

Competition in the food marketing chain[†]

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Competition in the Australian food marketing chain is of continuing concern, but little evidence is available to guide policy debate. In a search for broad guidelines, the theoretical and empirical evidence is reviewed and the recent report of the Joint Select Committee on the Retailing Sector is examined. Then publicly available data on several food groups are used to test for evidence of persistent market power. The purchasing behaviour of the grains and oilseeds processing sector is found to warrant more detailed attention. A possible research agenda and a call for greater attention to data requirements complete the article.

1. Introduction

Whether or not the Australian food marketing chain is competitive or, conversely, whether market power exists in the chain, has been an issue of concern to farmers and policy-makers for most of this century. Indeed, the incentive for the establishment of marketing boards for primary products was partly the fear that farmers were at the mercy of powerful buyers who had the ability to earn supernormal profits.

This concern has heightened in recent years for a number of reasons. First, the data show that food product marketing margins have increased over time, and especially in the last decade or so. Retail prices have increased more rapidly than farm prices, and the farmer's share has declined (see, for example, figures 1 and 2 for two quite different products, beef and bananas. For a perspective using monthly beef data, see Chang and Griffith 1998, figure 1). Many agricultural producers still view these trends as evidence of non-competitive behaviour in the processing and marketing chain, even though the factors determining the size of marketing margins are well known (Tomek and Robinson 1990; Campbell and Fisher 1982), namely, the extensive

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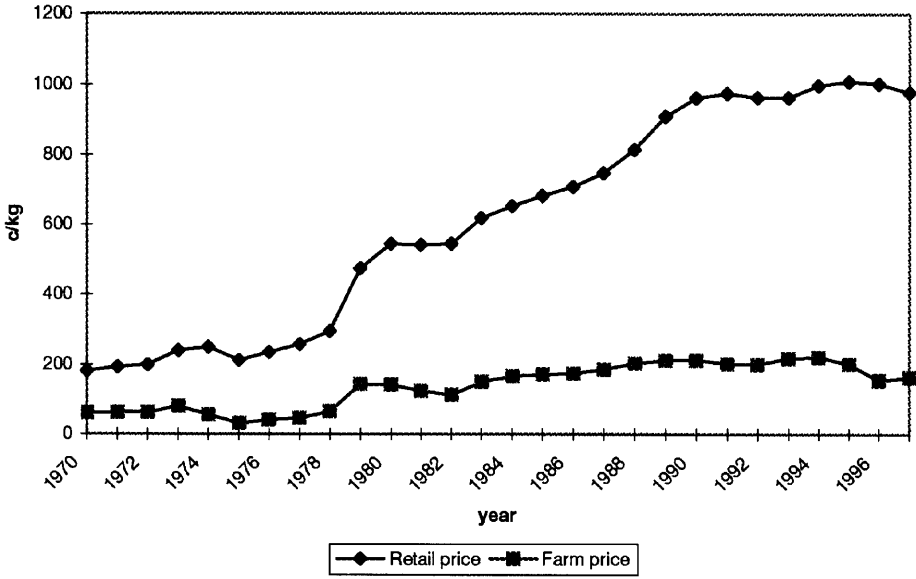


Figure 1 Nominal retail and farm beef prices, 1970-97

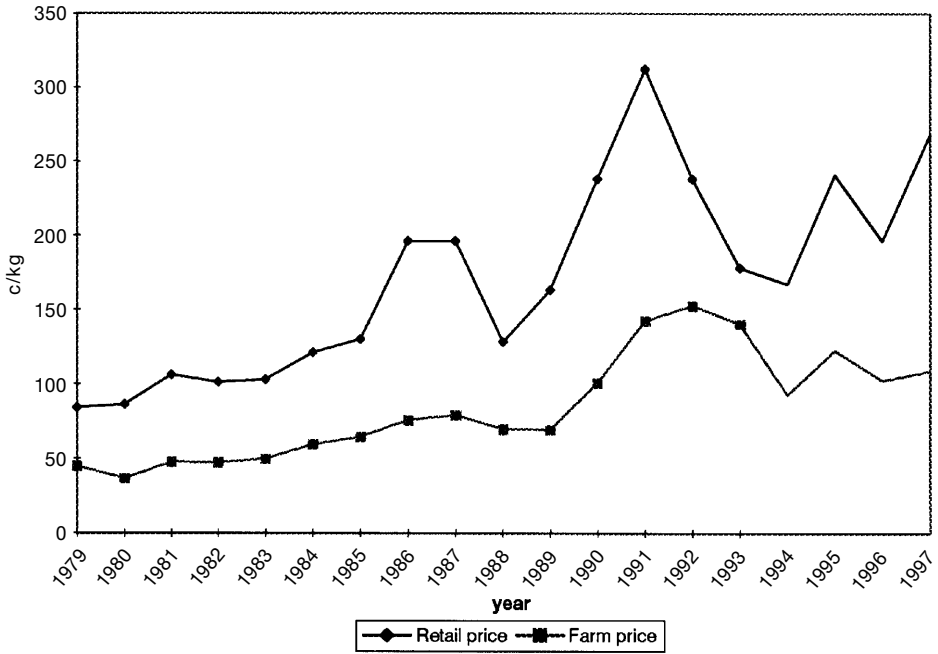


Figure 2 Nominal retail and farm banana prices, 1979-97

range of activities that can be involved in converting raw farm products into products demanded by consumers, and compensation for risk bearing by marketing firms.

The range of services provided by the food marketing chain and how the chain is managed have undergone significant change recently in response to major social and cultural changes among consumers. These have been well documented by Kinsey *et al.* (1996) and the ACCC (1999) among others. Increasing requirements for quality assurance, extended shopping hours, ready-to-eat meals and eating food away from home are all manifestations of income growth, time-constrained households and more discerning consumers. Food marketing firms, sometimes acting in response to consumer preferences and sometimes of their own volition, play an important role in determining what is actually produced on farms. It is now often a case of retailers 'pulling' a product with appropriate characteristics out of the system in response to consumer preferences, in contrast to past practices of agricultural producers 'pushing' a product into the chain at discount prices. The cost of providing these new sorts of marketing services is a rapidly growing source of growth in marketing margins and in the final price for the product paid by consumers.

Second, the marketing board system in many States has been progressively dismantled with the elimination in many industries of guaranteed farm prices, production quotas, vesting and single desk selling arrangements. This process has been more keenly focused over the past five years or so under the legislative requirements of National Competition Policy, where all regulations relating to agricultural product markets must be reviewed. For the regulations to remain in force, a net social benefit test must be passed. My involvement in several of these reviews indicated that the issue of non-competitive marketing chains was a crucial part of the deliberations about the distribution of the potential benefits of deregulation and of the argument for the maintenance of regulations at the farm gate as a form of countervailing power (see, in particular, NSW Government Review Group 1997). Various review teams have sought the advice of economists in relation to these matters, but little empirical evidence has been available to help resolve them.

Third, and associated with both the reform process in domestic agricultural markets and the increasