster the producer price. On the other hand, the CATFI system which determined the milk to butter/skim and cheese prices reduced the incentives to develop new products and depressed manufacturing milk prices.

The seasonality of milk supply was altered by the Boards due to the emphasis on fresh liquid milk. With the priority for fresh liquid milk gone after the Scheme, a legacy of very few fresh products produced by the industry, and new technology which may mean "fresh" products can be made from butter-oil and SMP, a return

to a more traditional seasonal profile may occur. However, systems to work out the optimal seasonal profile for both buyer and seller still require to be developed.

In the wake of deregulation the market for raw milk was characterised by a degree of overheating, and milk buyers wished to secure a milk supply in an environment of excess processing/manufacturing capacity with a firm ceiling placed on raw milk production by the quota policy. This overheating has led to a period of high prices for milk producers. However, if the liquid market continues to decline at present rates, overcapacity may develop in the poly-bottle cartoning sector. This over-capacity will be relative to the market, rather than relative to the milk supply. Thus, the effect on producer price will be downward. As processors' margins are squeezed by the buying power of the supermarkets, the processors in turn will put downward pressure on the producer price.

In general the theory would indicate that dairy producers will obtain higher long term prices through direct contracting in groups, fragmented voluntary cooperatives, integrated processing cooperatives or a combination of all these marketing forms, rather than selling through a very large dominant monopolistic cooperative. In certain circumstances, where the inherent properties of the final product stem from the raw product as it was produced on the farm, producers may have the opportunity to enhance their market power through the formation of vertical partnerships with the retail multiples. In this way producer groups can enter the game of vertical competition at a low overhead cost, simply by re-organising the structure of contracts within the marketing chain.

The arguments developed in the preceding chapter regarding producer cooperatives and vertical partnerships are also reflected in this analysis of milk marketing. In general the same conclusions apply in that large marketing-only cooperatives do not yield "countervailing market power" simply through the concentration of marketing structure. In the dairy sector they may even be detrimental to producer prices due to the manner in which they might precipitate and facilitate downstream oligopsony behaviour.

The review of vertical partnerships including both individual direct supply contracts and group marketing suggests that the latter has logical benefits over the former, and the initial evidence since deregulation suggests that group marketing seems to offer higher returns. Thus, the analysis indicates that producer marketing structure may suffer by being too fragmented. This is so because the individual producer, or very small group, may have few alternative buyers, and so an overly fragmented marketing structure may reduce the spatial boundaries of the market, thus allowing spatial oligopsony power to operate. In turn, this suggests that when buyers are potentially cartelized, on both a national and a local scale, there is some optimal range for producer marketing structure in between the extremes of monopoly and atomistic.

Where does this case study analysis leave the idea of countervailing market power in horizontal cooperative marketing? Firstly, because the market is a spatial oligopsony due to the existence of high transport costs is there an advantage to some horizontal cooperation in agricultural marketing. Secondly, horizontal cooperation can also be too high tending to precipitate cartel behaviour downstream. Thirdly, because buyers demand long term supply contracts, professional negotiation with full market information may yield additional advantages to groups utilizing such facilities[62]. Accordingly, the countervailing power of sellers through horizontal cooperation may be said to exist only within some range of producer marketing structure, and this only where markets are spatial oligopsonies.

---

[62]"Full market information" in this context means - information equivalent to that possessed by the buyer.

Chapter 7
CONCLUSIONS

7.1 Overview

This thesis has dealt with the vertical market interaction of the food chain in a new format. It has taken a two-stage game-theoretic framework developed from industrial organisation literature, and extrapolated this into the area of bargaining relationships. This has allowed the development of an inter-sectoral model involving competition within and between sectors of industry at different levels of distribution. In turn this inter-sectoral model has been applied to the area of agricultural marketing philosophy. The resulting ideas have yielded new insights into many areas of the U.K. food chain. New ideas and areas for further research have arisen from this cross-fertilization. The overall conceptual framework developed also allows a view of the food chain which encompasses the dynamic nature of both horizontal and vertical competition. In particular the areas where new understanding has emerged include:

(1)   the development of a holistic framework regarding two-stage competition in a two-dimensional domain;

(2)   the dynamics of market structure in bilateral oligopolistic vertical market interaction;

(3)   the rationale behind the rise of non-linear contracts in this setting;

(4)   the limitations of the countervailing market power hypothesis;

(5)   the dynamic nature of the process of competition and the consequences for market structure;

217

(6)   the insignificance of the equilibrium approach to bilateral oligopolistic situations; and

(7)   the factors upon which competition policy decisions may depend in such situations.

This chapter may conveniently be divided into five sections. Section **7.2** describes the holistic two-dimensional model of competition, its concentration dynamics and the implied rationale behind non-linear contracts. The section then considers the endogenous sunk cost model within the context of the two-dimensional model before returning to consider the necessary conditions for countervailing power to apply in the context of agricultural marketing. Section **7.3** goes on to consider the dynamic nature of the process of competition together with the parallels of the current approach with Modern Austrian economics. Section **7.4** considers the factors which must be taken into account in an appraisal of consumer welfare and competition policy. Section **7.5** identifies the main areas for further research which would follow from this thesis and section **7.6** briefly summarizes the main findings of the research.

7.2   The Two-Dimensional Model

The exposition below demonstrates how this research has led to a more complete view of the concept of market power. It becomes possible within this framework to break down various aspects of market power and, in turn, to appraise the effects of each facet of market power in terms of its effect on concentration levels of both upstream and downstream sectors. This extension of the two-stage game model also demonstrates the manner in which the "process of competition" in a sector of industry cannot be considered in isolation from the structure and strategies of the firms with which it trades upstream and downstream.

7.2.1 Traditional Approaches to Market Power

The traditional view of market power was one which did not distinguish between the various aspects of firm strategy which might affect bargaining relationships and echoes of the theory of countervailing market power put forward by Galbraith (1952) are still found in much recent work. For Galbraith, the food manufacturers were the holders of original market power, while large buyers, such as the retail multiples, were the holders of countervailing market power. Venturini (1993) and Connor et al (1994) for example, used retailer own-label share as a proxy variable representing retailers' countervailing market power, which was rechristened as vertical competition.

Sutton (1991) used the two-stage game framework to unravel the two-way link between conduct and structure. Because both R&D and advertising can be thought of as sunk costs which will enhance consumers' willingness-to-pay for the firms' product(s), these are choice variables. Hence these decision variables are treated as endogenously determined. On the other hand, technological factors determine the minimum efficient scale of a single plant, and this element of sunk cost is thus exogenously defined. Sutton's (1991) theory unravelled the manner in which these two elements of sunk cost interact to determine the entry and investment decisions of firms. This may involve acquisition of plant and equipment (setup costs) and R&D and/or advertising expenditure (endogenous sunk costs). These investment decisions are embodied within the first phase (Stage 1) of the game, and these decisions feed through to affect the subsequent pricing competition within the subsequent (Stage 2) subgame. Because advertising and R&D can affect the demand for a firm's products, then Stage 1 decisions may involve a competitive escalation in advertising and R&D outlays. Thus, higher sunk costs are incurred at equilibrium, and in this way a lower bound to equilibrium levels of concentration is defined, no matter how large the market becomes. In turn, the "height" of this lower bound is positively related to the degree of demand responsiveness to increases in Stage 1 outlays on advertising and new product development (NPD).

7.2.2 The Need for a Holistic Approach

In this thesis the two-way link between conduct and structure is preserved in considering "horizontal" competition between firms in the same industry. More significantly, however, this model is extended to consider the two-way link between conduct and structure in the "vertical" market context, namely between firms in different industries which are related through trade. Accordingly, a model has been developed which allows an appreciation of the complex interaction between strategy, bargaining and market structure.

For ease of exposition a distinction will be made between "endogenous sunk cost" and "exogenous sunk cost" industries. Endogenous sunk cost industries are those in which advertising or R&D outlays currently form a significant element of the sunk cost of entry to the industry. Such advertising intensive industries presently include not only food manufacturing sectors such as frozen ready meals, soft drinks and margarine and spreads, but also the advertising intensive U.K. retail sector. For these industries primary interest is centred on the endogenous sunk cost model. However the exogenous sunk cost model is also considered below. This description of the two-dimensional model then concludes with an investigation of the necessary conditions under which countervailing market power can be said to apply. As this is carried out in reference to the next upstream stage of distribution, it also forms the basis for an original consideration of agricultural marketing philosophy. In particular the paradigm developed has implications for the traditional U.K. assumptions behind cooperative marketing strategy.

A central tenet of the extension of the two-stage game framework into two dimensions, namely horizontal and vertical, is that consumer responsiveness to advertising and R&D outlays by manufacturers is affected by the nature of competition within the concentrated retail sector. In this way it is fairly obvious that Stage 1 decisions in food manufacturing may be affected by the advertising strategies and the degree of consumer patronage of the retail sector. It is equally plausible to envisage a competitive interaction in advertising outlays as elements

of Stage 1 competition between downstream retailers and upstream manufacturers. In this way the model developed below extends Sutton's (1991) two-stage game model into two dimensions, horizontal and vertical.

7.2.3 Endogenous Sunk Cost Industries

The summary of the two-dimensional endogenous sunk cost model is outlined with reference to the U.K. food retail and manufacturing industries under four issues, namely (i) Downstream Horizontal Interaction, (ii) Upstream Horizontal Interaction, (iii) Vertical Competition and (iv) Countervailing Market Power. The analysis considers the argument that the paradigm might require further refinement to allow for "diagonal" or "cross-link" effects between, for example, the Stage 2 downstream and the Stage 1 upstream sub-games. However little evidence has been found to support this idea.

(i) Downstream Horizontal Interaction

Horizontal competition refers to competition between firms within the same industry or sector of industry. Within the two-stage game framework, Stage 1 of the game involves the firms' decisions of whether to enter the market and the level of sunk costs which must be incurred to do so. In the endogenous sunk cost model Stage 1 competition can encompass any feature of the good or of associated services that raises consumers' willingness to pay for a product as opposed to rival products (Sutton, 1991, p.45). A lower bound to equilibrium levels of concentration arises because, within industrial structures which are too fragmented, it will be optimal for some deviant firm to increase advertising, or other Stage 1 outlays, increasing the total sunk costs of entry.

It is contended in this thesis that competition within U.K. food retailing can be described in terms of an endogenous sunk cost two-stage game. Retailers in the U.K. have used advertising, R&D, site acquisition, and in store environment as aspects of Stage 1 competition. Thus, at Stage 1 firms consider whether to enter

the market and so consider the level of sunk costs which must be recouped at Stage 2. The endogenous element of Stage 1 sunk costs for retailers includes advertising, R&D, product range, in-store environment and associated services. For the horizontal retail game, Stage 1 outlays can raise consumers' willingness-to-pay for a basket of groceries, as opposed to other stores' offerings, by increasing consumer loyalty through advertising, or through an improved in-store environment. In the horizontal game a competitive escalation in Stage 1 outlays can be seen as an attempt to increase or defend market share and to increase unit margins in the Stage 2 subgame. In Chapter 3 it was demonstrated that such a competitive escalation in Stage 1 outlays has occurred in U.K. food retailing. This has raised the lower bound to equilibrium levels of concentration, because the sunk costs of entry have increased due to the endogenously determined advertising outlays. In this way, as market size increases, the level of equilibrium concentration becomes independent of setup costs, because the latter becomes a small fraction of total fixed outlays.

However, advertising and other outlays which raise consumers' willingness-to-pay only become profitable when a minimal market size is attained, and this size varies with the level of concentration in the market. So a low value of setup costs permits a low level of concentration to emerge only over some intermediate range of market size. Once a certain level of market size is reached, relative to the existing level of concentration, firms perceive an increase in the effectiveness of advertising. In turn this causes a sudden leap in advertising outlays and the sector enters into the advertising-intensive regime. Thus, increases in market size may initially lead to declining concentration. However, once a minimal market size is reached, advertising becomes profitable and hence further increases in market size are accompanied by indefinite increases in advertising outlays. This leads to the appearance of a non-monotonic schedule relating concentration and market size, as proposed by Sutton (1991, p.61). As the point at which this switch to an advertising regime occurs varies with the initial level of concentration in the market, changes in technology, or other exogenous factors which shift concentration, may also cause a sector to move into an advertising-intensive

regime. In this way a competitive escalation in advertising outlays may occur once a threshold in the market size/market structure schedule has been breached. Thus, anything which initially raises concentration above the advertising-intensive threshold, such as a change in technology which increases the minimum efficient scale (M.E.S.) of plants, may cause a competitive escalation in advertising such that total sunk costs become endogenous.

However, the U.K. food retail sector breached the advertising-intensive threshold not because of technological advances or changes in M.E.S. but because of the effect of scale on bargaining relations with upstream industries. Chapter 3 described the manner in which realized buying-power economies caused an initial increase in concentration in U.K. food retailing. In turn this allowed the sector to breach the advertising-intensive threshold and so precipitated a competitive escalation in advertising. That the advertising threshold was breached is related to the two-dimensional model outlined below[63]. This suggests that such horizontal games cannot be considered in isolation from the vertical interaction with sectors upstream or downstream.

Stage 2 of the horizontal retail game embodies the subsequent price competition, once Stage 1 investment decisions have been made. For retailers the horizontal "toughness of price competition" relates not to the level of retail prices but to the level of retail margins. The contention is that Stage 1 outlays can enhance the Stage 2 margins of the food retailing firm. As a major effect of Stage 1 outlays by retailers is to increase the level of own-label penetration, and as retailers tend to take higher margins on own-label products[64], it follows that Stage 1 outlays do indeed tend to increase the average Stage 2 margins for food retailers.

---

[63] This also means that the vertical game described also maintains the two-way link between structure and conduct.

[64] This observation was made by various authors including van Dijk and Mackel (1991, p.353) and DAL (1977, p.39-40).

However, as own-label products generally have significantly *lower prices* to final consumers, despite *higher* retail *margins*, it becomes possible to appreciate the necessity of the holistic approach adopted here. Therefore to consider the level of retail *prices* involves not only the horizontal retail game, but also the horizontal manufacturing game and the vertical game between these two sectors. Likewise, in order to analyze retailer own-label penetration requires consideration of its effects in all the games described. First, own-label penetration may involve Stage 1 outlays by retailers in R&D and advertising expenditure, which feed through to affect Stage 2 retail price competition. Second, it may involve changes in the overall Stage 1 outlays in the upstream manufacturing industry through vertical competitive interaction. As a consequence of this it also may involve changes in Stage 2 upstream price competition. As such own-label penetration is returned to again below under both manufacturing horizontal competition and vertical competition.

(ii) Upstream Horizontal Interaction

Sutton (1991) described an endogenous sunk cost two-stage game for a variety of U.K. food manufacturing sectors. Therefore no separate attempt is made in this work to carry out a stand-alone consideration of the horizontal manufacturing game. Rather this thesis has sought to expand the dimensions of the two-stage game model. Sutton (1991, p.90) made scant reference to the high level of retail concentration and own-label penetration in the U.K., and so one aim of this thesis has been to build a two-dimensional picture encompassing both horizontal and vertical aspects of two-stage game competition, specifically for the U.K. food industries.

In Chapter 3 of this thesis the two-stage game model was used to describe competition and the evolution of market structure in the U.K. food retail sector. This expanded Sutton's model by showing how the effect of bargaining relationships must enter the description of competition and the determinants of market structure. In Chapter 4 Sutton's horizontal two-stage game framework was

taken and it was shown how bargaining relationships and the strategies of the downstream retail sector may be included to yield a more complete picture of the factors determining market structure. Therefore Chapters 3 and 4 laid down the precepts which are utilized here to develop a holistic paradigm of competition and market structure within the U.K. food chain.

(iii) Vertical Competition

Previous analyses of industrial structure have used game theory to concentrate on the nature of horizontal competition to explain market structure. In addition the theories of contract negotiation and bargaining utilize game theory to describe various types of vertical market interaction (see Marsh, 1984). The current analysis brings both the vertical and horizontal applications of game theory together to provide a unified view of how horizontal and vertical aspects of competition are intertwined. The expansion of the model into this *two-dimensional* realm, where horizontal and vertical games interact is depicted in Figure 7 below.

Figure 7: *The Two-Dimensional Model of Competitive Interaction*
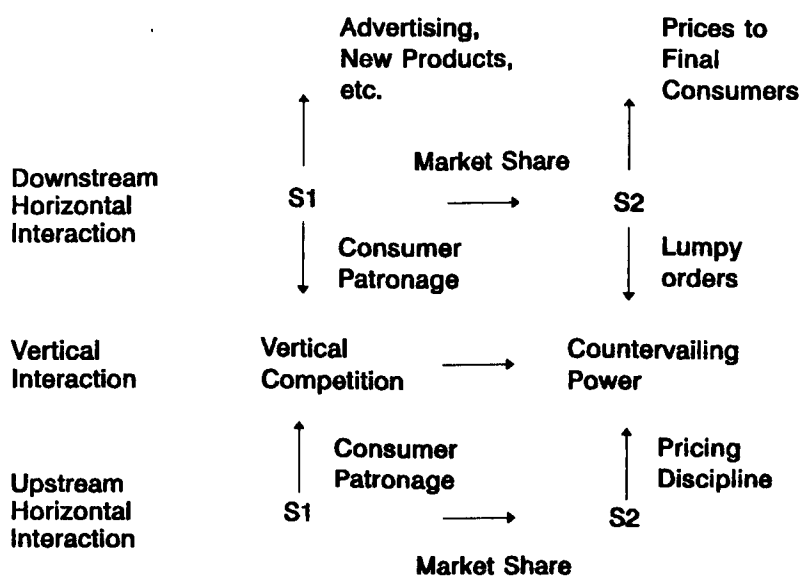
Two different aspects to the concept of market power are revealed in Figure 7. One relates to the effect of Stage 1 (S1) competition on vertical relations, and this is termed *vertical competition*[65]. The second aspect relates to the effect of the resultant Stage 2 (S2) competition on vertical relations, and throughout this thesis is termed *countervailing power*.

Within the vertical market inter-sectoral perspective retailers and manufacturers compete for consumer patronage, and this is regarded as a facet of Stage 1 vertical competition. In Figure 7 such investment competition for consumer patronage is termed *vertical competition*. This is seen as directly affecting the bargaining power relationship between the retailers and manufacturers. Thus, Stage 1 vertical competition involves a relationship between consumer patronage and bargaining power. This relationship is based on the idea that a manufacturer has greater bargaining power with the retailer when it has significant consumer patronage for its branded product. In turn the retailer will have greater bargaining power over its suppliers in negotiation for own-label supplies, rather than for manufacturer branded products, because it has a potential choice of suppliers for its own-label products. Accordingly, the level of own-label penetration, or manufacturer brand awareness, affects the overall degree of bargaining strength on each side. Stage 1 decisions as regards advertising and R&D affect Stage 1 bargaining power as one aspect of the retailer's overall buying power. Thus, vertical competition can be thought of as "Stage 1 bargaining power", because the factors which affect the relative bargaining positions result from endogenous sunk costs as strategic variables which have a direct bearing on the relative bargaining positions.

In the vertical realm a competitive escalation in outlays on Stage 1 variables can be seen as an attempt to increase bargaining power. Accordingly, the large

---

[65]Venturini (1993) first used this term in reference to the countervailing market power of large buyers. However, as he used own-label penetration as a proxy variable for countervailing market power, the term is used here to refer specifically to the effects of consumer patronage (Stage 1 outlays) on bargaining relations.

retailers and the manufacturers battle for consumer patronage and hence market power through the Stage 1 variables of advertising and new product development (NPD). Thus, while Sutton hypothesized that endogenous sunk costs at Stage 1 could raise the Stage 2 margins of the food manufacturing firm, here the concept is given a second dimension to show that Stage 1 sunk costs by the retailer can not only increase consumers' willingness-to-pay for its products, and hence affect Stage 2 horizontal competition, but can also increase the retailer's buying power over its suppliers, and so give rise to Stage 1 vertical competition.

The Life Cycle of Vertical Competition

In the vertical realm, Stage 1 outlays by retailers are likely to impact upon the Stage 1 outlays of manufacturers. The case study evidence suggests that retailer own-label penetration may stimulate advertising in upstream sectors as brand manufacturers attempt to maintain market share against own-label. It was noted in Chapter 4 that in the initial stages of own-label penetration manufacturers may attempt to defend market share by increasing their advertising. This clearly points to a competitive interaction in the vertical relationship between retailers and manufacturers. However Chapter 4 also demonstrated that, after a certain point, own-label penetration undermines manufacturer brand advertising, and so brand advertising subsequently declines in manufacturing due to Stage 1 competition by retailers. This "life cycle hypothesis" in vertical competitive interaction between retailers and manufacturers apparently has not been documented before. Sutton only noted that own-label appears to have grown to the point when it may be more costly for a manufacturer to achieve a given market share by dint of advertising support for a new brand (1991, p.90). In this thesis the analysis suggests that only in the initial stages of own-label encroachment is manufacturers' advertising stimulated, and that after a certain point own-label reaches a high enough share of the market that advertising by manufacturers declines to low levels. In this way highly branded products tend gradually to become commodities with low brand awareness among consumers and low advertising. Thus, in the long run vertical competition can force a particular manufacturing sector out of the advertising-

intensive regime. Canned vegetables would be an obvious example of this phenomenon, and a more recent example would be frozen vegetables, where manufacturer brands have been overtaken by own-label in terms of market share. The experience of the biscuit sector, described in Appendix I, also appears to demonstrate that an initial increase in manufacturers' advertising, as a reaction to retailer own-label penetration, is followed by a subsequent cutback in advertising by brand manufacturers as own-label begins to dominate.

A second facet of Stage 1 vertical competition relates to R&D outlays. A competitive escalation in R&D on new product development may occur between retailers and the large manufacturers. An example of this phenomenon is demonstrated in the frozen ready meals market, where the market leaders in manufacturing appear to be competing with the largest retailers for market share by constantly introducing new products. This process could be thought of as a competitive escalation in R&D expenditure between manufacturer and retailer. Furthermore, the shift from advertising to new product development as the main aspect of Stage 1 vertical competition in the frozen ready meals demonstrates the dynamic nature of vertical competitive interaction within the two-dimensional paradigm. This is returned to in Section **7.3** of this chapter.

(iv) Countervailing Power

Stage 2 vertical interaction relates to the observation that bargaining power appears to be affected by relative firm size in the market. As success in the horizontal retail game affects firm size and hence relative concentration, bargaining relationships are affected by a second mechanism. This mechanism is termed *countervailing power* in Figure 7. In Chapter 3 it was demonstrated how the effect of scale in buying, by increasing the "toughness of price competition" upstream, precipitated the growth of a concentrated retail sector. In this way the two-way link between conduct and structure is preserved within the vertical market context. The initial development of concentration in retailing was therefore seen as a consequence of the effect of the "lumpy orders" strategy upon the supplying

industries. This mechanism is couched within the Stage 2 competition of the supplying industries. The "toughness of price competition" for food manufacturers depends upon the level of concentration in the downstream retail sector. For retailers the "toughness of buying power" (or countervailing market power) is affected by their scale of operation and hence their level of concentration.

Accordingly, Stage 2 bargaining power derives specifically from the effect of relative scale of operation on bargaining relationships and market power. Thus, the use of the term *countervailing market power* here refers specifically to the effect of scale in buying. This was the original source of countervailing market power as described by Galbraith (1952). It is necessary to make this distinction in order to separate the effect of relative scale from the effect of relative consumer patronage. In turn the distinction is important because these two facets of market power have different effects upon industry structure. Chapter 4 described the potentially ambiguous effect of retail concentration and strategy upon concentration levels in upstream industry. Chapter 4 and Appendix I also tested this theory through considering a set of industry case studies.

The manner in which scale and concentration affect the balance of market power between buyers and sellers was described in Chapter 3 in relation to retail concentration. The initial concentration of U.K. retailing can be seen as a process of realised countervailing power economies in a legal environment permitting price discrimination between buyers. Therefore scale alone was sufficient for buyers to win significant price reductions from suppliers. In this way Chapter 3 demonstrated that relative scale, in itself, affects relative bargaining power without recourse to the idea of consumer patronage.

7.2.4 The Two-Dimensional Model and Dynamics of Market Structure

The concentration dynamics of vertical market interaction were the subject of Chapters 3 and 4 of this thesis. For retailers the evolution of concentration has been described in terms of both vertical and horizontal dimensions. Figure 8

utilizes the two-dimensional framework to describe the process which led the U.K. retail sector towards higher levels of concentration.

Figure 8: *The Evolution of Two-Dimensional Competition and Market Structure*
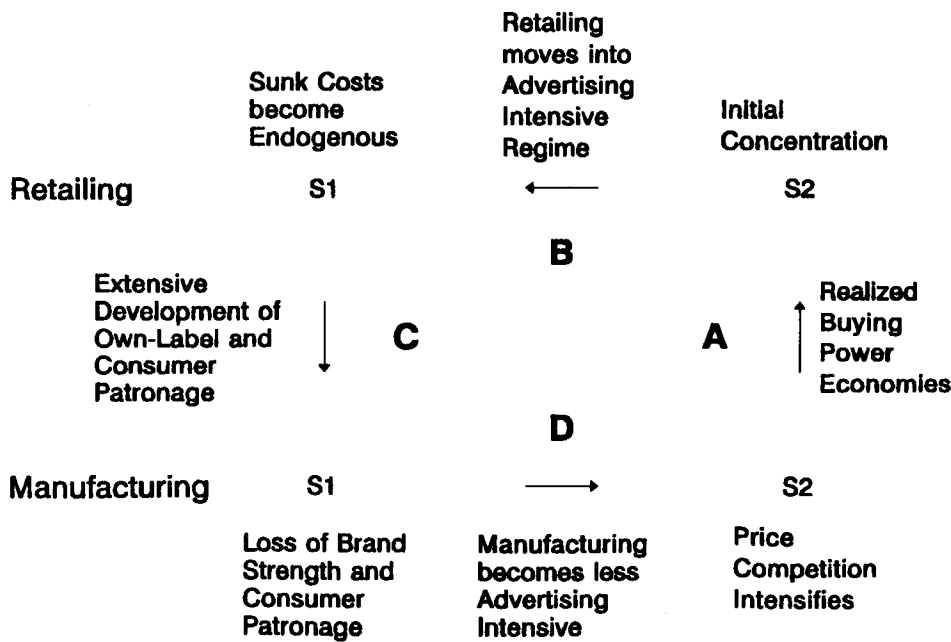
In Figure 8 the process towards retail concentration begins with the realized buying power of the multiples at **A**, a result of Stage 2 (S2) vertical interaction, which was facilitated by permissive U.K. legislation towards price discrimination. Realized buying power is seen as a two-way link between structure and vertical conduct. In this way as scale in buying has reaped rewards in terms of lower prices from suppliers, so the scale and concentration of buyers has rapidly increased. This initial concentration has meant that the retail sector has moved into the advertising-intensive regime at **B**. The resultant escalation in Stage 1 (S1) outlays by retailers has meant that a shift in consumer patronage has occurred, diminishing the strength of the manufacturers' brands at **C**, which affects Stage 1 (S1) outlays by manufacturers. In turn the diminished strength of manufacturer brands has fed through to the upstream Stage 2 (S2) pricing subgame at **D**, which effectively has increased the intensity of price competition among manufacturers. This in turn may have reinforced the economies to scale in retail procurement.

For the manufacturing sector, the effects of changes in Stage 1 (S1) variables on equilibrium levels of concentration need to be added to the effects of changes in Stage 2 (S2) price competition upon concentration. This may lead to ambiguous effects on the level of upstream concentration. It may, however, have discernable impacts on the overall configuration of market structure, i.e. the size distribution of firms in the market.

To see this, suppose that advertising effectiveness is undermined in upstream manufacturing due to pervasive retailer own-label penetration. One effect of this is to decrease the lower bound to equilibrium levels of concentration in manufacturing. However, if competition among manufacturers subsequently leads to lower prices to supply the growing own-label sector this constitutes an increase in the "toughness of price competition" and hence may cause some consolidation. Therefore, the effect on upstream concentration is ambiguous. However, the theoretical effect on the overall configuration (size distribution) of firms in the upstream market is not ambiguous. This is the case because, while sunk costs are endogenous (i.e. the sector remains advertising intensive), large firms can co-exist with a long tail of small firms who compete on price. The large firms survive (and make higher margins) by means of advertising support. Once advertising becomes undermined, and price competition subsequently intensifies, any extra economies to be derived by increases in scale will become of paramount importance. Therefore the relationship between the market majors and the tail of small firms changes. Indeed the dual market structure may no longer exist as a stable equilibrium. If large firms can achieve economies of scale over the small firms, then the configuration of the market may change due to a decline in the number of small firms. Consequently, the dual market structure of the advertising-intensive regime may begin to disappear.

However, the effect on the tail of small firms obviously depends on the shape and slope of the long-run average cost curve at outputs over and above the standard M.E.S. level. M.E.S. is customarily given an arbitrary definition as corresponding to the scale at which further cost savings of no more than 10 percent could be

achieved by further increases in scale of operation. Engineering estimates otherwise tend to imply an implausibly high value for M.E.S. relative to the other popular measure of M.E.S., viz, the size of the median plant in the industry (Sutton, 1991, p. 25). If the long-run average cost curve were sufficiently flat, then the removal of the sunk cost of advertising would outweigh the effect of increased price competition on the equilibrium level of concentration[66]. This appears to be borne out by the evidence given in Chapter 4, where sectors which have become dominated by own label have shown some tendency towards fragmentation. Thus, while the effect of own-label penetration on upstream *concentration* may be somewhat ambiguous, the effect on the *configuration* of firms upstream may be more predictable. In the context of the above example, the endogenous sunk cost of entry has diminished, but at the same time the importance of scale economies has increased. Therefore theoretically different factors constrain the set of equilibrium levels of concentration.

7.2.5 Cross-links in the Two-Dimensional Model

Another potential aspect of this two-dimensional paradigm worth consideration is that of cross-links either between Stage 1 downstream and Stage 2 upstream or between Stage 2 downstream and Stage 1 upstream competition as depicted in Figure 9. For example, if we assume own-label penetration is the result of lower retail margins, rather than as a result of Stage 1 vertical competition, and that own-label penetration has an impact on Stage 1 competition in manufacturing, then there arises the possibility of cross-links between Stage 2 downstream and Stage 1 upstream competition. However, as already noted, retail margins on own-label tend to be higher than on manufacturers' brands (van Dijk and Mackel, 1991, p.353), suggesting the invalidity of this type of cross-linkage. The example of the tea sector, described in Appendix I, suggests cross-linkage is not an important consideration. The multiples refer to tea as a known value item (KVI) and as such

---

[66]The relation between M.E.S. and the toughness of price competition is returned to in Section 7.2.7.

the price of tea is kept as low as possible. Also because own-label and the two branded market leaders have similar market shares, it appears that own-label has stimulated advertising outlays in manufacturing. However, the low price of own-label tea is regarded as having stemmed not from lower retail margins, but from the retailers' ability to extract lower prices from their suppliers. Van Dijk and Mackel (1991) note that the lower price of own-label stems from the retailers' ability to negotiate a very competitive buying-in price in return for a guaranteed volume.

Figure 9: *Cross-links in Two-Dimensional Competition*

Retailing
Horizontal   S1   ⟶   S2
Game

Cross-linked
Vertical
Competition

Manufacturing
Horizontal   S1   ⟶   S2
Game
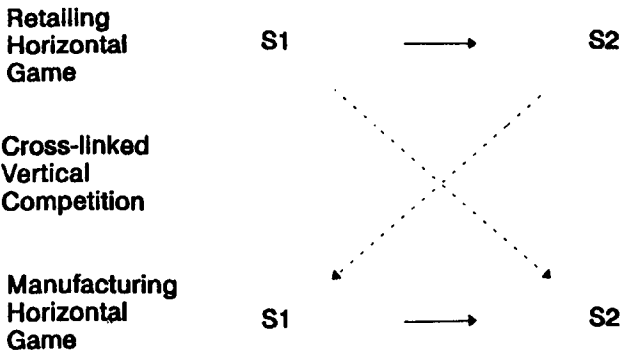
The possibility also arises that the lower prices achieved from manufacturers might stem from a cross-linkage between Stage 1 retail and Stage 2 manufacturing competition. However, manufacturers sell retailer own-label brands at lower prices for two reasons and both of these reasons invalidate the idea of a cross-link. First, own-label development as Stage 1 retail investment feeds through to Stage 2 retail buying power (the lumpiness of orders) and through this route has an effect on Stage 2 upstream competition. Second, the Stage 1 investment by retailers on own-label may impact upon Stage 1 competition in upstream manufacturing. Whether the effect is to stimulate or diminish advertising upstream, the effect of Stage 1

retail competition on Stage 2 price competition between manufacturers has still been routed through Stage 1 manufacturing investment competition. As the above arguments tend to negate the possibility of such cross-links between opposite stages of the two interacting horizontal games, the hypothesized effects depicted in Figure 9 appear to be invalid. Accordingly, the interactions between games maintain their rectangular appearance as shown in Figure 7.

7.2.6 Non-Linear Contracts in the Two-Dimensional Model

Non-linear contracts typically involve the exchange of a lump sum between trading partners so that revenues are not simple linear functions of the quantities traded. Arguably the application of the endogenous sunk cost game-theoretic model offers a novel insight into the apparent rise of non-linear contracts. Such contracts were discussed fully in Chapter 3 of this thesis. The justification offered here for non-linear contracts relates to the shift in bargaining positions which takes place between the initial date at which trade is negotiated, before any sunk cost or risk is incurred, and the date at which trade begins, after sunk cost and risk have been incurred.

For own-label products, the retailer bears the risk that the supplier will opportunistically recontract after sunk costs have been incurred. The shift in bargaining positions occurs because the retailer divulges information regarding the potential niche market to the processor. Once the processor has invested in new product development (NPD) and capacity to produce the new own-label product he may have a strong incentive to recontract, or threaten to recontract to alter prices, the exact price of the product being unknown until after it has been developed. However, suppose at the outset the processor has had to pay the retailer a lump sum in order to enter the process of NPD for the new own-label product, and that this lump sum is gradually recouped through the price of the new product once trade begins. In this way the non-linear contract has clearly taken away the processors incentive to recontract, and removed his ability to threaten to recontract.

For manufacturer-branded products, non-linear contracts may exist for a slightly different reason. Again however, the rationale for their existence may depend upon a shift in bargaining positions throughout the introduction of a new manufacturer-branded product. Before introduction of the new product, the manufacturer is in a weak bargaining position with the retailer. Neither party knows whether the introduction will be successful. Therefore, without a non-linear element in the contract, the retailer would require to take risk on behalf of the manufacturer. In other words the retailer would require to bear the risk that the manufacturer's product will fail. Accordingly, the manufacturer may choose to pay a lump sum to the retailer to get his product introduced. If the product is successful with consumers, the manufacturer's bargaining position has strengthened because he now supplies a successful product under his brand label. As such the initial lump sum can be recouped through the price of the product.

These explanations for non-linear contracts have some conceptual shortcomings. For the manufacturer-branded product the manufacturer pays the retailer to bear risk on his behalf, yet for the own-label product the manufacturer gets no such compensation for taking risk on behalf of the retailer. Thus, if the own-label product fails to sell the manufacturer may make a loss[67]. However, this would not be the case if the original contract to supply specified a volume of goods which allowed the manufacturer to recoup any sunk costs. In this instance the retailer would bear all the risk in introducing its own-label product.

Another difference between these two explanations of the existence of non-linear contracts is their starting point. For the own-label product the lump sum may change hands before investment costs are sunk (to prevent opportunistic

---

[67]It may be that the *direction* of the lump sum payment in this case depends upon the perceived riskiness of the new own-label product. Where the new own-label product is regarded as risky this obviously weakens the retailer's position at the outset. This must be set against its perceived desirability to alternative retail outlets, in turn affecting the sellers ability to recontract, and hence strengthening the retailers case at the outset and his demands for a lump sum to prevent recontracting later.

recontracting later). For the manufacturer's product the lump sum may change hands just before the launch of the new product (after investment costs have been sunk)[68]. However, the common thread in both of these explanations is that the lump sum changes hands just before the period in which the relative bargaining positions of the parties are liable to take a foreseeable shift. In both cases the lump sum is recouped through trade into the future.

In this way the application of the two-dimensional model into the vertical arena of bargaining relationships may have yielded an explanation for the prevalence of non-linear contracts in the U.K. food industries.

7.2.7 Exogenous Sunk Cost Industries

Exogenous sunk cost industries are those in which advertising plays little or no role in raising the sunk cost of entry to the industry. The salt and sugar industries are examples of sectors where the sunk costs of entry are not affected by (endogenously determined) advertising outlays. Thus, these are examples of exogenous sunk cost industries.

The exogenous sunk cost model is of less relevance to the current two-dimensional model. As the level of sunk costs is determined exogenously by technology, the interaction of retailers and manufacturers is less obvious. However, an important aspect of the exogenous sunk cost model relates to the relationship between measures of minimum efficient scale (M.E.S.) and the role of the "toughness of price competition". As noted earlier in measuring the M.E.S. it is customary to adopt an arbitrary definition of M.E.S. as corresponding to the level beyond which further increases in output would lead to a reduction in average cost of no more than 10 percent. However, the importance of increases in firm size beyond this

---

[68]This makes intuitive sense as the manufacturer can develop his brand product and production capacity before entering negotiations with buyers, whereas the retailer must enter negotiations with suppliers before NPD can begin.

arbitrary level clearly depends upon the exogenous "toughness of price competition" in the market (Sutton, 1991, p.25).

What the current analysis has to offer in this setting is simply the observation that the development of a concentrated retail sector effectively increases the "toughness of price competition" for manufacturers, and so, in the absence of changes in endogenous sunk costs, will lead to higher levels of concentration. This is contrary to earlier hypotheses by Venturini (1993) and Connor et al (1994), but is in agreement with Mackenzie (1988). The resolution of the contradiction between the Venturini hypothesis and that of Mackenzie was explained in Chapter 4 within the terms of the endogenous two-stage, two-dimensional model. Venturini (1993) hypothesized that increased retail buying power (which he termed vertical competition) would check increases in manufacturing concentration. He used the retailers' own-label share in a sector as a proxy variable for its countervailing power (vertical competition[69]), and found that increases in own-label share did tend to restrain increases in manufacturing concentration. However, the two-dimensional paradigm shows that it is a misinterpretation to regard this as an effect of increased countervailing power. If Stage 1 outlays by retailers undermine Stage 1 outlays by manufacturers, as described above by the "life cycle" of vertical market interaction, then an important constraint on upstream industry structure has effectively been relaxed, which in turn may allow for some fragmentation in manufacturing. This is so because the reduction in upstream advertising outlays effectively reduces the height of the lower bound to equilibrium levels of concentration.

This is opposite to the hypothesised effect of countervailing market power. This force stems from the scale of buyers, and because it tends to increase the "toughness of price competition" upstream, it tends to increase concentration in manufacturing, in line with the observations of Mackenzie (1988) and as

---

[69]Venturini (1993) and Connor et al (1994) treat vertical competition and countervailing market power as synonymous terms. Here these are separated due to their theoretically opposite effects on upstream concentration.

recognized by the MMC (1981, p.35). As such, the seemingly contradictory views of these authors is easily explained in terms of the paradigm developed here.

Therefore the two-dimensional model developed for retailers and manufacturers arguably advances the current understanding of what is meant by "countervailing market power" and "vertical competition", because it clearly separates the "relative scale" effect from the "consumer patronage" effect upon inter-sectoral relationships. In turn the market structure of both retailers and manufacturers is in part a result of this two-dimensional process of competition. Thus, the paradigm developed also provides a framework for understanding the likely effects of shifts in the strategic variables on concentration levels in both upstream and downstream sectors.

The model developed achieves a number of the aims of the thesis. First, the two-stage game paradigm has been extrapolated to apply to the U.K. food retailers when they act in the market as sellers. Second, the two-stage game model has also been transposed to consider vertical market competition, when retailers act as purchasers from upstream industries. Third, a holistic vision of competitive interaction in the U.K. food chain, in both horizontal and vertical dimensions, has been developed. This in turn points to many potential areas of further research[70]. Fourth, the holistic vision created provides a fresh basis for the analysis of countervailing power in the realm of agricultural marketing philosophy. This application is considered next.

7.2.8 The Necessary Conditions for Countervailing Power

The effects of scale and concentration on bargaining power were examined in detail in Chapters 5 and 6 in the analysis of producer cooperatives. Chapter 5 demonstrated the asymmetry in the majority of food market situations. This asymmetry relates to the observation that, in general, one side of a market attempts

---

[70]Areas for further research are returned to below.

to gain market power through tacit collusion (as demonstrated by the use of game theory in oligopoly models), while the other side of the same market attempts to gain market power through breaking this tacit collusion of the former. For the majority of food industry situations it is the buyers who attempt to encourage deviant behaviour upstream through an increase in the size of orders, and hence have a pro-competitive effect on an otherwise stable upstream oligopolistic industry. For sellers in homogenous goods industries, the level of concentration in the market affects the level of coordination achievable between the firms in terms of their pricing. In this way unit margins rise with increasing concentration.

Chapter 6, however, showed that in certain circumstances the asymmetry can be reversed such that the "incentive to collude" lies with the buyers. In other instances producers may face spatial oligopsony in their output markets, and Chapter 6 showed that the implications for countervailing market power may be different when this possibility exists. Therefore it is necessary to make a distinction in the discussion of countervailing power between situations where spatial oligopsony does and does not exist. Accordingly, the analysis below is divided into (i) Countervailing Market Power in Non-Spatial Markets and (ii) Countervailing Market Power in Spatial Oligopsony.

Galbraith (1952) did not explicitly state that oligopsony power had to exist between buyers for the countervailing power of agricultural cooperatives to operate. However, in reference to the countervailing power of large *buyers* he did note that "original market power" would require to exist on the sellers side in order that there is something there for the large buyer to countervail (p.125). This may be relevant to the transposition of countervailing power to the agricultural marketing context because it may suggest that "original market power", or oligopsony power, is necessary on the buyers' side of the market, such that countervailing power has something to operate against. In addition, Galbraith wrote in the context of the U.S. where spatial oligopsony power is more prevalent in agricultural commodity markets than it is in the U.K.

(i) Countervailing Power in Non-Spatial Markets

The two-dimensional model describes how changes in the relative size of buyers and sellers, in the absence of any change in relative consumer patronage, affects the relative bargaining power between firms in upstream and downstream sectors. In addition, a game-theoretic explanation for the observed effect of large buyers on upstream oligopolistic coordination was provided in Chapter 4 of this thesis.

Within this two-dimensional model, the exogenously given "toughness of price competition" in the market was linked to such factors as product characteristics, the state of competition policy, and the scale of buyers to the sector. However, the "toughness of price competition" was also seen as causing adjustments in the degree of concentration in the selling industry. In this way unit margins could recover from an exogenous increase in the "toughness of price competition". This idea may initially suggest some validity for the idea of countervailing market power of agricultural marketing-only cooperatives, because unit margins rise with increases in market concentration for any exogenously given level of "toughness of price competition". Herein lies the traditional Bain (1956) paradigm of a one-way chain of causation running from structure to conduct to performance. However extrapolating this idea to the area of agricultural marketing involves a number of assumptions which may not be appropriate.

First, within the two-dimensional model vertical market interaction depends upon both the Stage 1 components of market power, relating to the relative degree of consumer patronage on each side (vertical competition), and Stage 2 components of market power, which relate to the relative scale of buyers and the level of concentration of sellers (countervailing power). For agricultural marketing philosophy the Stage 1 facets of bargaining power suggest the obvious strategy of attempting to develop consumer patronage for a cooperative's outputs. However, for primary produce procurement or marketing-only cooperatives the idea of countervailing market power relates to the Stage 2 components of bargaining power, i.e. the effects of scale and concentration on bargaining power.

In the U.K., the countervailing market power hypothesis has been used to suggest that, if producers band together to market their produce as one large seller, this will allow them to bargain more effectively with large buyers. However the idea of Stage 2 relative bargaining power embodies within it an important asymmetry in relation to the effects of scale on relative bargaining positions. Critically, Stage 2 bargaining power for *sellers* requires a level of tacit coordination across the firms, whereas Stage 2 bargaining power for *buyers* relates to the effects of scale in buying upon the coordination achievable between sellers, for any given level of concentration in the upstream industry. As such, coordination between buyers is not required. Rather the scale of buyers in itself is enough to affect the level of coordination between sellers.

Thus, for agricultural marketing-only cooperatives facing non-spatial, non-oligopsonised buyers increases in scale alone are not sufficient to generate increased market power. Since tacit collusion does not exist on the buyers' side, the "incentive to collude" remains on the sellers' side of the market. Accordingly, a level of tacit coordination across all the sellers of a product would be required for the hypothesized link between concentration and market power to apply. However, agricultural marketing-only cooperatives generally operate in an environment of competing atomistic firms. Therefore, the co-existence of a long tail of small firms in the market invalidates the link between scale in selling and market power.

While many food manufacturing sectors are made up of large firms in co-existence with a long tail of smaller competing firms, in general, the large firms maintain market share and bargaining power through advertising support for their products (Stage 1 horizontal and vertical competition). Assuming that agricultural marketing-only cooperatives deal in homogenous commodities, a comparable game-theoretic analogy in food manufacturing would be that of the homogenous goods (exogenous sunk cost) industries. The sugar, salt, flour milling and bread baking industries in the U.K. are all examples of homogenous goods industries in which the process of concentration has continued until the tail of small firms has

been more or less eradicated. The homogeneity of the product, through increasing the "toughness of price competition", has led to highly concentrated market structure equilibria. Unit margins recovered only in the absence of the tail of small firms. Thus, it follows that agricultural marketing-only cooperatives could only gain higher prices in the non-spatial context in the absence of a long tail of individual producers.

Figure 10 depicts the application of the industrial structure/bargaining paradigm to the area of agricultural marketing. In Figure 10, *manufacturing and retail procurement* are taken together, as both these sectors source requirements from the agricultural sector. Again the market power of these buyers is separated into two aspects, involving vertical competition for relative consumer patronage and concentration to acquire countervailing power. This separation allows an appraisal of agricultural marketing philosophy regarding the source of market power which has not been possible before.

Figure 10: *The Two-Dimensional Paradigm and Agricultural Marketing*
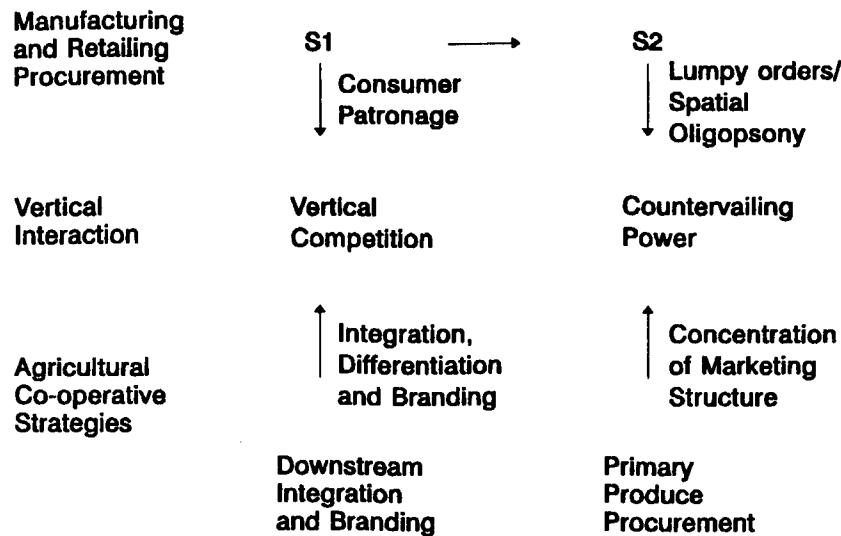
In Figure 10, *downstream integration and branding* relates to vertical interaction because it involves sunk cost investments in either downstream plant and equipment (vertical integration) or investment in developing a brand image and hence consumer patronage (vertical competition). These are treated as Stage 1 facets of market power because they stem from the direct effects of sunk cost on bargaining relationships. For the downstream industries Stage 2 (S2) market power derives from the effect of scale upon buying power, either through the "lumpy orders" strategy or through oligopsony behaviour. *Primary produce procurement* relates to the idea that the concentration of selling structure through the formation of marketing-only cooperatives will yield producers greater bargaining power with buyers.

The separation of the components of market power has also facilitated a consideration of producer market power which reveals an erroneous aspect of many earlier studies on agricultural cooperation[71]. In particular many of these made reference to the countervailing market power of producer marketing-only cooperatives. This study has revealed that the market power of sellers does not stem from firm size alone. In the absence of spatial oligopsony power, agricultural marketing-only cooperatives would require to operate in an environment without a tail of competing individual producers *and* enjoy a level of tacit coordination between all the suppliers of a homogenous product[72]. As these conditions rarely, if ever, exist in the U.K. agricultural marketing context, it follows that the assumption of countervailing market power of marketing-only cooperatives in many situations is groundless. Therefore the arguments developed have undermined a myth which has been circulated since Galbraith (1952).

While the analysis may have questioned previous preconceptions, it has also pointed to strategies which could conceivably enhance producer market power.

---

[71]These earlier studies were noted in **Chapter 5**.

[72]In the case of the U.K.'s Marketing Boards the enforced solidarity of producer marketing had the effect of shifting the "incentive to collude" onto the buyers. This was discussed fully in Chapter 6 and is returned to below.

These strategies lie in the area of vertical competition, namely strategies which reach downstream in the food chain. Brand strategies which develop consumer patronage for a group of producers can conceivably enhance the market power of those producers. This is because the direct link between the producer and consumer gives the producer more bargaining power with the intermediaries in the chain of distribution.

(ii) Countervailing Power in Spatial Oligopsony

In Chapter 6 it was demonstrated that the asymmetry noted between buyers and sellers, in terms of their market power, can in certain situations be reversed. The U.K. dairy industry was used to illustrate this phenomenon. The reversal in asymmetry, involving the necessity for buyers rather than sellers to coordinate, was argued to be due to three special facets of the dairy sector. First, the quota policy has constrained the total supply of raw milk which has led buyers in the market to become aware of their interdependence. Second, the marketing of the raw product was (up until 1994) carried out by a monopolistic institutional arrangement and this in itself also tended to nurture coordination between buyers. Third, raw milk was highly perishable and costly to transport. The first two factors point to the possibility of collusion between buyers on a national scale, while the third indicates the possibility of localized spatial oligopsony power.

The implications for agricultural cooperation appear to be different when buyer collusion is a possibility. Also the two levels of tacit collusion between buyers noted above, national and local, leads to the situation where the optimal producer marketing structure lies somewhere between the extremes of highly concentrated and overly fragmented. This is explained by reference to the effect of seller concentration upon the potential for tacit collusion and spatial oligopsony between buyers.

On the one hand, highly concentrated seller marketing structure can actually precipitate and facilitate collusion between buyers. The manner in which this is

possible was described in Chapter 6. Briefly, with a highly concentrated marketing structure, a defecting buyer within an oligopsonistic cartel will be more easy to detect and easier to punish compared to the situation where the seller market configuration is more fragmented. As such the tacitly collusive equilibrium will be more easily supported. In support of this argument, buyer collusion has been observed in other sectors when they face a monopolistic supplier (Geroski, 1988, p.110).

On the other hand, if producers face more localized spatial oligopsony power, some degree of seller cooperation effectively expands the spatial dimensions of the market and hence impacts positively upon the competitiveness of the buyers. This is so in this situation, because the marketing-only cooperative can credibly threaten a large buyer with a variety of alternative competing buyers, whereas this may not be a credible threat for the individual producer. The strategy works in this instance because of the existence of high transport costs which negate the individual's ability to issue credible threats of alternative buyers. Alternatively stated, the high transport costs make it easier for buyers to avoid competition between themselves for input supply. However, for a group of producers the extra transport costs involved in marketing to an alternative buyer are less inhibitive because of the economies of scale in transport. As such the group's threat of alternative buyers is more credible than that of the individual.

This suggests that the idea of countervailing market power in agricultural cooperation can apply over some range when sellers face spatial oligopsony power downstream. However, in the context of the U.K. milk industry where buyers may be potentially oligopsonised on a national scale, the analysis also suggests that seller marketing structure can be too concentrated to be optimal for the producer in attempting to stimulate competition for input supply between his downstream buyers.

In terms of Figure 10, Stage 2 vertical interaction, or countervailing market power, appears to operate over some range in defeating spatial oligopsony.

Moreover, Stage 1 strategies such as vertical integration into food manufacturing, act as *downstream tapered integration* for the producer sector as a whole and can keep the downstream industry more competitive in its input markets. This effect was formally expressed by Sexton (1990) in terms of conjectural variations between oligopsonists.

In the context of raw milk marketing, prices are determined for a period into the future (usually three months) and the details of the "agreement to supply" contract regarding factors such as transport, seasonality, composition and quality may have a marked effect on the final price received by the producer. Accordingly, prices are determined partly by the marketplace and partly by the process of negotiation. Thus, the relative degree of market information and negotiating skill are important to the determination of final prices. This suggests a second advantage of cooperative marketing, namely its potential ability to negotiate on an equal basis in terms of market information and contract bargaining skills with buyers.

The vertical partnerships discussed in Chapter 5 generally entail the negotiation of a long-term supply contract. As such, it may be beneficial for producers to employ professional negotiation, with access to equivalent market information as possessed by the buyer. Hughes (1994a, 1994b) does not allude to the importance of the negotiating process for the producer, but one of the advantages of this method of agricultural marketing is that it provides the service the customer demands, namely secure and traceable supplies of raw product. This can enhance the efficiency of the food chain as a whole, and has the potential to increase returns to producers. However, whether it does or not depends upon the vagaries of the individual product market, in terms of i) the relative benefits of long-term supply contracts for the buyers (and hence their incentive to opportunistically recontract), ii) the competition between them for input supply and iii) the relative negotiating skills and market information available to the two parties.

7.3   Dynamic Two-Dimensional Competition and the Market Process

This section reviews the findings regarding the dynamic nature of competition within the two-dimensional framework, together with the striking parallels of the approach with the market process theory of Modern Austrian Economics and the factors needing to be considered in an appraisal of competition policy.

Competition within the two-dimensional framework is seen to be composed of a number of variables relating to both horizontal competition for market share and vertical competition in terms of bargaining power. These variables have various weightings, and through time these weightings shift in terms of their importance. The game continually moves on from one phase of competition to another. Firms evolve new combinations of strategies to either increase or defend market share and market power. Retailers shift between various combinations of advertising, product range, in-store environment and price as aspects of horizontal and vertical competition. Upstream, manufacturers shift between new product development and advertising as aspects of both horizontal and vertical competition. As such the dynamic nature of competition could be pictured as a continual flux in the weightings on the set of strategic variables.

As market structure is seen as a consequence of the underlying game, the implication is that this continually shifts also. Thus, the level of advertising, R&D and other Stage 1 strategic variables shift in response to consumer preferences and in response to the strategic shifts of other "players", both horizontally and vertically in the marketplace. Because these Stage 1 outlays continually change in response to other firms strategies, so the endogenous sunk cost of entry continually shifts with it. Therefore the theoretical lower bound to equilibrium levels of concentration is also in a continual state of flux. In turn, as products move through their life cycles from branded to commodity status, so the toughness of price competition changes, which puts new constraints on the market structures as described previously.

7.3.1 Modern Austrian Criticisms of the Equilibrium Approach

The process of competition described in this thesis in terms of the two-dimensional game-theoretic model has many parallels with Modern Austrian Economics, as described in Chapter 2 of this thesis. Primarily, the description of markets given by the two-dimensional model shows that markets do not instantaneously adjust to their equilibrium values. In addition, the model describes the *process* of competition in terms of the interactions of economic agents in responding to each other, as much as in responding to the underlying variables of consumer preferences and resource availabilities. To explore these links between game-theoretic industrial organisation economics and market process theory it is first necessary to outline the arguments developed by Kirzner (1992). The discussion is couched in terms of (a) the *underlying variables* (UVs), identified as preferences, resource availabilities and technological capabilities, and (b) the *induced variables* (IVs) consisting of prices, methods of production and quantities and qualities of outputs, which the market at any given time generates under the impact of the UVs.

The equilibrium approach sees market phenomena at each point in time as accurately expressing the balance of forces relevant to the underlying data of that moment. This view postulates that at each and every instant the actual market values of the IVs are equal to their equilibrium values predetermined by the relevant values of the UVs. In turn, because equilibration processes are assumed to be powerful and rapid the approach also assumes away the task of explaining the nature of such processes. Even apparent discrepancies are explained away in the equilibrium approach by reference to the costs of removing ignorance. In this way the equilibrium approach simply expands the *scope* of the equilibrium assumption to assume that marginal search costs are equated with the marginal benefits of new learning.

Market process theorists, however, see things quite differently. The constellations of prices, product qualities, methods of production and incomes observed at any

given instant are not at all taken to be the relevant equilibrium values. Rather these variables are seen to be subject to market-generated changes, apart from the impact exercised by exogenous changes in the underlying variables. Market process theorists do not conceive market forces as operating in deterministic fashion (Kirzner, 1992, p.41).

As noted above, equilibrium analysis takes the view that even apparent discrepancies between the Ivs and their respective equilibrium values can be explained by the costs of learning. However, a deliberate act of learning occurs only when one recognizes one's lack of knowledge, is aware of the way in which this lack can be rectified, and at what cost. From the market process view, ignorance is by its very nature unknowable. In the Austrian approach the emphasis is on discovery, rather than on deliberate search. Thus, for Kirzner, equilibrium models turn out to be pictures from which the most important features of the market (entrepreneurship, unknowable ignorance and discovery) have been excluded (1992, p.44). Neither instantaneous adjustment to equilibrium, nor the absence of any equilibrating process with regard to the UVs can be assumed. Somewhere between these two extremes, the process of competition operates in an environment of ignorance and discovery.

7.3.2 The Two-Dimensional Model and the Austrian Approach

The Modern Austrian Economics of Kirzner (1992) has much in common with the game-theoretic two-dimensional model outlined in this thesis, where players in the market continually shift the weightings on a whole series of strategic variables. These shifts neither perfectly reflect the underlying demands of the marketplace, nor are they operating completely independently of final demand.

The two-dimensional model developed here, demonstrates that the possible set of market structure equilibria is large, and indeed the model only defines a lower bound to possible equilibrium levels of concentration. This clearly reduces the usefulness of the concept of equilibrium in the field of industrial market structure.

However, the similarity with market process theory goes further than the usefulness of the concept of equilibrium. Thus, the market process of competition is not dependent upon changes in the *underlying variables* of preferences, resource availabilities and technological capabilities in a deterministic fashion. Rather the two-stage game-theoretic model throws up the indeterminacy of the process of competition, as horizontal and vertical players constantly evolve new strategies in their attempts to increase or defend market share and relative bargaining power. Thus, both approaches focus on the importance of the *induced variables* i.e. prices, methods of production, quantities and qualities of outputs.

The role played by ignorance and discovery within market processes are also encompassed in the two-dimensional model outlined. Firms up and down the market continually attempt advertising and product innovation in an effort to win the hearts and minds of consumers. This relates less to the idea of adjustment to equilibrium than to the idea of ignorance and discovery in the market process. Indeed the advent of supergame theory in explaining industrial structure (and with it the *process* of industrial competition) in itself admits that the IVs do not necessarily shift instantaneously in such a way to provide equilibrium in the UVs. Because economic agents may perceive their interdependence in the market, the IVs can be clearly seen to exhibit a degree of independence from the UVs. However, at the same time they cannot be totally independent of the UVs.

In the Austrian view, disequilibrium persists because unknown opportunities exist which remain to be exploited. The equilibrating tendency of the market process is driven by the discoveries of entrepreneurs in overcoming ignorance. In the game-theoretic context, a sector is out of equilibrium when a firm has an incentive to deviate from the collusive equilibrium. Such deviancy may take the form of lower prices, higher advertising or increased NPD activity. Therefore both schools of thought stress the relationship between the equilibrating tendency of the market and original innovative behaviour.

However, for the endogenous sunk cost model the relationship between the IVs and the UVs becomes more difficult to interpret, and with it the relationship of the model with Kirzner's idea of market process. This is because advertising, as an endogenously determined IV, can increase consumers' willingness-to-pay for a firms products. As such, it may no longer be reasonable to assume that even the UVs (which include consumers' preferences) are independent of the IVs.

7.3.3 Differences with the Austrian Approach

At this point there appears to be a divergence with the Austrian paradigm regarding the role of advertising. Kirzner (1992) based his arguments around the factors within the free market economy which give it an "equilibrating tendency" towards fulfilling the underlying variables (UVs) of preferences, resource availabilities and technological capabilities. These UVs are exogenously given for Kirzner. However, within the game-theoretic model developed in this thesis, firms have the ability to influence consumers' willingness-to-pay for their products through advertising. Whether or not the UVs can be considered to be independent of the advertising strategies of firms leads into the debate regarding the desirability of advertising, i.e. the "advertising-as-persuasion" versus "advertising-as-information" debate. Advertising-as-persuasion sits more comfortably within the model as it raises consumers' willingness-to-pay. However, advertising-as-information can also be reconciled with the model, if advertising is seen as a guarantee of product quality (Sutton, 1991, p.312-313).

The difference between these two explanations of advertising is crucial to the relation of the present model with that of the Modern Austrian School. For Kirzner, any claim to the effect that consumers' preferences dictate the allocation of resources can have validity only to the extent that these preferences are sensed and transmitted by market entrepreneurs (Kirzner, 1992, p.76). However, if entrepreneurs actually influence consumers' preferences through advertising, rather than simply transmitting them, then the UVs cannot be taken as exogenously given. If advertising acts as persuasion the market process is even more dependent

on the actions of entrepreneurs. It becomes difficult to evaluate the effectiveness of the market process in allocating resources to consumers' preferred uses, because such preferences become endogenous to the market process itself. Herein lies the difficulty with the appraisal of competition policy in the context of the two-dimensional model.

In this thesis the Austrian view is preserved in that i) a distinct equilibrium is never attained, ii) the independent variables constitute an important element of the market process, and iii) entrepreneurship is the *force majeure* of the market process. However, a potential divergence also arises with the Austrian School in that, as the advertising-as-information stance cannot be verified, even the UVs may not be described as independent of the process of competition. In turn this possible interdependence between the IVs and the UVs leads to the main problem in ascertaining the implications for competition policy of the two-dimensional paradigm.

7.4   Competition Policy

In order to assess the implications for competition policy it would first be necessary to outline the effects of the two-dimensional game on consumer welfare. No such attempt is made in the analysis. However, it is still possible to make some general comments regarding current competition policy, and to shed light on the factors which might come into any wider appraisal of consumer welfare.

Mackenzie (1988, p.60) noted that a major problem with the Competition Act 1980 is that it is not well suited to dealing with problems arising from the effects of competitive behaviour at different levels of distribution (ie. food retailing and food manufacturing). He is also critical of the Office of Fair Trading (OFT) for not referring proposed retail mergers to the Monopolies and Mergers Commission (MMC), whereas firms in the food manufacturing sector are often discouraged from merger by the threat that an MMC investigation might be initiated and the

threat that another bidder might emerge in the intervening period (Mackenzie, 1988, p.57-58).

In terms of competition policy the two-dimensional model outlined in this thesis is of some relevance. The buying power of retailers is broken down into two separate facets. Only one of these two types of buying power, countervailing power, relies on breaking upstream pricing discipline. This operates through scale in procurement. Possibly due to focusing on this effect alone the competition authorities came to regard retail mergers as unimportant (OFT, 1985). Certainly, countervailing market power was used by buyers to counter an oligopolistic supplying industry and temper its selling power and "monopoly profits". In Sutton's (1991) analysis, concentration increases in order to maintain a level of price coordination such that adequate returns on capital are achieved. However, if competition policy has been applied unequally to food retailers and manufacturers, as contended by Mackenzie (1988), then clearly the concentration in food manufacturing cannot adjust to moderate increases in the toughness of price competition. At the same time retailing may continue to concentrate and hence continue to apply ever greater countervailing power. Indeed it appears that retail mergers have continued up until 1995 without significant threat of referral to the MMC. This is surprising in view of the recommendation in the MMC "Discounts to Retailers" report which stated that "..it is important to keep a particularly close watch on future mergers in the distributive trades" (MMC, 1981, para 9.34). The view that competition policy has been unequally applied may also be supported by the observation that profit rates between 1981 and 1995 have in general been higher in food retailing than in food manufacturing.

Indeed the MMC (1981) themselves have indicated the potential inequality in application of legislation:

> ..the Secretary of State may refer mergers to this Commission only if the combined market share of the parties exceeds 25 percent or the value of assets taken over exceeds £15 million. ..It is highly desirable that it should

be possible to refer to this Commission for closer scrutiny any mergers which appear likely to reduce materially the extent of competition in retailing on a national or regional scale. If it should appear that the existing criteria are too limited to allow the reference of such mergers, we hope that consideration would be given to suitable modification of the criteria (MMC, 1981, para 9.35).

While the legislation remains as outlined, a merger in food manufacturing would be eligible for referral if, for example, the combined market share of baked beans exceeded 25 percent, whereas a retail merger would only be eligible for referral if the combined market share of the entire grocery market exceeded 25 percent (provided the target company remained under the £15 million threshold). As such there may be some justification for Mackenzie's (1988) arguments.

On the other hand, the opposite view, laid out in Kirzner's terms, is that the entrepreneurs in retailing have been able to reflect the demands of consumers more accurately than their counterparts in food manufacturing. This is not because the retail entrepreneurs were better, but rather because society's underlying preference was for lower prices on retailer own-labels, larger stores and one-stop shopping. If this "underlying preference" argument were adopted, it provides a powerful alternative justification for the higher margins in food retailing to counter the argument that the difference is due to an unequal application of competition policy.

However, there is little doubt that the discounts available to large retailers under U.K. competition policy have facilitated the rapid emergence of concentration. Furthermore the operation of the existing competition policy appears somewhat limited in checking these increases in concentration, at least relative to its effectiveness in upstream industries. As such, a future objective for policy makers might be to attempt to design competition policy so that it applies equally to different levels of the food chain. In addition, the rate of increase in retail concentration would be checked by a competition policy which has some mechanism for discerning what constitutes unreasonable discriminatory

discounting, and has legislative power to deal with it. In regard to the long term effects of current U.K. competition policy, Everton (1988) in her appraisal of overseas competition policy in the food industries, reminds us that:

> One day, when the temperature cools, there may be room for the thought that true freedom demands higher ideals than those which currently govern commercial thinking. If transatlantic Antitrust has any long term message for the U.K. food trade, it may be to pay heed to the spirit if not the form of Robinson-Patman[73] (Everton, 1988, p.159).

In Everton's opinion, the lack of any legislation on discriminatory discounting has prevented a truly equitable market place in the U.K. Therefore, true freedom requires that small independent retailers are not at a serious disadvantage in entering, or remaining in, the market. Accordingly, the discounts available to large buyers, in the absence of legislation, are seen as having raised the barriers to entry into retailing. Thus, it may be that policy should reflect the trade-off between price discrimination-as-countervailing power and price discrimination-as-barrier to entry into retailing.

In Chapter 3 it was noted that some new entrants to the U.K. multiple food retail sector have complained of difficulty in locating U.K. suppliers. Some of the blame for this is levelled at incumbent retailers for allegedly pressurizing their upstream manufacturers not to supply to the new entrant. New entry to retailing is an essential element in maintaining a market structure which is a reflection of the divergent demands of society. As such, any attempts by incumbent retailers to

---

[73]In the U.S., the Robinson-Patman Act (1936) amended Section 2 of the Clayton Act (1914) to reinforce the outlawing of price discrimination between different purchasers of "goods of like grade and quality" where the effect "may be substantially to lessen competition or tend to create a monopoly in any line of commerce, or to injure, destroy, or prevent competition with any person who either grants or knowingly receives the benefit of such discrimination, or with the customers of either of them (Scherer and Ross, 1990, p.510)."

prevent their suppliers from dealing with new or potential entrants to the retail sector should be dealt with very seriously by the competition authorities.

The analysis of competition policy so far largely ignores the other type of buying power outlined by the two-dimensional model. The shift of consumer patronage towards retailers has also enhanced their buying power and their margins. Moreover, this shift has been enabled by the initial increase in retail concentration and countervailing power. Such consumer patronage increases the Stage 2 margins of the retail firm. In turn, advertising and other Stage 1 investments are funded from the higher margins earned in the Stage 2 subgame. Therefore, in order to ascertain the competitive effects of retail concentration on consumer welfare, entails not only a very close scrutiny of retail prices to consumers, which affect retail margins and hence further Stage 1 investments, but also requires a stance to be taken as regards the desirability of advertising. In turn, the appraisal of advertising must consider not only its overall effect on welfare, but its effect on welfare regarding whether manufacturers or retailers carry out the bulk of the advertising.

In this regard the Monopolies Commission (MC, 1973) investigation into the breakfast cereals sector is revealing. The MC believed there were significant barriers against the entry of new competition, not least as a result of heavy advertising by the leading brands. The MC concluded that price competition was muted with Kellogg being the price leader with over 50 percent of the market. They also found Kellogg's profitability to be excessive. This view is clearly contiguous to the Sutton (1991) model in that high advertising supports high concentration and high unit margins. The MC requested that prior approval should be required for any price increase, and this advice was accepted by the government (Howe, 1988, p.117)[74]. This decision by the MC required a judgement to be

---

[74]Since the time of the MC investigation own-label has grown from 4 percent to more than 20 percent, and this has allowed new entry to the industry to supply the own-label business. This observation clearly supports Hypothesis 5 (Chapter

made regarding advertising. In their view consumers were paying more than necessary due to a combination of high advertising, product proliferation and price leadership. Thus, in a sense Kelloggs had been too successful in their product proliferation and advertising strategies in either informing or persuading consumers of the benefits of their products. As such, it is not necessarily collusion or monopoly in itself which acts against the public interest; rather advertising and consumer patronage are complicit in acting against the public interest.

However, the issue of the returns to advertising and consumer patronage has not yet entered the debate regarding the market power of the retail multiples. In Chapter 3 it was demonstrated that during the 1980s the multiples shifted the area of competition away from prices. The resultant increase in margins facilitated rapid expansion through merger and site acquisition. In addition the 1990s has witnessed the introduction of the multiple card holder schemes (initiated by Tesco), whereby loyal and high spending customers can gain extra discounts. At the same time these card schemes give the retailers extensive marketing information on their customers and their purchases. This development further enhances the consumer patronage that the large multiple holds. Perhaps more importantly the card scheme may allow price discrimination between high and low spending customers. While the competition authorities took the view that price discrimination between retailers and their suppliers was beneficial to the public interest, price discrimination between retailers and final consumers surely requires separate analysis. This analysis would lead the researcher into the arena of the welfare ramifications of changes in the distribution of income. Indeed the problem becomes philosophical in the same way as the treatment of advertising, because it falls back on the other side of the economy which creates the *interface* known as the "market"; i.e. consumers and society. Whether or not advertising is in the consumers' interest requires judgements to be made regarding what consumers' interests exactly are.

---

[74](...continued)
4) that own-label penetration can cause fragmentation in upstream industry through undermining the endogenous sunk cost of advertising.

In this regard the question of consumers' preference structures is worth some comment. Scherer and Ross (1990) point out that advertising can destroy utility along with creating it. Advertising seeks to make the utility of the individual consumers depend not only upon the goods and services they consume, but also on the consumption decisions of their peers. As such it is not clear whether consumption in response to advertising does any more than return consumers to the satisfaction level they would have maintained without the persuasive assault on their preference structures. Thus, advertising renders utility functions interdependent, and so generates external diseconomies in consumption (Scherer and Ross, 1990, p.580).

However, Scherer and Ross also point out that late in a product's life cycle, when highly advertised brands can face strong competition from other advertised brands, or unadvertised own-label products recognized by consumers to be of comparable quality, the result can be lower consumer prices. Then the combination of strong horizontal competition among retailers to stock well-known brands plus strong horizontal and vertical competition among manufacturers for consumers' patronage may mean that consumer prices will be lower than they would be in the absence of national advertising (Scherer and Ross, 1991, p.576). However, this phenomenon must be regarded as transient because, in general, advertising is related to superior profitability and higher prices. Indeed, it is difficult to see why firms would persist in heavy advertising if prices would actually rise in its absence. It seems plausible that in this situation the firms are caught in a prisoners dilemma, where if all firms dropped advertising they would be better off, but if only one dropped advertising and the other firms maintained advertising support, the former would lose out in terms of market share.

As noted above, the difficultly in evaluating the effectiveness of the market mechanism under any particular competition policy relates to the difficulty in independently estimating the other half of the market, i.e. consumers' preference structures. Thus, a short discussion of this underlying problem is worthwhile. For the majority of society the driving force which provides motivation is no longer

one of fulfilling basic necessity or need[75]. Rather, society in general can be seen as playing a game in which the payoff structure is given by the distribution of income. Indeed this follows simply by assuming that the society of entrepreneurs is the same as the society of consumers. As the distribution of income has continued to widen in the U.K., so entrepreneurs have had to attempt to fulfil widely differing demands in food markets. Thus, some groups of consumer prefer to pay for advertising and in-store environment, whilst others prefer the lower priced and lower advertised offerings of discount stores. If this Austrian School view can be applied to the phenomenon of advertising, (thus taking advertising itself as part of consumers' preferences and hence an underlying variable), then the level of advertising is linked to the distribution of income. In the same way, the development of polarised marketing strategies in the multiple retail sector is evidence of the widening, if not polarised, distribution of income (see Hughes, 1994a, p11-14, and Hughes, 1994b, p.1-2). For Kirzner (1992), the actions of dispersed entrepreneurs in the market economy will always reflect the new and divergent demands of society more accurately than central planners ever can. As such, it is probably also fair to state that the actions of dispersed entrepreneurs in society yield more insights into the preference structures of consumers than economists (or policy makers) can ever independently estimate. Consequently, a fundamental problem thrown up by the Austrian approach is how can economists and policy makers judge the ability of the market mechanism to fulfil consumers' preferences, when the best estimate of those consumers' preferences can be gained only from the same market mechanism which we wish to evaluate. In other words, there is not an independent source of estimating consumer preferences; the same problem encountered by central planners.

However, what *is* known is that the ability of the market process to fulfil consumers' preferences depends upon entrepreneurial freedom. This freedom requires the legal framework to guarantee that freedom of entry is not impeded by

---

[75]This however, is not to deny the continuing existence of an underclass in society who are denied even the most basic of necessities.

either excessive price discrimination, excessive consumer patronage (as was enjoyed by Kelloggs) or exclusive trade arrangements.

In summary, a shift of focus is perhaps still required in competition policy from an intra-sectoral consideration of competition to a broader two-dimensional vision of vertical market interaction and the factors determining market power and concentration dynamics. Alongside this broader vision of the determinants of market structure and the type and level of competition, there would require to be a wider debate and consensus of opinion regarding the desirability of advertising in terms of social and individual utility.

7.5 Areas for Further Research

The findings and observations of the thesis point to two main areas for further research. Within each of these areas there are a number of subsidiary questions requiring investigation. First, the two-dimensional model has led to the identification of two separate facets of market power and has shown that a firm's strategy must involve both the horizontal and vertical considerations. Therefore, one obvious area of further research would be to attempt to appraise the relative importance of each facet of market power, and the relative importance of horizontal and vertical considerations in a firm's strategy.

Second, the two-dimensional model, when applied to the area of agricultural marketing, has suggested that increases in marketing scale through cooperation may positively affect the producers bargaining position over some range when spatial oligopsony is present. However, the analysis has also suggested the importance of negotiating skill and market information in the determination of prices. As a diverse range of marketing forms have come into existence in the U.K. dairy industry since deregulation in 1994, this sector offers an opportunity to explore the price implications of these various marketing forms.

Therefore, two specific lines of enquiry arising from the thesis which require further investigation are:

1) Further refinement of the two-dimensional game-theoretic model of competition. This would allow an understanding of the relative importance of horizontal and vertical competition within a firm's strategic behaviour. In addition, the advancement of this theoretical framework would allow an appraisal of the relative importance of the two separate aspects of market power defined by the model.

The advancement of the theoretical model would be strengthened through the use of industry case studies in a two-dimensional context. Detailed case studies chosen from a variety of U.K. and European manufacturing industry and retail sectors with a simultaneous focus on both inter-firm and inter-sectoral relationships would allow a broader picture to emerge concerning the two dimensions of competition as described above. This case study approach would also allow an appraisal of the relative importance of vertical competition and countervailing market power as defined previously. This in turn would allow an understanding of the effects of countervailing power and vertical competition on the market structures of retailers and manufacturers.

2) The thesis has also outlined that, where spatial oligopsony exists between buyers, agricultural cooperative marketing may have two separate theoretical means by which it may increase producer prices. These two facets of cooperative strategy may be defined as i) the effects of scale; and ii) the effects of market information and negotiating skill. A case study approach within the context of the two-dimensional model provides an opportunity for an appraisal of the relative importance of facets i) and ii) in the determination of final producer prices.

This would allow a separation of the effects of scale in marketing as against the effects of professional negotiation on final producer prices. Thus, an awareness of the effectiveness of countervailing market power in agricultural cooperation could be gained. The analysis would also lead to an appreciation of the importance of

professional negotiation in cooperative marketing. This in turn would allow an estimate to be made of the cost effectiveness of employing such negotiators.

The U.K.'s unique milk marketing arrangements provide a suitable candidate for such a case study. This sector provides the opportunity to differentiate between agricultural returns in different forms of agricultural marketing. These forms include (a) individual producers; (b) producer groups without professional negotiation; and (c) producer groups with professional negotiation. Such an analysis would allow an appraisal of the relative effectiveness of i) countervailing power and ii) professional negotiation in respect of agricultural cooperative marketing strategy in spatial oligopsony situations. In addition, the further refinement of the theoretical framework within the cooperative marketing context would provide an appreciation of the particular market characteristics which effect the relative importance of i) and ii) within the cooperative marketing strategy.

7.6   Summary

The broad view taken by the thesis has allowed advancement of the general theory of competition and market structure in the U.K. food chain. This has been possible through the synthesis of divergent schools of economic thought. The application of game-theoretic industrial organisation has yielded an understanding of vertical market interaction and concentration dynamics. In turn this framework has been used to consider the rationale for various forms of agricultural marketing.

In summary, the main insights to have arisen from the analysis stem from the application of the two-stage game framework to the horizontal competition within the various sectors of the food chain, and its extension into studying the vertical market interaction between these sectors. This has allowed the identification of two separate facets to the idea of market power. In turn it has permitted an appraisal of the rapid emergence of retail concentration in the U.K., its effects on the

equilibrium market configuration of upstream industries, and a novel analysis of the rationale behind various producer marketing structures and strategies.

Appendix I

ANALYSIS OF FOOD MANUFACTURING CONCENTRATION

The Industry Data

This Appendix to Chapter 4 is intended to provide a more comprehensive view of food manufacturing sectors in terms of the theory. These sectors were excluded from Chapter 4 for the sake of clarity. Some of the sectors listed below bear little relevance to the primary subject of enquiry, i.e. the impact of the multiples, because in some cases only a fraction of the sectors outputs directly goes to final demand (Appendix Table 3). In other cases the three digit SIC sectors cover essentially diverse sub-sectors, some of which are advertising intensive and others which are not. This makes an analysis of concentration change in terms of the theory rather tenuous. However, for completeness all of the food sectors in listed in Appendix Tables 1 and 2 below are followed up with short descriptive analyses.

Appendix Table 1 shows five firm concentration ratios as a percentage of gross output for selected years between 1980 and 1992, while Appendix Table 2 gives the number of small enterprises in each sector for selected years between 1984 and 1992. Appendix Figure 1 summarizes the data in Appendix Table 1. It shows the average percentage change over each two-year period in five-firm concentration ratio (C_5) between 1984 and 1992. A longer time series could not be compiled from the official data due to a discontinuity in sampling technique in 1983. The figure nevertheless indicates the broad trend in concentration over the late 1980s and early 1990s. However, it is useful to consider changes in the number of small firms in the sector as it gives a broad indication of the number of entering or leaving a sector. Appendix Figure 2 gives the average percentage change in the number of small firms for each food processing sector. It therefore summarizes the broad trends in the number of small firms in each sector over the period.

Appendix Table 1: *C₅ as Percentage of Gross Output*

	1980	1982	1984	1986	1988	1990	1992
Organic Oils and Fats	72	71	79	72.9	65.9	64.3	52.8
Slaughtering of Animals	na	na	15	20.3	21.4	21.7	19.7
Milk and Milk Products	52	52	54	58.6	57.6	59.7	59.4
Fruit and Vegetable Processing	35	38	34	33	37	47.9	47.5
Fish Processing	64	69	69	63	64	52.7	49
Grain Milling	65	64	68	68.9	69.3	66.3	62.3
Bread, Biscuits and Flour Confectionary	67	65	46	54.7	51.3	47.6	47
Sugar and By-Products*	100	100	100	100	100	100	100
Ice Cream, Cocoa, Chocolate and Sugar Confectionary	62	64	65	60.7	60.2	59.3	69.8
Animal Feeding Stuffs	46	45	36	49.8	49.1	47.9	54.1
Starch and Miscellaneous Foods	28	23	25	28.7	30.8	30.5	29.8
Soft Drinks	52	49	45	37	50.6	55.1	63.1

Source: Business Series Monitor, PA1002 Various
*Figures for Sugar and By-Products approximate

Appendix Table 2: *Number of Enterprises in the 1-99 Employee Size Group*

	1984	1986	1988	1990	1992
Organic Oils and Fats	80	47	53	43	26
Slaughtering of Animals	1618	1560	1655	1230	1140
Milk and Milk Products	320	328	251	278	273
Fruit and Vegetable Processing	225	250	235	208	242
Fish Processing	258	251	258	249	241
Grain Milling	107	107	93	78	75
Bread, Biscuits and Flour Confectionary	3713	3843	3923	3781	3585
Ice Cream, Cocoa, Chocolate and Sugar Confectionary	540	546	518	486	478
Animal Feeding Stuffs	517	522	452	429	393
Starch and Miscellaneous Foods	709	854	956	891	906
Soft Drinks	211	197	183	168	162

Source: Series Business Monitor, PA1002 various
na: Not Available

Appendix Figure 3 shows the broad trends in own-label penetration over the early 1990s. The product categories listed do not correspond exactly with the three digit SIC industries given in the Business Series Monitor data in Appendix Tables 1 and 2. However, the figure provides a useful reference for the analysis which follows and a broad indication of the degree and trend in own-label penetration in each sector.

Appendix Figure 1: *Average Percentage Change in Concentration, 1984-1992*
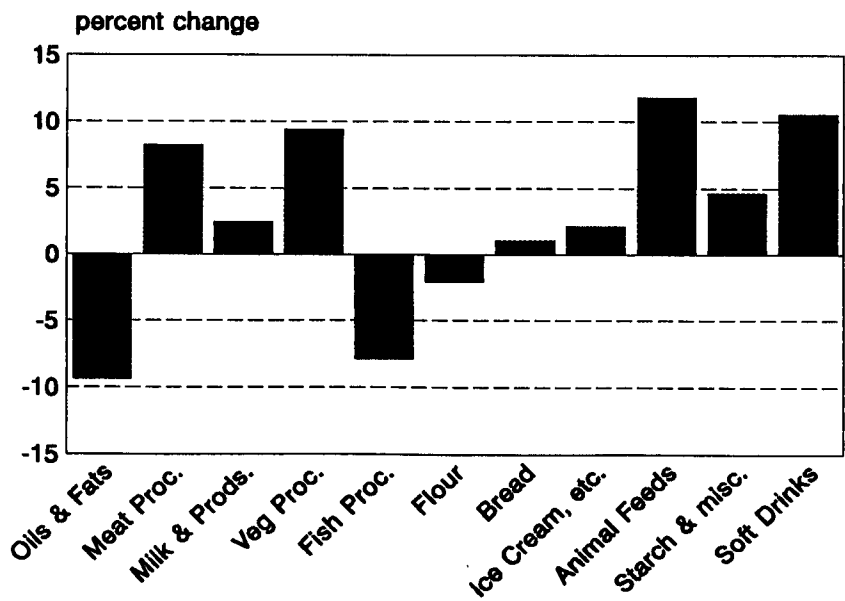
Source: PA1002

Appendix Figure 2: *Average Percentage Change in No. of Small Firms (1-99 employees), 1984-1992*
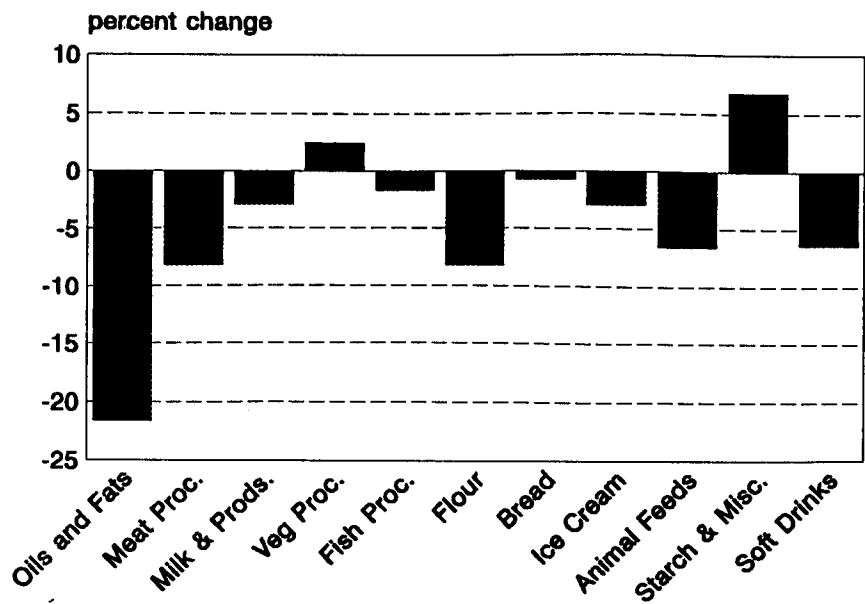
Source: PA1002

Appendix Figure 3: *Own-Label Shares by Product Categories*

percent
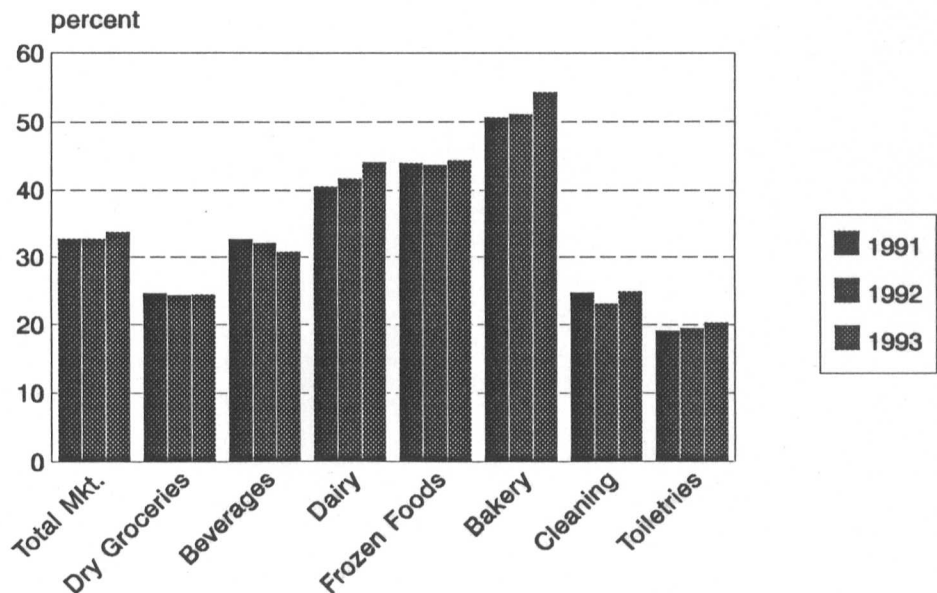
Source: AGB Superpanel (1994)

Appendix Table 3 below attempts to bring together all of the factors which are of importance to the hypothesis. Due to the differing characteristics of sub-sectors contained within some of the three digit sectors listed above, the analysis looks in closer detail at the various different sub sectors where possible. Appendix Table 4 categorizes the sectors listed above. In some cases the sector appears in the table twice because sub-sectors of that three digit SIC sector belong in different categories. Where the various sub-sectors belong in different categories in terms of the hypothesis, they are dealt with separately in the text under the relevant category.

Appendix Table 3: *Hypothesis Classification of Food Manufacturing Sectors*

	Percent of Output delivered to final demand[a]	Multiple Share of Retail Sales[b]	Advertising to Sales ratio[c]	Own-Label Penetration[b]	Summary of Categories
Oils & Fats	48		low	nr	low advertising
Meat Processing	78	60% 1994	low	nr	low brand advertising
Fish Processing (Fresh)	65	33% 1992	low	nr	low multiple share of sales
Vegetable Processing	65	71% canned 1991	0.58 canned	45-65% canned	low advertising
Sugar	26		0.06	nr	low sales to final demand
Bread	56		0.29	40% 1989	low brand advertising
Milk & milk products	66	80% cheese	1.5 cheese 1993	40.6 1991 83% cheese	low initial brand advertising
Grain Milling	14		0.96	nr	low sales to final demand
Animal Feeds	28	low	low	nr	low sales to final demand
Soft Drinks	- high	less than 40%	1.2		low sales through multiples
Pet Foods	- high	~ 70%	4.3	7 to 30%	low own-label penetration
Starch and Miscellaneous	78	80% pasta 1993 70% coffee 1987 72% tea 1991	increasing for coffee	11-94% pasta 20-21% coffee	pasta low branding coffee low own-label penetration

Appendix Table 3: *Hypothesis Classification of Food Manufacturing Sectors*

	Percent of Output delivered to final demand[a]	Multiple Share of Retail Sales[b]	Advertising to Sales ratio[c]	Own-Label Penetration[b]	Summary of Categories
Ice Cream, Chocolate and Confect-ionary	75	13% confectionary 1992	3.5 chocolate 2.1 sugar		low sales through multiples
Margarine and Vegetable Oils	- high	76-80% oils 1993	10.2	55% oils 1993 26% margarine 1991	high advertising and high own label-penetration
Fish Products (Frozen)	- high	67.6% 1992	decreasing		high branding & increasing own-label penetration
Frozen Food	- high	~80%	2.6	42% 1990	high advertising and increasing own-label
Biscuits & Cakes	- high	78% biscuits 1993	1.9	36% cakes 1993 27% biscuit 1993	previously high advertising and high own-label penetration

- high: Figure not available, but assumed to be a very high proportion of total output.

~ Authors own estimates

[a] Source: CSO "Input Output Tables for the United Kingdom 1990" in *The U.K. Food and Drink Industry*, Strak and Morgan (eds), 1995.

[b] Source: Economist Intelligence Unit, Retail Business Market Reports and Surveys (various).

[c] Source: Figures given are for 1986. Source Sutton (1991), p.107, except for cheese.

nr - Not Relevant

Appendix Table 4: *Hypothesis Classification of Food Manufacturing Sectors*

Hypothesis Classification	Segregation of Sectors	Predicted Change in Concentration	Observed Change in C_5 Each Sector 1984-92
H3: Advertising never was significant.	Oils and Fats Meat Processing Fish Processing (Fresh) Sugar Bread Milk and Products Grain Milling Vegetable Processing Animal Feeds	Increasing	↓ ↑ ↓ - - ↑ - ↑ ↑
H4: Advertising significant, but not undermined by own-label penetration.	Soft Drinks Pet Foods Starch and Misc. Foods Ice cream, Choc., and Sugar Confectionary	Increasing	↑ ↑ ↑ ↓
H4: Advertising was significant but subsequently undermined by own-label.	Margarine and Vegetable Oils Fish Products (Frozen) Frozen Food Biscuits and Cake	Decreasing	↓ ↓ ↓ ↓ -

Key to Table: ↑ indicates an average increase in concentration over the period.
  ↓ indicates an average decrease in concentration over the period.
  - concentration remained fairly stable

Analysis of Food Manufacturing Sectors

Advertising Insignificant

The sectors covered in this section have typically had very low advertising expenditure over the period. As such, industry structure is not regarded as having been constrained by endogenous sunk costs. Therefore, the main influence of the retail sector is on the "toughness of price competition" and so manufacturing

concentration would be expected to have risen as a consequence of increased concentration in retailing.

Some of the sectors covered in this group are in the middle ground between homogenous goods industries and advertising intensive industries. Canned vegetables, for example, was once shaped by heavy advertising. However, over the past generation, with the decline of the industry, advertising has given way to price pressure in terms of the main influence on market structure. Thus, in considering the effects of concentration in retailing in this section, the effects are likely to be less clear cut because the constraints on the structure of a sector are only loosely defined in the first instance. The sectors covered in this section are grain milling, bread baking, sugar, milk and milk products and fruit and vegetable processing.

Grain Milling

The grain milling industry is a primary food processor in that only 14 percent of the sectors outputs directly went to final demand in 1990 (Appendix Table 3). As such the influence of the retail multiples on the sector is not likely to be strong. However, the high degree of vertical integration with the bread baking sector and the manner in which upstream and downstream relationships have affected market structure makes an analysis of grain milling concentration a useful inclusion to the theory of bilateral concentration dynamics.

The flour industry in the U.K. is highly concentrated in comparison with other nations. The development of this concentrated structure can be traced to two separate phases, both of which are of relevance to the hypothesis[76]. First, when government control of the industry ended in 1921, the industry was left with a serious overcapacity problem. This led to a period of severe competition, which in turn led to a process of acquisition by the two larger firms, Ranks and Spillers.

---

[76]This account draws on Sutton (1991), p.166-168.

The second phase began in 1953, the year in which wartime controls on the importation of grain were finally lifted, when Allied Bakeries fell into dispute with Ranks and Spillers over discount terms and reacted by turning to Canadian sources of flour. While Ranks and Spillers subsequently reached agreement with Allied, they set out thereafter to acquire additional bakeries in the U.K. to ensure a secure outlet for their flour production (Maunder, 1970). In turn Allied proceeded to integrate backwards into flour milling. By 1972 the process had run its course, and the three leading firms accounted for 70-75 percent of flour production (Sutton, 1991). This strategy, discussed in greater detail in Chapter 5, is known as tapered integration. The bakers engaged in upstream tapered integration, while the flour millers entered a process of downstream tapered integration.

Flour is not an advertising intensive product and so fragmentation due to own-label development is not predicted by the theory. Rather increases in the level of concentration would be expected due to increases in the toughness of price competition, a result of increased downstream bargaining power. In Appendix Table 2 it is indicated that grain milling has experienced, on average, a slight decrease in concentration over the period (Appendix Figure 1). The C_5 fell from 69.3 percent in 1988 to 62.3 percent in 1992. However, as was noted above, in the U.K. flour industry concentration is substantially higher than would be expected on the basis of Sutton's cross sectional analysis (Sutton, 1991, p.165). Thus, within the terms of the theory, there is scope for some deconcentration. At the same time the number of small firms in the sector is also declining (Appendix Figure 2). This suggests that new entry to grain milling, as would be expected under the hypothesis, is not significant.

Bojduniak and Sturgess (1995) give two possible reasons for the high level of concentration in U.K. flour milling: i) British taste and ii) ABF. The U.K. bread market was dominated by the cut slice loaf with a shelf life of four to five days, whereas daily purchasing of bread was the norm in the rest of Europe. The longer-life and easily wrapped "high rise loaf" produced in the U.K. lent itself to large-scale bakeries, flour milling and distribution operations. ABF has been credited

with raising the level of concentration in U.K. flour milling because they integrated backwards from baking to flour milling in the 1950s and 1960s. In turn, it is argued that the level of integration has maintained a consistent pressure on competitors to keep unit costs low (Bojduniak and Sturgess, 1995).

However, it would seem unreasonable here to explain market structure simply by the actions of one of the players in the market. The area of primary interest is the set of underlying factors which have led the ABF to adopt this strategy. The fact that the U.K. was a major importer of flour may have been partly responsible for the initial evolution of this concentrated structure. At around the turn of the century the attractiveness of constructing new large-scale mills in the immediate vicinity of major ports led to an expansion of new plant, with no offsetting closure of older mills. In turn, the overcapacity prompted severe competition throughout the 1920s which in turn led to a process of acquisition by the two larger firms Ranks and Spillers (Hart, Utton and Walse, 1973). Accordingly, it may be the nature of upstream supply to the industry which has had a profound effect upon the industry's structure.

The further periods of consolidation, during the 1950s and 1960s, however, are less easily explained in terms of upstream supply. It may be that the high level of concentration in flour milling left as a legacy of the 1920s and 1930s, and the fact that millers were positioned near ports, and so could easily threaten bakers with exporting flour, led to the process of vertical integration in the 1950s and 1960s. Thus, while the retail sector may not have had a large discernible impact upon the flour milling and bread baking industry, the case history of the sector does exemplify the importance of inter-sectoral bargaining relationships upon industry structure, in that it was difficult vertical relationships in the market which caused rapid consolidation through increasing the toughness of price competition.

Bread

The multiples have had a distinctive dual effect on the bread baking industry which is not directly related to advertising. On the one hand, severe price pressure caused consolidation of the brand manufacturers. On the other, the advent of the in-store bakery has led to an increase in the number of small bread baking units. As stated previously, the bread industry in the U.K. is largely vertically integrated with the flour industry and is dominated by two very large concerns. To remain viable, bread plants require to run at high capacity utilisation and so plant bakers rely on big orders from multiple retailers who can guarantee big sales volume. The low profitability of the baking industry stems from the low brand identification in the market. This enables the supermarkets to seek large discounts which in turn put pressure on margins (Key Note, 1986). The pressure on bakery margins has prompted a trend towards larger bakeries and consequent labour productivity gains. RHM, for example, reduced its number of plants from sixty-five to twenty-five between 1980 and 1987 (Sutton, 1991). However, from Appendix Table 1, concentration has declined slightly in the bread, biscuits and flour confectionary sector between 1986 and 1992.

For bakery products as a whole, own-label penetration is very high and increasing, at over 50 percent (Appendix Figure 3). Own-label penetration of the household bread market for 1989 was estimated at 40 percent. The development of the retailers in-store bakery has taken off throughout the 1980s. It was estimated that around 10 percent of household bread supplies came from in-store bakeries in 1991 (EIU, 1991, No.395). In-store bakeries rely on supplies of frozen dough from wholesalers, and so the in-store bakery requires no mixing technology. This allows the multiples to sell fresh baked bread at a high price and higher margin, alongside branded sliced bread at much lower prices. The combination of the two marketing strategies gives rise to the development of a special type of dual market structure where the large bread manufacturers must consolidate to squeeze out costs, and at the same time small in-store units can open utilising frozen dough and sell bread at higher margins.

Sugar

The history of the sugar refining industry demonstrates the importance of product homogeneity and government policy in affecting "the toughness of price competition" which in turn have influenced the structure of the sector. The U.K. sugar industry is dominated by two very large concerns. British Sugar controls all sugar beet production in the U.K. through the entire EC country quota for U.K. sugar beet[77]. Tate and Lyle retain a sizable fraction of the market producing sugar from imported cane. Imports constitute only 6 percent of the market, but play a crucial role in constraining the strategies of domestic producers.

The reasoning behind such a high level of concentration in the sugar sector is not related to the high set-up costs relative to market size. For the U.S. industry, Anderson et al (1975) found that the level of concentration could not be explained by the economies of scale in the refining process. A single plant firm of minimum efficient scale would account for 3 to 6 percent of total sales in the average marketing region of the U.S. Instead the broad differences in the levels of concentration in sugar refining across countries can be traced to differences in the intensity of price competition. Also, the difficulty of maintaining adequate price cost margins in a fragmented industry appears to lie at the root of the historical tendency towards highly concentrated structures (Sutton, 1991).

The retail market in sugar has been declining with an offsetting increase in the industrial market. Only 26 percent of the sectors outputs were delivered to final demand in 1990 (Appendix Table 3). However, attempts at advertising have taken place, although this began to ward off proposed nationalization in the 1970s. Retailers own-labels are unimportant in sugar. Sainsbury is alone in using an own-label granulated sugar, which accounts for only one third of their granulated sugar

---

[77]The U.K. industry partly owes its concentrated structure to the Sugar Industry (Reorganisation) Act of 1936, which amalgamated all existing sugar beet processors, to form British Sugar. This structure is effectively ossified by the E.C. sugar regime.

sales (Sutton, 1991). Increased retailer power is unlikely to have any significant impact on the already highly concentrated structure of the sugar industry (Appendix Table 2). Industrial buyers already play the two main producers off against each other to the full, and merchants are always ready to increase imports should the price differential increase between the U.K. and the Continent. Thus, the combination of a homogenous product and large industrial buyers means that "the toughness of price competition" has had an overriding influence on the equilibrium structure of the market. Again it appears to be the nature of an underlying game which is responsible for shaping market structure.

Milk and Milk Products

This sector is dealt with separately in Chapter 6 due to the unique system of milk marketing which was in place in the U.K. and the existence of the E.C. quota policy. It can be seen from Appendix Figure 1 that concentration increased over the period, and from Appendix Figure 2 that the number of small firms declined. With the level of own-label penetration at 40.6 per cent in 1991 (Appendix Figure 3) it might expected that there would be some trend towards deconcentration due to the shift in advertising. However, the milk marketing system in place in the U.K. has given rise to a high proportion of commodity-type products, which have necessitated scale economies in their production. Therefore, in general, there was insignificant branding or advertising barriers in place. For example the advertising/sales ratio for cheese was 1.5 percent in 1993. Thus, the rise of own-label could not be expected to lead to deconcentration as there was little or no advertising barrier to be removed for the majority of dairy products. Secondly, barriers to entry to the dairy industry were high under the Milk Marketing Scheme, and this is discussed further in Chapter 6.

On the contrary, the increased buying power of the multiples, who sell 80 percent of all retail sales of cheese, and a rapidly increasing percentage of liquid milk, has forced the dairy commodity processors towards higher levels of concentration through increases in the toughness of price competition. For pre-packed hard

cheese, own-label accounted for 83.4 percent of the total market in 1993 (EIU, 1994, No.433). Own-label penetration is so high that price pressure is more important in its effect than the removal of advertising barriers, and so the effect on concentration is likely to be upward. Therefore the changes in concentration in the dairy product sector remain consistent with the hypothesis.

Fruit and Vegetable Processing

Fruit and vegetable consumption in the U.K. is predominately in fresh form rather than processed. Processed vegetables accounted for 25 percent of the total vegetable market, and processed fruit accounted for 12 percent of the total market for fruit in 1994. Within the market for processed vegetables canned vegetables accounted for 40 percent, with frozen vegetables for 59 percent and dried vegetables for less than 1 percent of the total in 1994. Seventy percent of processed fruit consumed is in cans with the remainder dried (Datamonitor, 1994).

From Appendix Table 1 concentration in the sector can be seen to be increasing, while Appendix Table 2 shows that the number of small firms has varied both up and down over the period. However, the data in Appendix Tables 1 and 2 include potatoes which has the effect of increasing the concentration ratios.

Within the individual sub-sectors canned vegetables have increasingly become commodity products with low advertising intensity, which sell basically on price. Own-label penetration is relatively high for most canned vegetables being generally between 45 and 65 percent in 1991 (EIU, 1992, No.411). Multiple grocers accounted for 71 percent of distribution in 1991, and so their influence on the processing sector is very significant. As a sector vegetable canning in the U.K. has a concentration ratio for the top three manufacturers of 42 percent (Datamonitor, 1994). This is low in terms of other food sectors representing a mature market, as well as the dominance of own-label sales (Simpson, Farley and Hallam, 1995).

In contrast to the U.S. major brands in canned vegetables have never really emerged in the U.K.[78]. As such the hypothesis would not predict the rise in retailer own-label share to lead to a trend towards fragmentation. Rather, as these products sell on price, the hypothesis would predict that the increase in the buying power of supermarkets is more likely to increase the toughness of price competition between firms and lead to higher levels of concentration. Indeed this appears to have been the case. Most major producers have sold brands and retailer own-label lines. In the early 1980s margins were low, partly as a result of competition at the retail level and partly due to the intensity of price competition for the retailers own-label business. At this time the food conglomerate Hillsdown acquired five U.K. canners, and subsequently rationalized the brand structure. Price competition became less severe in the latter half of the 1980s. This was in part the result of some easing of pressure on own-label by the retails, but it also reflected the industry's experience of price cutting during the mid 1980s, when attempts by one producer to gain share led to price matching and a consequent fall in margins (Sutton, 1991).

Price pressure on most sellers, appears to have led to a trend towards consolidation in canned vegetables. The almost complete disappearance of strong brands may in the past have held in check the process towards concentration. Rather the high level of product homogeneity, the low growth in the market as frozen foods have gained over canned vegetables, and retailer price pressure have resulted in a process of consolidation.

Advertising Intensive Industries not Undermined by Own-Label

The industry sectors covered in this section are those which typically have high advertising intensity. Thus, it may be assumed that concentration levels are raised

---

[78]In 1973, the advertising sales ratio for canned vegetables was 0.7 percent (Sutton, 1991, p.427)

by the endogenous sunk cost of advertising. However, deconcentration due to retailer own-label penetration is not expected either because retailer own-label penetration is insignificant, as in instant coffee, instant pasta, frozen pasta and pet foods[79], or because the multiples do not distribute a high proportion of the sectors outputs, as in ice cream, chocolate, and sugar confectionary.

Ice Cream, Cocoa, Chocolate and Sugar Confectionary

As with oils and fats the data covers a set of essentially different product groups and so masks the changes within each. From Appendix Table 1, the C_5 increased up until 1984, then declined in 1990 to 59.3, and then leapt to 69.8 in 1992.

The chocolate confectionary sector is highly concentrated with the top three firms holding 77 percent of the market (Appendix Table 5). High concentration is to be expected in the wrapped chocolate bars segment, with very high advertising intensity[80]. In all about 50 firms are active in the market.

On the other hand, the sugar confectionery sector is more fragmented than the chocolate sector. Small firms appear to survive well in the sugar sector, where the smallest firms confine themselves to supplying loose confectionary in jars. To produce packaged sweets requires a much heavier outlay - and so, in a segment like mints, for example, there is a sharp distinction between the branded, packeted segment where two of the majors dominate and the fringe of small producers supplying loose unbranded mints (Sutton, 1991).

---

[79]Covered in Chapter 4.

[80]The Big Three rank as second, third and fourth in the U.K. league of advertising spenders, behind Procter and Gamble, the soap and detergent manufacturer (Sutton, 1991, p.469).

Appendix Table 5: *Market Shares for Sugar Confectionary, 1992*

	Sugar	Chocolate
Trebor Basset	27	28[a]
Nestlé Rowntree	11	26
Wrigley	6	-
Mars	5	23
Terry's	4	4
Others	47	19
Total	100	100

[a] Cadbury
Source: Nestlé Rowntree

In other sectors own-label suppliers are generally the smaller firms. In sugar confectionery however, the key own-label suppliers are among the largest firms in the industry. This anomaly is due to the high level of concentration in retailing. The major retailers need firms who are large enough to supply at a national level. The small confectionary suppliers may be too small to do this. Also the major confectionary producers have a strong incentive to maintain high capacity utilisation when they experience a loss of market share in the branded segment. Thus, it is relatively easy to offset a fall in brand share by building up own-label supplies (Sutton, 1991). Own-label sweets, however, accounted for only around 10 percent of the sweets market. Nevertheless, while the share of distribution of all confectionary items accounted for by multiple grocers is increasing, it was only 13 percent in 1992 (EIU, 1993, No.427). Thus, the influence of a highly concentrated multiple sector on the chocolate and sugar confectionary manufacturers is not likely to be very large.

Starch and Miscellaneous Foods

Starch and miscellaneous foods covers a broad range of sectors including maize, wheat and potato products, dextrose, coffees, teas, diet foods and pasta. Appendix

Table 1 shows that concentration has remained fairly stable with slight increases in recent years. Appendix Figure 2 shows an average increase of over 5 percent in the number of small firms in the sector.

i) Pasta

Pasta is estimated to take up approximately just under a quarter of the sector in terms of gross output. The grocery multiples dominate sales of pasta with over 80 percent of the total distribution. Appendix Table 6 gives the level of own-label penetration in the various sectors. Of these the instant and frozen sectors probably account for the largest proportion of advertising spent on pasta, and these also have the lowest own-label penetration. However it is difficult to estimate the total amount spent on advertising owing to the diversity of products under review. As such it is difficult to estimate the effect of own-label, on advertising and equilibrium concentration. Dried pasta has been a major growth market throughout the 1980s and early 1990s with sales increasing four-fold to £110 million in 1993 (Gunthorpe et al, 1995). Own-label accounted for 56 percent of the market in 1992 while the largest brand presence (Nestlé) had only 7 percent, demonstrating the dominance of own-label in this commodity sector.

Appendix Table 6: *Pasta Own-Label Penetration, 1992*

	Percent of Market	Own-Label
Canned	17.1	24
Dry	21.6	56
Fresh	4.6	70
Frozen	18	11
Chilled	14.8	94
Cabinet	1.6	35
Instant	15.6	negligible
Savory	6.7	21

Source: EIU Retail Business Market Survey, July 1993, No.425.

ii) Coffee

The U.K. market for coffee is unusual in that 76 percent of the volume of output of the industry consists of soluble coffee. The market is largely dominated by Nestlé and General Foods. Nestlé controls around half of the entire U.K. market. For instant, Nestlé brands accounted for 57.9 percent of the market in 1993. Own-label accounted for around 20 percent of the instant coffee market in 1987, and multiples distributed 70 percent of all coffee by volume. The coffee market expanded by 27 percent between 1977 and 1987, and advertising outlays were increasing during the mid 1980s (EIU, 1987, No.356).

Thus, it appears that own-label penetration has not had a diminishing effect on the trend towards concentration in the market, as advertising outlays have been increasing. Also own-label may have been held in check by the brand manufacturers refusal to supply own-label. In turn this ability of the sector to refuse to supply own-label may be due to the fact that set-up costs are very high for instant coffee, which constitutes the vast proportion of the U.K. market.

The roast and ground (R&G) coffee market grew by 18.6 percent in 1994 and is led by own-label. Own-label accounted for 39.5 percent in 1994, an increase from 37.3 percent in 1993 (Gunthorpe et al, 1995, p.309). Set-up costs are much lower in the R&G sector. However, the packaging of the product can involve substantial set-up costs if modern oxygen-free packing techniques are used to achieve a long shelf life. If this process is taken into account set-up costs for roast and ground may be up to one-half that incurred by producers of instant coffee. Thus, it may be that the lower set-up costs for R&G coffee are responsible for the lower advertising outlay and higher own-label penetration. Sutton (1991) also hypothesized this link between set-up costs and advertising outlays and investigated the link by pair-wise comparisons of similar sectors (Sutton, 1991, p.263-283). However, in the U.K., the fact that the catering market plays a key role for R&G producers may also diminish advertising effectiveness for the sector.

iii) Tea

For tea, own-label penetration has grown from 16 percent in 1986 to 26.8 percent in 1994 (Gunthorpe, Morgan and Strak ,1995, p.308), and the C_4 was 74 percent in 1989, decreasing to 69 percent in 1990. Advertising increased slightly between 1988 and 1992, and this reflects a struggle for market leadership between Lyons Tetley and Brook Bond. The multiples share of distribution increased to 72 percent in 1991 from 64 percent in 1985 (EIU, 1992, No.417). Thus, it appears that own-label tea may have had an effect on concentration levels, but advertising actually increased over the period as the brand manufacturers fought to maintain market share against own-label[81]. Concentration can begin to decline despite higher advertising outlays by the majors because new entrants do not have to incur the sunk cost of advertising to supply the growing own-label segment. In 1994 the two brand leaders and own-label had very similar market shares (Appendix Table 7). Price competition is also an important factor in the tea sector. Multiple grocers

---

[81]This increase in manufacturer advertising as a response to own-label penetration is covered in Chapter 7 under "The Life-Cycle of Vertical Competition".

tend to view tea as a "known-value item" (KVI) and so it is one of the yardsticks by which consumers will judge a store's quality and value for money. Therefore, retail buyers are likely to press the manufacturers for the maximum discount possible.

Appendix Table 7: *Tea Market Shares, 1994 (% Value)*

	Market Share (Percent)
Brooke Bond	26.5
Lyons Tetley	25.7
Own-Label	26.8
Others	21

Source: Nielson

Advertising Intensive Undermined by Own-label Penetration

The industry sectors covered in this section typically have high advertising intensity and so a lower bound to equilibrium levels of concentration is defined by the endogenous sunk cost of advertising. However, the sectors covered below have also experienced a fairly high degree of retailer own-label penetration. Therefore, with the endogenous advertising barrier weakened, some deconcentration may be expected because new entrants or small firms can supply the growing own-label segment.

Biscuits

The multiples sector had a 78.5 percent share of sales of biscuits in 1993. Own-label penetration in biscuits has remained stable for over a decade, 26.2 percent in 1979 (Price Commission), and 27.4 percent in 1993 (EIU, 1994, No. 437).

Sutton (1991) suggests another mechanism for the development of concentration in the biscuit sector from that hypothesized here. He states that for biscuits, the

original growth of concentration in the sector appears to have been as a response to price competition and the growth of own-label which prompted a trend towards higher advertising outlays (Sutton, 1991). This is the reverse of the theory being tested here, which states that own-label can undermine advertising intensive sectors. Rather Sutton suggests that advertising was stimulated by the encroachment of own-label, and with it higher levels of concentration. However, advertising expenditure had returned to an extremely low level, equivalent to only 0.8 percent of sales by 1993. This may suggest that own-label *initially* forces up advertising by the majors. As the share of own-label increases, advertising may be undermined as the major brand manufacturers begin to supply the own-label segment. This process is described as the "life-cycle of vertical competition" in Chapter 7.

While this might be the case, a trend towards deconcentration in the industry has not occurred, as it appears the market majors also supply a sizeable fraction of own-label goods. Therefore, scale economies in production may have partially replaced the sunk cost of advertising as the main factor determining industry structure.

Cakes

Own-label penetration in cakes is also high at 35.6 percent in 1991. Again two large companies dominate the branded segment and also supply a large proportion of the own-label market (Appendix Table 8). Grocery outlets accounted for over 70 percent of distribution, and between 1988 and 1991 total advertising expenditure fell by almost 50 percent, although some of this decline was due to a Milk Marketing Board promotion of cream cakes costing over £2 million in 1988. However, the main brand manufacturers also reduced advertising expenditure over the period. Thus, while no observed decline in concentration has taken place, it may be that a trend towards fragmentation is prevented by a rise in the importance of scale economies.

Appendix Table 8: *Brand Shares in the Cakes Market (% of value), 1991*

Manor Bakeries	23
Mr Kipling	18
Cadbury	5
Lyons Bakery	11.3
Memory Lane	2.7
McVities	2.6
Park	0.8
Others	24
Own-Label	35.6
Total	100

Source: Retail Business No.420 February 1993

Organic Oils and Fats

The organic oils and fats sector includes processing of fish oils, oilseed rape, treated vegetable oils and margarine. Forty-eight percent of the sectors outputs went directly to final demand. Thus, the oils and fats sector is somewhere in the middle ground between a primary and secondary food processor. Both advertising intensive and homogenous goods industries make up the sector, therefore any interpretation of changes in market structure of the sector in the context of the theory is difficult. However, the margarine and spreads market, and the vegetable oils sector are considered separately.

i) Margarine

For margarine the development of structure in this sector, and the identity of some of the leading firms have been affected by the advent of the dairy spread. The relatively relaxed legislation in the U.K. in this area has given rise to many products which are mixtures of butter and vegetable oils (Sutton, 1991). The margarine and dairy spread market are advertising intensive, and so, in the absence

of own-label, a barrier exists to new brand manufacturers. However, own-label penetration in the segment increased over the period to reach 26 per cent in 1991.

ii) Vegetable Oils

For the vegetable oils sector, own-label products dominate with 55 percent of both the mainstream vegetable oils and olive oils. The multiples also dominate in terms of distribution with 76 percent of mainstream oils and over 80 percent of olive oil. Advertising expenditure is however extremely low in this sector, representing less than 1 percent of sales in 1993 (EIU, 1994, No.440).

Fish Processing

The fish processing sector includes fresh fish processing as well as frozen fish and other fish products. Therefore some of the sectors outputs may be advertising intensive. However, the main element of the fish processing data relates to fresh fish processing which is not advertising intensive. Appendix Table 9 however shows how advertising on fish has declined between 1988 and 1992, especially in the frozen fish products sector.

Over half of fresh fish distribution is through the traditional fishmongers. Multiple distribution is increasing, and only constituted 14.4 percent of the total in 1986. By 1992 the multiples accounted for 32.9 percent of fresh and chilled fish distribution. For frozen fish the multiples accounted for 67.6 percent of distribution (EIU, 1993, No.419). However, the multiples have their impact on the sector. The quality guidelines laid down by them have resulted in merchants having difficulty in disposing of the remainder of the catch. This reduces the quality of fish through other outlets such as the wholesale markets.

Appendix Table 9: *Advertising Expenditure on Fish, 1988-92*

	1988	1989	1990	1991	1992
SFIA	3415	571	1249	1291	1282
Welsh Fish	66	88	-	-	-
Scotch Salmon	383	209	365	-	-
Scotch Salmon Association	-	79	-	-	-
Lochinvar Salmon	-	-	418	224	223
Frozen Fish Products	6924	6039	6908	4747	3402
Total	10788	6986	8904	6262	4907

Source: Register-MEAL, in EIU No.419.

Concentration in fish processing has been decreasing (Appendix Table 1), yet the number of small firms also appears to have been decreasing. The number of firms in the upper-middle size group (200-499 employees) has increased throughout the decade from 4 firms in 1980 to 11 firms in 1992, while the number of large firms (500 and over employees) has remained constant. Among the major companies supplying processed fish are Birds Eye, Ross Young and Findus. These companies originally maintained high market shares through advertising support. With the multiple retailers having increased their share of distribution by developing own-label products and by allocating increasing amounts of space to the retailing of frozen fish products, it is likely that the fish processing sector has become less concentrated due to the diminishing necessity of advertising as a sunk cost. Appendix Table 9 shows how advertising has declined most in the frozen fish products sector. Thus, the deconcentration experienced by the fish processing sector may be partly the result of own-label penetration in undermining the endogenous sunk cost of advertising.

Appendix II

AUCTION SYSTEMS FOR MARKETING MILK

Introduction

This appendix considers current auction theory in the context of the Scottish dairy industry. Before deregulation of the market in November 1994, the Scottish Milk Marketing Board produced an outline proposal for a new system of selling the milk supplied to it as a producers cooperative. The Scottish Dairy Trade Federation (SDTF)[82] strongly opposed the system. However despite attempts to change the proposal on the basis that it would cause destructive competition, the main elements of the system were adopted.

The system has five main elements:

(1) Bid Markets:- in which milk will be sold through a Dutch auction;

(2) Option Milk:- where customers are offered, as an option to purchase, a pre-determined volume, based on the total level of purchases from the co-op in a preceding period;

(3) Spot Milk:- tendered in small volumes on a daily basis;

(4) Small Buyers Market:- priority supply to very small buyers; and

(5) Buyer of Last Resort:- as an outlet for unsold milk.

While around 50 per cent of milk was to be sold as option milk, clearly, success in securing a milk supply in the medium term depended upon success in the bid

---

[82]Which since has changed name to the Scottish Dairy Association (SDA).

market in the short term and accordingly the choice of Dutch auction is investigated.

The importance of the Dutch auction in the determination of the structure of milk allocation to buyers can be easily demonstrated. Assume for simplicity only the first two market systems apply. Dairy processors' profits are directly related to their milk supply such that:

$$\pi_{it} = a_i P(k(Q_{it})) - C_i \qquad (A1)$$

where P is the processing firms output price, Q_{it} is the quantity of raw milk input of firm i in period t, k is a constant conversion factor, and C is the total cost of firm i. The quantity of milk acquired is the sum of quantities from both the option and bid markets, so:

$$Q_{it} = O_{it} + B_{it} \qquad (A2)$$

where O_{it} is the quantity acquired in the option market and B_{it} is the quantity secured in the bid market. However, ultimately the quantity of milk offered as option milk is dependent on success in the bid market. The option entitlement is equivalent to a proportion of total milk purchased by that customer in the qualifying period. For example, if the qualifying period is the six months prior to delivery, lagged by two months, then:

$$\Delta O_{it} = f(\beta_1 B_{i\ t-8} + \beta_2 B_{i\ t-7} + \beta_3 B_{i\ t-6} + \beta_4 B_{i\ t-5} + \beta_5 B_{i\ t-4} + \beta_6 B_{i\ t-3}) \qquad (A3)$$

where ΔO_{it} is the change in quantity of option milk offered to firm i in period t. Therefore, changes in total milk supply can be expressed purely in terms of quantities bought in the bid market in different periods:

$$\Delta Q_{it} = f(\beta_1 B_{i\ t-8} + \beta_2 B_{i\ t-7} + \beta_3 B_{i\ t-6} + \beta_4 B_{i\ t-5} + \beta_5 B_{i\ t-4} + \beta_6 B_{i\ t-3}) + \Delta B_{it} \qquad (A4)$$

Thus, we may concentrate primarily on the implications for competition and collusion in the auctioned portion of the raw milk market, as ultimately it is this market which determines the quantities offered as option milk. Clearly, the long

run effect of success in the bid market, in increasing option milk in the future, is likely to increase competition for milk in the bid market in the short run.

Theory of Auctions[83]

Because auctions are stylized markets with well defined rules, modelling them with game theory is particularly appropriate. Often the buyers of a good know more about its valuation than the seller. Thus, auctions can be very useful for sellers to extract information about the value of a good for sale (Rasmusen, 1990, p.245). Auctions are commonly classified in terms of the differences in the values buyers put on what is being auctioned. The monetary value of the utility that player i receives from a bundle of a good is termed its *value* to him, V_i, and his estimate of its value is termed its *valuation*, $\hat{V}_i$. In a private value auction each player knows his value with certainty, although he may still have to estimate the values of the other players. Knowing all the other bids in advance would not change his valuation, although it might well change his strategy. Even though the values are private, the best response bids depend on the strategies the bidder thinks other players have adopted (Rasmusen, 1990, p.246).

We will consider four common types of auction in reference to the selling of milk by a large and dominant milk selling cooperative, to an established milk processing trade with only twelve significant players. These are:

1) English;
2) First-price sealed bid;
3) Second-price sealed bid; and
4) Dutch.

---

[83]The models of auction discussed below are more fully addressed in Rasmusen (1990).

1) English auction

In an English auction each bidder is free to revise his bid upwards. When no bidder wishes to revise his bid further, the highest bidder wins the good and pays the bid. His payoff is his value minus his highest bid. In a private value English auction, a player's dominant strategy will be to keep bidding a small amount, ϵ, more than the previous highest bid until reaching his valuation, and then stop bidding. Therefore the bidding stops when the price reaches the valuation of the player with the second highest valuation. The optimal strategy is independent of risk neutrality, if players know their own values with certainty.

2) First-price sealed bid auction

In this type of auction each player submits one bid, in ignorance of the other bids, and the highest bidder pays his bid and wins the good. A player's strategy is his bid, in relation to his value and his prior beliefs about other players valuations. Again a player's payoff will be his value minus his bid.

Suppose that John's valuation is 29. If he bids 29 when the second bid was 26, he would wish that he had bid only $26+\epsilon$. If it is common knowledge that the second highest value is 26, John's bid should be $26+\epsilon$. However, if he is unsure of the second highest valuation, the problem is difficult and no general solution has been discovered. The trade-off is bidding high and winning more milk, against bidding low, and thereby benefiting more if the bid wins. The optimal strategy depends on the risk neutrality and beliefs about other players values, so the equilibrium is less robust than the equilibria of English or second-price auctions.

Suppose John knows that Alan's value is either 28 or 25 with equal probability, and John's value of 32 is known by both players. Alan bids either 28 or 25 in equilibrium, and John always bids $28+\epsilon$, because his value is so high that winning is more important than paying a low price. However, if John's value were 28.1 instead of 32, the equilibrium would be much different. John would use a mixed

strategy in that he would switch (unpredictably) between high and low bids. Alan would still offer 25 if his value were 25, if his value were 28 he would use a mixed strategy too. No pure strategy could be part of a Nash equilibrium, because if John always bid a value $x < 28$, Alan would always bid $x+\epsilon$, in which case John would bid $x + 2\epsilon$, and if John bid $x => 28$ he would be paying 3 more than necessary half of the time.

3) Second-price sealed bid auction

Each player submits one sealed bid in ignorance of the other bids. The winner is the highest bidder who pays the amount of the second highest bid and wins the good. The winners payoff is his value minus the second highest bid that was made. Second price auctions are similar to English auctions in that the price is similar to the second highest value. Each players dominant strategy is to bid his own valuation, as a player who bids less is more likely to lose the auction, but pays the same price if he does win.

4) Dutch (Descending) auction

The seller announces a bid, which he continually lowers until some buyer stops him and takes the good at that price. Again the player's payoff is his value minus his bid. His strategy depends on his own valuation and his prior beliefs as to the other players' valuations. The Dutch auction is **strategically equivalent** to the first-price sealed-bid auction, with a one-to-one mapping between the strategy sets and the equilibria of the two games. The reason for this equivalence is that no relevant information is disclosed in the course of the auction, only at the end when it is too late to change anybody's behaviour. In the first-price sealed bid auction a player's bid is irrelevant unless it is the highest. Likewise in the Dutch auction a player's stopping price is irrelevant unless it is the highest. The equilibrium price is calculated in the same way for both auctions (Rasmusen, 1990).

Vickrey (1961) also points out the possibility of operating a second-price Dutch auction. This makes the Dutch auction strategically equivalent to the second-price sealed-bid auction discussed above. In the second-price Dutch auction the apparatus is set up such that the first button pushed would merely preselect the buyer but allow the clock to continue descending. There would be no overt indication until the second button had been pushed, whereupon the register would stop indicating the price, and the purchaser who was first to press the button.

The bidding apparatus can also conceivably be set up to allow bidders to preset their stopping price at any desired bid, with electronic clock arranged to search out the two top bids and indicate the party with the top bid and the amount of the second bid. However, with such "user programs" the Dutch auction is virtually reduced to a second-price sealed bid auction.

Multiple Auctions

In the case of milk, there is more than one similar lot to be sold, and each bidder has use for at least one lot. In such a situation, a **simultaneous** auction system is a possibility. Because simultaneous systems require to be repeated less often than a successive auction of 'lots' it is likely to suffer less from collusion. This is so because the more frequent the repetitions of the bidding procedure in the successive auction the more it facilitates rapid punishment of a cheater on a buyers cartel. Thus, the successive auction may suffer more from collusion than the simultaneous auction.

Successive auctions allow for learning of other players valuations and strategies. As they are repeated games they may also facilitate collusion, as later rounds of the game can be used to punish cheating on a cartel agreement. As such the more frequent the repetitions, the more opportunity there is for a collusive outcome. Thus, it is not surprising that the Scottish Dairy Association (SDA) desired small lots of one tanker load to be auctioned one at a time, whereas Scottish Milk choose to auction milk in bigger lots. In addition Scottish Milk allow a successful bidder

to specify the number of lots required, from one to nine lots on any particular round of bidding. Therefore, the larger lot size, and the ability of buyers to acquire more than one lot if successful, reduces the number of repetitions. This in turn reduces the ability of players to enforce collusive outcomes.

Auction Rules in Comparison

If we assume that all players are risk neutral, and that the bidders adopt strategies which constitute a non-cooperative equilibrium, in all four kinds of private independent-value auctions discussed, the seller's expected price is the same. The expected revenue generated for the seller by the mechanism is precisely the expected value of the object to the second highest evaluator (Milgrom and Weber, 1982). This is the so-called **revenue equivalence theorem** (Vickrey, 1961).

The revenue equivalence theorem does not mean that in every run of the game all four auction rules will yield the same price, only that the expected price will be the same. The difference arises because in the Dutch and first-price sealed-bid auctions, the winning bidder has estimated the value of the second highest bidder, and that estimate may be above or below the true value in particular realizations. In second-price sealed bid (or second-price Dutch auctions) there is no incentive to estimate other players' values. A player's optimal strategy is to bid his own value. Thus, the variance of the price is higher in Dutch or first-price auctions due to the extra estimation, which means that a risk-averse seller would prefer to use the English or second-price auction. With the Dutch or first-price auctions, in attempting to determine at what point to make a bid so as to obtain the greatest expectation of gain, a buyer will require to take into account whatever information he has concerning the probable bids that might be made by others, and the bids made by others will in turn depend on their expectations concerning the behaviour of the first bidder.

As the announced price is progressively lowered below a bidder's value the possibility of a gain emerges, but as the gain sought increases with the lowering

of the point at which a bid is to be made, the probability of securing this gain diminishes. Each bidder must therefore attempt to balance these two factors in terms of whatever knowledge he has concerning the probable bids of the others. This involves a considerable amount of appraisal of the market situation as a whole, in addition to an appraisal of what the good is worth to the particular bidder himself (Vickrey, 1961). This is especially so in an industry where the various bidders want the raw material for different purposes. The appraisal of the market involves substantial additional information gathering activity. However, given the institutionalized history of the dairy industry it is likely that players can reasonably estimate each others' valuations. It is one of the salient advantages of the second-price method that it makes any such general market appraisal entirely superfluous, whether considered from the standpoint of the individual gain or from that of the allocation of resources. Each bidder can confine his attention to the value the input has in his own hands (Vickrey, 1961). However, second-price auctions may suffer from collusion among buyers as discussed below.

In the case of the Scottish Milk situation the impact of bidders' risk aversion on the optimal auction type is likely to be of importance. Auctions with risk-averse bidders are difficult to analyze. One known fact is that in a private-value game the Dutch or first-price sealed-bid auction yields a greater expected revenue than the English or second-price auctions. This is because by increasing his bid from the level optimal for a risk-neutral bidder, the risk averse bidder insures himself. If he wins, his surplus is slightly less because of the higher price, but he is more likely to win and avoid a surplus of zero. Thus, the buyers' risk aversion helps the seller (Harris and Raviv, 1981). In the case of the dairy industry there is everything to lose from failing to secure a constant milk supply. We might therefore conjecture that players are risk-averse, and will trade-off a lower surplus in return for greater certainty over milk supplies. The common knowledge that excess capacity exists is likely to cause a greater perceived risk by milk buyers. Excess capacity means that the available milk supply could be taken up by less than all players. Thus, it causes a higher perceived risk of losing milk supply. In

turn, the extra perceived risk increases the likelihood of risk averse behaviour by bidders.

Risk aversion among milk buyers may be one factor which influenced the choice of Dutch auction by Scottish Milk. English and second-price auctions will not yield as high revenues with risk-averse bidders, because the price will stop after the second highest valuation has been reached. In the first-price or Dutch auction, this second highest valuation must be estimated, and risk-aversion will err on the side of caution, therefore raising stopping prices.

Buyer Collusion

One motivation for auctions is to discourage collusion between players. Robinson (1985) pointed out that whether the auction is private-value or common-value[84], the first-price sealed-bid or Dutch auction is superior to the second-price sealed-bid or English auctions for deterring collusion among bidders. Assume a buyers' cartel forms to try to maximise joint expected profits. The members have credibly revealed their private information to each other. The cartel is assumed to select from among its members a "designated winner" (who should be the member with the highest valuation) and to recommend that he follow a particular bidding strategy, while requesting the other cartel members to be inactive in the bidding. The cartel, however, faces an enforcement problem. The designated losers in the cartel may find it in their private interest to deviate from the recommended strategy, and cheat on the agreement. For the cartel to be stable, each member's recommended strategy should be *incentive compatible*, in that an alternative strategy should not be strictly preferred by that bidder. For progressive (English) auctions, whether private or common-value, cartel strategies are incentive compatible. However in first-price sealed-bid or Dutch auctions, no cartel strategy which yields positive profits is incentive compatible.

---

[84]A common-value auction is one in which all players have the same value.

Assuming that the industry under consideration is of the independent values model, as members have different uses for milk, then the following axioms apply.

Theorem: When bidder J is known to have the highest valuation among the cartel members, then: (i) for the oral auction, the situation in which bidder J has a drop-out price of V and all other cartel members having a drop-out price of R or not bidding is a stable cartel equilibrium in the sense that each members strategy is incentive compatible; and (ii) in a first-price sealed-bid or Dutch auction, no Nash equilibrium will exist where bidder J bids below the second highest valuation (Robinson, 1985).

Proofs: In the progressive auction, bidder J's dominant strategy is to bid up to the point where his own valuation is reached. No other bidder will make positive profits, given that bidder J's drop-out price is V, which is greater than R. Once bidder J plays his dominant strategy, any other bidder might as well not enter the auction, no matter what the other bidders do. J can therefore wield a credible threat to hold the cartel to their agreement. However, in the first-price sealed-bid or Dutch auctions there is an incentive to cheat on the cartel. In the independent values model, the second highest evaluator could make positive expected profits by outbidding bidder J, if J bid below that value; but then J would want to alter his bid. Thus, no cartel strategy is a Nash equilibrium in the Dutch auction with independent values.

Consider a buyers cartel in which buyer John has a private value of 29, the other buyers' values are each 27, and they agree that everybody will bid 25 except John who will bid 26 (we will not consider the rationality of this choice of bids which could be based on avoiding anti-trust action). In an English auction this is self enforcing, because if somebody cheats and bids 27, John is willing to go all the way up to 29 and the cheater will end up with no gain from his deviation. Enforcement of the cartel is also easy in a second-price sealed-bid auction, because the cartel agreement can be that John bids 29 and everyone else bids 25. If someone cheats and bids 26, John still wins the milk and pays 26.

In a first-price sealed-bid auction or Dutch auction, however, it is hard to prevent buyers from cheating on their agreement in a one-shot game. John does not want to have to bid 29, because he would have to pay 29, but if he bids anything less than the other players value of 27 he risks them overbidding him. The seller will end up with a price of 27, rather than the 25 he might receive in an English auction with collusion.

In a Dutch second-price auction John can bid his value of 29 and rest assured that the price will come in around 27, the second highest value. However, a buyers cartel will be easily able to ensure that no-one else bids until the price is down to 25. Being in the knowledge that John will have bid first their will be no incentive to stop the clock earlier. Thus, the available milk might be more easily shared around by a buyers cartel under a second-price Dutch auction.

An important condition of these ideas is that no private information remains inside the cartel. If bidders have private information they will frequently have positive expected profits. The condition that information be credibly revealed is necessary, or some bidders with high value estimates might have an incentive to lie and then outbid the cartel. Again such a type of cheating is more difficult to punish, and therefore more likely, with the Dutch auction system. However in the repeated game context, cartels can (and do) form in the first-price sealed-bid and Dutch auction cases. Potential cheaters may be deterred by the loss of long-run profits.

These results suggest that when progressive auctions are used, the seller must be especially alert to the possibility of collusion among the bidders. This may explain the existence of the *Scottish auction* (Cassady, 1967), which is a progressive auction with a time limit (a flickering candle). A cheater has positive expected profits if he bids the instant before the candle goes out, and the cartel strategy is no longer a Nash equilibrium (Robinson, 1985).

The choice of Dutch auction as a method of selling Scottish milk may be firstly due to the method's usefulness in prohibiting collusion between buyers. Secondly,

the method is likely to yield higher prices than alternative auction systems when buyers are risk averse. Thirdly, the lot size, and the ability of successful bidders to acquire up to nine lots at a time, reduces the number of repetitions of the bidding procedure, which in turn will reduce the ability of buyers to enforce cooperative outcomes.

Thus the very high milk prices experienced after deregulation are a result of the combination of buyers risk aversion, compounded by the existing excess capacity, and the low number of repetitions of the Dutch auction system. An equally valid interpretation may be that the outcomes produced by the system are overly competitive, and that the system exploits the risk aversion of buyers. In turn the risk aversion is in part the result of the overcapacity situation which developed under the combination of the Milk Marketing Scheme and the milk quota policy described in Chapter 6.

List of References

Abreu, D. (1986), "Extremal Equilibria of Oligopolistic Supergames," *Journal of Economic Theory*, **39**, 191-225.

Abreu, D. (1988), "On the Theory of Infinitely Repeated Games with Discounting," *Econometrica*, **56**, No.2 (March, 1988), 383-396.

Abreu, D., D. Pearce and E. Stacchetti (1990), "Toward a Theory of Discounted Repeated Games with Imperfect Monitoring," *Econometrica*, **58**, No.5 (September, 1990), 1041-1063.

Abreu, D., P. Milgrom and D. Pearce (1991), "Information and Timing in Repeated Partnerships," *Econometrica*, **59**, No.6 (November, 1991), 1713-1733.

Anderson, K.B., M.P. Lynch and D.J. Ogur (1975), *The Sugar Industry*, Washington, D.C.:U.S. Federal Trade Commission.

Appelbaum, E. (1979), "Testing Price Taking Behaviour," *Journal of Econometrics*, **9**, 283-294.

Axelrod, R. (1984), *The Evolution of Cooperation*, New York: Basic Books.

Azzam, A.M. (1992), "Testing the Competitiveness of Food Price Spreads," *Journal of Agricultural Economics*, **43**, No.2, May 1992, 248-256.

Bain, J.S. (1956), *Barriers to New Competition*, Cambridge, MA: Harvard University Press.

Barker, J. (1989), *Agricultural Marketing*. Second Edition. Oxford Science Publications 1989. ISBN 0-19-859492-5.

Baron, P.J. (1978), "Why Cooperation in Agricultural Marketing?" *Journal of Agricultural Economics*, **29**, No.2, May 1978, 109-117.

Bertrand, J. (1883), book review of "Theorie Mathematique de la Richesse Sociale" and of "Recherches sur les Principes Mathematiques de la Theorie des Richesses", *Journal des Savants*, **67** (1883).

Bojduniak, R. and I. Sturgess (1995), "Cereals and Oilseeds", in Strak, J. and W. Morgan (eds.)(1995) *The U.K. Food and Drink Industry*, Euro PA & Associates, p.77. ISBN 1-900017-00-8.

Boston Consulting Group (1995) in *The Economist*, March 4th, 1995, Retailing Survey.

Bowley, A. (1924), *Mathematical Foundations of Economics*. New York: Oxford University Press.

Brander, J.A. and J. Eaton (1984), "Product Line Rivalry," *American Economic Review*, **74**, 323-334.

Brander, J.A. and T.R. Lewis (1986), "Oligopoly and Financial Structure: the Limited Liability Effect," *American Economic Review*, **76**, 956-970.

Bresnahan, T.F. (1981), "Duopoly Models with Consistent Conjectures," *American Economic Review*, **71**, 934-945.

Bresnahan, T.F. (1982), "The Oligopoly Solution Concept is Identified," *Economic Letters*, **10**, 87-92.

Bresnahan, T.F. (1989), "Empirical Studies of Industries with Market Power," in Richard Schmalensee and Robert D. Willig, eds., *Handbook of Industrial Organisation*, Vol.2, Amsterdam: North Holland, 1989.

Burns J., and A. Swinbank (1988) (eds.), *Food Policy Issues and the Food Industries*, Food Economics Study No.3, Department of Agricultural Economics and Marketing, University of Reading.

Cassady, R. (1967), *Auctions and Auctioneering*. Berkeley: University of California Press, 1967.

CEAS Consultants (Wye) Ltd. (1988), *Cooperative Success in Agri-Food Processing in France and the Netherlands and the Lessons for the UK*. A Report Prepared for the Co-operative Development Board. CEAS 1081/AMH/NAY, 1988.

Coase, R.H. (1937), "The Nature of the Firm," *Economica*, 4, (November, 1937), 386-405.

Colman, D.R. (1986), "Agricultural Price Policy and the Food Industry," Chapter 2 in J. Burns and A. Swinbank (Eds.) *Food Policy Issues and the Food Industries*, Food Economics Study No.3, Department of Agricultural Economics and Marketing, University of Reading.

Colman, D.R. (1992), "The Breakdown of Management of the U.K. Milk Market," Paper prepared for the Agricultural Economics Society Conference at Aberdeen, 3-5 April 1992.

Connor, J.M., R.T. Rogers, B.W. Marion and W.F. Mueller (1985), *The Food Manufacturing Industries; Structure, Strategies, Performance, and Policies*. Lexington Books. D.C.Heath and Company/Lexington, Massachusetts/Toronto. 1985.

Connor, J.M., R.T. Rogers and V. Bhagavan (1994), "Concentration Change and Countervailing Power in the U.S. Food Manufacturing Industries," Paper prepared for 4° Convegno Internazionale, Economia e Politica dell'Innovazione Il caso dell'Industria Alimentare, Piacenza, giugno, 1994.

Cournot, A.A. (1838), *Researches into the Mathematical Principles of the Theory of Wealth*, reprint of the 1927 ed. translated by Nathaniel T. Bacon (New York: Augustus M. Kelly 1838, 1971).

Cox, J.C., V.L. Smith and J.M. Walker (1983), "A Test that Discriminates Between Two Models of the Dutch-First Auction Non-Isomorphism," *Journal of Economic Behaviour and Organization.* **4** (1983) 205-219. North Holland.

Cox, J.C., B. Roberson and V.L. Smith (1982), "Theory and Behaviour of Single Object Auctions," in Vernon L. Smith, (ed.), *Research in Experimental Economics*, Vol. 2 (JAI Press, Greenwich, CT).

Central Statistics Office (selected years), *National Accounts Blue Book*, HMSO: London.

Central Statistics Office (selected years), *Business Series PA1002 - Summary Volume - Report on the Census of Production*, HMSO: London.

Central Statistics Office (1994), *Input Output Tables for the United Kingdom 1990*, HMSO: London.

Clarke, R. (1995), "Milk Procurement - The European Perspective," Plunkett Foundation Directors Forum, **The New World - One Year On**, Birmingham Metropole Hotel, 19th September, 1995.

Cubbin, J. (1975), "Quality Change and Pricing Behaviour in the U.K. Car Market," *Economica*, **42**, 45-58.

Dairy Industry Newsletter (various issues), Eden Publishing Co.. 13 Hereford Street, Cambridge CB4 3AE. ISSN 0956 8131.

Dairy Facts and Figures (various editions), The Federation of United Kingdom Milk Marketing Boards. Thames Ditton, Surrey.

Datamonitor (1994), *U.K. Food Reports, Fruit and Vegetables*. Datamonitor, 106 Baker Street, London, W1M 1LA.

Davies, G. (1993), *Trade Marketing Strategy*, Paul Chapman Publishing ISBN 1-85396-213-9.

Development Analysts Ltd. (DAL)(1975) "A study of the evolution of concentration in the food industry for the United Kingdom", Commission of the European Communities, Vol. I, 1975.

Development Analysts Ltd. (DAL)(1977) "A study of the evolution of concentration in the food distribution industry for the United Kingdom", Commission of the European Communities, Vol. I, 1977.

Diederichs, K. (1993), "Is Further Restructuring Likely in the European Food and Drinks Industry?" *British Food Journal* **95**, Number 4, 1993.

Dijk, G. van, and C. Mackel (1991), "Dutch agriculture seeking for market leader strategies," *European Review of Agricultural Economics* **18** (1991) 345-364.

Dixit, A.K. (1980), "The role of investment in entry deterence," *Economic Journal*, **90**, 95-106.

Dixit, A.K. and B.J. Nalebuff (1991), *Thinking Strategically, The Competitive Edge in Business, Politics, and Everyday Life*, W.W. Norton and Company, N.Y. 10110. ISBN 0-393-02923-9.

Domowitz, I., R.G. Hubbard and B.C. Petersen (1986), "Business cycles and the relationship between concentration and price-cost margins", *Rand Journal of Economics*, **17**, 1-17.

Duke, R.C. (1989), "A Structural Analysis of the U.K. Grocery Retail Market," *British Food Journal*, **91**, No.5, 17-22.

Duke, R.C. (1992), "Structural Changes in the U.K. Grocery Retail Market," *British Food Journal*, **94**, No.2, 18-23.

E.E.C. Dairy Facts and Figures (various editions), The Federation of United Kingdom Milk Marketing Boards. Thames Ditton, Surrey.

Economist Intelligence Unit (1987), Retail Business Market Surveys, October 1987, No.356, 47-56 and 57-66.

Economist Intelligence Unit (1988), Retail Business Market Reports, March 1988, No.361, 31-41 and 42-50.

Economist Intelligence Unit (1988), Retail Business Market Reports, April 1988, No.362.

Economist Intelligence Unit (1989), Retail Business Market Reports, July 1989, No.377, 16-34.

Economist Intelligence Unit (1990), Retail Business Market Reports, February 1990, No.384, 48-60.

Economist Intelligence Unit (1990), Retail Business Market Reports, May 1990, No.387, 31-46.

Economist Intelligence Unit (1990), Retail Business Market Reports, June 1990, No.388, 25-41.

Economist Intelligence Unit (1990), Retail Business Market Reports, September 1990, No.391, 37-52.

Economist Intelligence Unit (1991), Retail Business Market Reports, January 1991, No.395, 18-33.

Economist Intelligence Unit (1991), Retail Business Market Reports, April 1991, No.398, 51-61.

Economist Intelligence Unit (1991), Retail Business Market Reports, May 1991, No.399, 19-29.

Economist Intelligence Unit (1991), Retail Business Market Reports, August 1991, No.402, 58-71.

Economist Intelligence Unit (1992), Retail Business Market Reports, February 1992, No.408, 45-58.

Economist Intelligence Unit (1992), Retail Business Market Reports, May 1992, No.411, 45-56.

Economist Intelligence Unit (1992), Retail Business Market Reports, November 1992, No.417, 48-67.

Economist Intelligence Unit (1993), Retail Business Market Surveys, January 1993, No.419, 64-78.

Economist Intelligence Unit (1993), Retail Business Market Surveys, February 1993, No.420, 64-73.

Economist Intelligence Unit (1993), Retail Business Market Survey, July 1993, No.425, 15-39.

Economist Intelligence Unit (1993), Retail Business Market Surveys, November 1993, No.427, 71-87.

Economist Intelligence Unit (1993), Retail Business Market Survey, October 1993, No.428, 58-72.

Economist Intelligence Unit (1993), Retail Business Market Surveys. November 1993, No.429, 95-112.

Economist Intelligence Unit (1994), Retail Business Market Surveys, March 1994, No.433, 10-32.

Economist Intelligence Unit (1994), Retail Business Market Surveys, July 1994, No.437, 70-96.

Economist Intelligence Unit (1994), Retail Business Market Surveys, September 1994, No.349, 70-89.

Economist Intelligence Unit (1994), Retail Business Market Surveys, October 1994, No.440, 14-32, 34-45 and 66-89.

Economist Intelligence Unit (1994), Retail Business Market Surveys, November 1994, No.441, 88-109.

Economist Intelligence Unit (1994), Retail Business Market Surveys, December 1994, No.442, 40-57.

Economist Intelligence Unit (1995), Retail Business Market Surveys. January 1995, No.443, 66-83.

Everton, A.R. (1988), "Overseas Competition Policy and the Food Sector," in Burns J. and A. Swinbank (eds.) *Competition Policy in the Food Industries*, Food Economics Study No.4, Department of Agricultural Economics and Marketing, University of Reading, p.143-161. ISBN 0-7049-0788-7.

Federal Trade Commission (1962), *Economic Inquiry into Food Marketing, Part II, The Frozen Fruit, Juice and Vegetable Industry*, Washington, D.C., U.S. Government Printing Office.

Financial Times (1986), "Environment Policy holds back superstore plans", 22nd July, 1986.

Foxall, G. (1981), "Is More Co-operation the Answer?" *Journal of Agricultural Economics*, **32**, No.1, January 1981.

Frank, S. and D. Henderson (1992), "Transactions Costs as Determinants of Vertical Coordination in the U.S. Food Industries," *American Jounal of Agricultural Economics*, **74**, 1992, 941-950.

Friedman, J.W. (1971), "A noncooperative equilibrium for supergames," *Review of Economic Studies*, **38**, 1-12.

Friedman, J.W. (1983), *Oligopoly Theory*, New York: Cambridge University Press.

Frisch, R. (1933), "Monopole - Polypole - la Notion de Force dans l'Economie," *Nationalökonomisk Tidsskrft*, vol.71, pp. 241-259.

Galbraith, J.K. (1952), *American Capitalism: The Concept of Countervailing Market Power*, Boston: Houghton Mifflin, 1952.

George, K. and T.S. Ward (1975), *The Structure of Industry in the EEC*, Cambridge: Cambridge University Press.

Geroski, P.A. (1988), "In pursuit of monopoly power: Recent quantitative work in industrial economics," *Journal of Applied Econometrics*, 3, 107-123.

Geroski, P.A., L. Phlips and A. Ulph (1985), "Oligopoly, Competition and Welfare: Some Recent Developments," *Journal of Industrial Economics*, 33, No.4, June 1985, 369-386.

Gollop, F. and M. Roberts (1979), "Firm Interdependence in Oligopolistic Markets," *Journal of Econometrics*, 10, August 1979, 313-331.

Gray, M. (1995), "Milk Marketing Deregulation and Oligopsony Behaviour," *Scottish Agricultural Economics Review*, SAC, No.8, July 1995, 133-142.

Green, E. and R. Porter (1984), "Noncooperative collusion under imperfect price information," *Econometrica*, 52, 87-100.

Gunthorpe, M., M. Ingham and M. Palmer (1995), "The Meat Industry," in Strak, J. and W. Morgan (eds), *The U.K. Food and Drink Industry*, Euro PA and Associates, 1995.

Gunthorpe, M., W. Morgan and J. Strak (1995), "Further-Processed and Branded Products, and Alcoholic Drinks," in Strak, J. and W. Morgan (eds), *The U.K. Food and Drink Industry*, Euro PA and Associates, 1995.

Hall, R.L. and C.J. Hitch (1939), "Price Theory and Business Behaviour," *Oxford Economic Papers*, 2, 12-45, 1939.

Harris, M. and A. Raviv (1981), "Allocation Mechanisms and the Design of Auctions," *Econometrica*, 49 (1981), 1477-1499.

Hart, P.E., M.A. Utton and G. Walse (1973), *Mergers and Concentration in British Industry*, Cambridge: Cambridge University Press.

Helmberger, P.G. (1964), "Co-operative Farm Enterprise as a Structural Dimension of Farm Markets," *Journal of Farm Economics*, **64**, 603-617.

Hobbs, J.E. (1992), "The future of the auction market mechanism - a transaction cost approach." Discussion Paper presented to Agricultural Economics Society Conference, Aberdeen, April 1992.

Houston, G. (1962), "Meat Marketing Margins in Britain," *Journal of Agricultural Economics*, **XV** (1), May 1962.

Howe, M. (1988), "UK Competition Policy and the Food Sector," in Burns J. and A. Swinbank (eds.) *Competition Policy in the Food Industries*, Food Economics Study No.4, Department of Agricultural Economics and Marketing, University of Reading, p.103-122. ISBN 0-7049-0788-7.

Hughes, D. (1994a)(ed.), *Breaking with Tradition: Building Partnerships and Alliances in the European Food Industry*, Wye College Press, 1994. ISBN 0-86266-102-1.

Hughes, D. (1994b), "Building Partnerships and Alliances in the European Food Industry," Discussion paper presented to 4° Convegno Internazionale, Economia e Politica dell'Innovazione Il caso dell'Industria Alimentare, Piacenza, giugno, 1994.

Hughes, D. and D. Ray (1994), "Factors Determining Success in Partnerships and Alliances," in Hughes, D. (1994), (ed.) *Breaking with Tradition: Building Partnerships and Alliances in the European Food Industry*, Wye College Press, 1994. ISBN 0-86266-102-1.

Institute of Grocery Distribution (1994), *Grocery Retailing - The Market Review*, IGD: Letchmore Heath.

Institute of Grocery Distribution (selected publications), *Food Retailing* (various issues), IGD: Letchmore Heath.

Iwata, G. (1974), "Measurement of conjectural variations in oligopoly," *Econometrica*, **42**, No.5, 947-966.

Jones, P. and B. Davies (1992), "The Retail Food Sector: A Case Study in Marketing," *Business Studies*, Volume 4, Number 3, February 1992, 9-11.

Kamien, M.I. and N. Schwartz (1981), *Dynamic Optimization: The Calculus of Variations and Optimal Control in Economics and Management*, New York: North Holland.

Key Note (1986), "Food Retailing in the UK," in *The Open University, Open Business School P790*, source materials 2, Key Note Publications Ltd.

Key Note (1993), "Convenience Retailing," 6th Edition, London, Key Note Publications Ltd.

Kirzner, I.M. (1992), *The Meaning of Market Process: Essays in the development of modern Austrian economics*, Routledge, NY 10001. ISBN 0-415-06866-5.

Koontz, S.R., P. Garcia and M.A. Hudson (1993), "Meatpacker Conduct in Fed Cattle Pricing: An Investigation of Oligopsony Power," *American Journal of Agricultural Economics*, **75**, August 1993, 537-548.

Kreps, D. and J. Scheinkman (1983), "Quantity pre-commitment and Bertrand competition yield Cournot outcomes", *Bell Journal of Economics*, **14**, 326-337.

LaFrance, V.A. (1979), "The Impact of Buyer Concentration - An Extension," *Review of Economics and Statistics*, **61**, August 1979, 475-476.

Lamont, J.T.J. (1992), "Agricultural Marketing Systems: Horizontal and Vertical Integration in the Seed Potato Industry," *British Food Journal*, **94**, No.8, 1992.

LeVay, C. (1983), "Agricultural Cooperative Theory: A Review," *Journal of Agricultural Economics*, **34**, 1-44.

Lustgarten, S.H. (1975), "The Impact of Buyer Concentration in Manufacturing Industries," *Review of Economics and Statistics* **57**, 2, May 1975, 125-132.

Mackenzie, M. (1988), "Competition and the Food Manufacturing Industries," in Burns J. and A. Swinbank (eds.) *Food Policy Issues and the Food Industries*, Food Economics Study No.3, Department of Agricultural Economics and Marketing, University of Reading, p.46-67, ISBN 0-7049-0788-7.

Marketing (1990), "Grocery Bullies," *Marketing*, 25 October, 1990, p.7.

Marschak, T. and R. Selten (1977), "Oligopolistic Economies as Games of Limited Information," *Zeitschrift für die Gesamte Staatswissenschaft*, **133**, 385-410.

Marschak, T. and R. Selten (1978), "Restabilizing Responses, Inertia Supergames and Oligopolistic Equilibria," *Quarterly Journal of Economics*, **92**, 71-93.

Maunder, P. (1970), *The Bread Industry in the United Kingdom*, Nottingham: University of Nottingham (Dept. of Agricultural Economics).

McCorriston, S. (1994), "Economics of Vertical Market Competition," Discussion paper presented to 4° Convegno Internazionale, Economia e Politica dell'Innovazione Il caso dell'Industria Alimentare, Piacenza, giugno, 1994.

McCorriston, S., and I.M. Sheldon (1992), "Policy Induced Capacity Constraints and Strategic Interaction in Processed Food Markets," *Journal of Agricultural Economics*, **43**, 149-159.

McDonald, J.R.S., A.J. Rayner and J.M. Bates (1989), "Market Power in the Food Industry", *Journal of Agricultural Economics*, **40**, No.1, January 1989, 101-108.

McMurdo, L. (1990), "Aldi Provokes a Chain Reaction", *Marketing Week*, 15 June 1990.

Meat and Livestock Commission (1994), *Meat Demand Trends*, MLC, Milton Keynes.

Meat and Livestock Commission (1994), *The Abattoir Industry in Great Britain*, MLC, Milton Keynes.

Meynell, P.J. (1990), *Milk Producer Organisations in the United Kingdom, Structure and Member Relations*. The Plunkett Foundation for Cooperative Studies. ISBN-0 85042 097 0.

Milgrom, P. and R. Weber (1982), "A Theory of Auctions and Competitive Bidding," *Econometrica.* **50**, 5, September 1982, 1089-122.

Mintel (1990), "Food Retailing", Mintel Publications Ltd., *Retail Intelligence*, Volume 1, 1990.

Mintel (1991), "Food Retailing", Mintel Publications Ltd., *Retail Intelligence*, Volume 1, 1991.

Monopolies Commission (1973), *Breakfast Cereals: A report on the supply of ready cooked breakfast cereals*, HC.2, HMSO: London.

Monopolies and Mergers Commission (1976), *Frozen Foodstuffs*, HC.674, HMSO: London.

Monopolies and Mergers Commission (1977), *Flour and Bread*, HC.412, HMSO: London.

Monopolies and Mergers Commission (1981), *Discounts to Retailers*, HC.411. HMSO: London.

Monopolies and Mergers Commission (1982), *Nabisco Brands Inc and Huntley and Palmer Foods plc*, Cmnd 8680, Hmso: London.

Monopolies and Mergers Commission (1983), *Linfood Holdings plc and Fitch Lovell plc*, Cmnd 8874, HMSO: London.

Monopolies and Mergers Commission (1983), *Dee Corporation plc and Brooker McConnell plc*, Cmnd 9429, HMSO: London.

Monopolies and Mergers Commission (1985), *Linfood Holdings plc and Fitch Lovell plc*, Cmnd 8874, HMSO: London.

Monopolies and Mergers Commission (1986), *White Salt*, Cmnd 9778 HMSO: London.

Monopolies and Mergers Commission (1987), *Tate & Lyle plc and Ferruzzi Finanziania Spa and S & W Berisford plc*, Cmnd 89, HMSO:London.

Monopolies and Mergers Commission (1989), *The Supply of Beer: A report on the supply of beer for retail sale in the United Kingdom*, Cmnd 651.

Monopolies and Mergers Commission (1994) *Ice Cream, A report on the supply in the UK of ice cream for immediate consumption*, Cmnd 2524, HMSO: London.

Morley, J. (1975), *British Agricultural Cooperatives*, Hutchinson Benham, London, 1975, ISBN 0-09-123960-5.

Murray, G.C. (1983), "Towards an Agricultural Co-operative Classification," *Journal of Agricultural Economics*, **34**, No.2, May 1983.

Nash, J.F. Jr. (1951), "Non-cooperative Games", *Annals of Mathematics*, **54** September 1951, 286-295.

Organisation for Economic Co-operation and Development (OECD)(1981), *Buying Power, The Exercise of Market Power by Dominant Buyers*, Report of the Committee of Experts on Restrictive Business Practices.

Office of Fair Trading (1985), *Competition and Retailing*. OFT: London.

Oustapassidis, K. (1988), "Structural Characteristics of Agricultural Co-operatives in Britain," *Journal of Agricultural Economics*, **39**, No.2, May 1988, 231-242.

Overstreet,T.R. (1983), *Resale Price Maintenance: Economic Theories and Empirical Evidence* (Washington: Federal Trade Commission Bureau of Economics staff report, November 1983).

Palmer, M. and J. Morris (1994), "J. Sainsbury's Tenderlean Lamb: Partners in Production," in Hughes, D. (1994), (ed.) *Breaking with Tradition: Building Partnerships and Alliances in the European Food Industry*, Wye College Press, 1994. ISBN 0-86266-102-1.

Phlips, L. (1971), *Effects of Industrial Concentration: A Cross-Section Analysis for the Common Market*, Amsterdam: North Holland.

Pickard, D.H. (1982), "The Role of Government in Agricultural Marketing," *Journal of Agricultural Economics*, **33**, No.3, September 1982, 361-368.

Pickering, J.F. (1966), *Resale Price Maintenance in Practice*, London: George Allen and Unwin Ltd, 1966.

Prescott, E.C., and M. Visscher (1977), "Sequential Location among Firms with Foresight," *Bell Journal of Economics*, **8** (Autumn 1977), 378-393.

Rasmusen, E. (1990), *Games and Information; An Introduction to Game Theory*, 1990. Cambridge University Press. ISBN 0-631-15709-3.

Ray, D. (1994a), "Who is Driving the Food Industry?" *Food Industry Perspectives*, Wye College, University of London, Discussion Paper Series: Number 2, March 1994. ISBN No. 086266-147-1.

Ray, D. (1994b), "Evaluating Partnerships and Alliances in the European Food Industry," in Hughes, D. (ed.)(1994) *Breaking with Tradition, Building Partnerships and Alliances in the European Food Industry*, p.51-66. Wye College Press, 1994, ISBN No. 086266-102-1

Revell, B.J. (1991), "The Agri-Food Complex in the UK," *Scottish Agricultural Economics Review*. Issue No.6. December 1991.

Ritchie, C.E. (1991), "Trends in Food Retailing and the Relationship with Agriculture." *Scottish Agricultural Economics Review*. Issue No.6. December 1991.

Ritson, C. and A. Swinbank (1991), *The British Milk Marketing Scheme - Implications for 1992*. Paper to the 25th EAAE Seminar, Braunschweig - Volkenrode.

Robinson, M. (1985), "Collusion and the Choice of Auction," *Rand Journal of Economics*. **16**, 1, Spring 1985, 141-145.

Rotemberg, J. and G. Saloner (1986), "A Supergame-Theoretic Model of Business Cycles and Price Wars During Booms," *American Economic Review*, **76**, June 1986, 390-407.

Schelling, T.C. (1960), *The Strategy of Conflict*, Cambridge: Harvard University Press.

Scherer, F.M. (1980), *Industrial Market Structure and Economic Performance*, (2nd ed.), Chicago: Rand McNally.

Scherer, F.M. and D. Ross (1990), *Industrial Market Structure and Economic Performance*. Houghton Mifflin Company, Boston. 1990. ISBN:0-039-35714-4.

Schmalensee, R. (1989), "Inter-Industry Differences of Structure and Performance," in Schmalensee, R, and R. Willig (eds.) *Handbook of Industrial Organisation*, Amsterdam: North Holland.

Scottish Dairy Trade Federation (1994), *Milk Focus*, Phoenix House, Clydebank, Glasgow. July, 1994.

Scottish Farmer (1996), "CWS farming nets record £5.6m profit," June 1, p.17, 1996.

Sexton, R.J. (1990), "Imperfect Competition in Agricultural Markets and the Role of Cooperatives: A Spatial Analysis," *American Journal of Agricultural Economics*, August 1990, 709-720.

Simpson, R., I. Farley and D. Hallam (1995), "The Fruit and Vegetable Industry," in *The U.K. Food and Drink Industry*, Strak, J. and W. Morgan (eds) Euro PA and Associates, Cambs 1995, p.251. ISBN 1-900017-00-8.

Shaked, A. and J. Sutton (1982), "Relaxing Price Competition Through Product Differentiation," *Review of Economic Studies*, **49**, 3-13.

Shaked, A. and J. Sutton (1987), "Product Differentiation and Industrial Structure," *Journal of Industrial Economics*, **36**, 131-146.

Shapiro, C. (1989), "Theories of Oligopoly Behaviour," in Schmalensee R. and R.D. Willig (eds) *Handbook of Industrial Organisation*, Amsterdam: North Holland, 1989.

Slater, J. (1988), "The Food Sector in the United Kingdom," in Burns J., and A. Swinbank (1988) (eds.), *Food Policy Issues and the Food Industries*, Food Economics Study No.3, Department of Agricultural Economics and Marketing, University of Reading.

Smith, A. (1776), *An Inquiry into the Nature and Causes of the Wealth of Nations* (1776; Modern Library Edition, 1937).

Spence, A.M. (1977), "Entry, capacity, investment and oligopolistic pricing," *Bell Journal of Economics*, **8**, 534-544.

Staatz, J.M. (1987), "Recent Developments in the Theory of Agricultural Cooperation," *Journal of Agricultural Cooperation*, **2**, 1987, 74-95.

Stackelberg, H. von (1934), *Marktform und Gleichgewicht*. Vienna: Julius Springer.

Stigler, G.J. (1964), "A Theory of Oligopoly," *Journal of Political Economy*, **72**, February 1964, 55-59.

Strak, J. and W. Morgan (eds.)(1995), *The U.K. Food and Drink Industry*, Euro PA and Associates, Cambs, 1995. ISBN 1-900017-00-8.

Street, P.R. (1990), "A Systems View of Commercial Supply and Marketing Links," in Jones, J.G.W. and Street, P.R.(eds.) (1990), *Systems Theory Applied to Agriculture and the Food Chain*, p.159-203. Elsevier Science Publishers Ltd. 1990. ISBN 1-85166-510-2.

Super Marketing (1994), "Dynamic Duos", 15 April 1994, Reed Business Publishing Group.

Sutton, J. (1991), *Sunk Costs and Market Structure, Price Competition, Advertising, and the Evolution of Concentration*. Massachusetts Institute of Technology. Second Printing 1992. ISBN 0-262-19305-1.

Sweezy, P. (1939), "Demand under conditions of oligopoly," *Journal of Political Economy*, **47**, 568-573.

Tailor, M.R.G. (1995) "Benefits of Selling Milk Through Non-Quota-Holding Milk Groups," Plunkett Foundation Directors Forum, **The New World - One Year On**, Birmingham Metropole Hotel, 19th September, 1995.

Tennbakk, B. (1995), "Marketing Cooperatives in Mixed Duopolies," *Journal of Agricultural Economics*, **46**, No.1, January 1995, 33-45.

Tirole, J. (1988), *The Theory of Industrial Organisation*. Massachusetts Institute of Technology. Fifth Printing 1992. ISBN 0-262-20071-6.

Traill, B. (1994), "Non-Price Competition and Market Structure in the Single European Market," Discussion Paper presented to 4° Convegno Internazionale, Economia e Politica dell'Innovazione Il caso dell'Industria Alimentare, Piacenza, giugno, 1994.

U.K. Dairy Facts and Figures (various), The Federation of United Kingdom Milk Marketing Boards, Thames Ditton, Surrey, KT7 0EL.

Venturini, L. (1993), "Vertical Competition, Endogenous Sunk Costs, and Market Structure in Food Industries," Paper prepared for 3° Convegno Internazionale, Economia e Politica dell'Innovazione Il caso dell'Industria Alimentare, Piacenza, 1993.

Vickers, G. (1995), "The Value of Quality and Service," Plunkett Foundation Directors Forum, **The New World - One Year On**, Birmingham Metropole Hotel, 19th September, 1995.

Vickrey, W. (1961), "Counterspeculation, Auctions, and Competitive Sealed Tenders," *Journal of Finance*, **16**, 1, March 1961, 8-37.

Williamson, O. (1975), *Markets and Hierarchies*. New York: The Free Press.

Wilson, B., B. Traill and J. Strak (1995), "Milk and Dairy Products," in Strak, J. and W. Morgan (eds.)(1995), *The U.K. Food and Drink Industry*, Euro PA and Associates, Cambs, p.173. ISBN 1-900017-00-8.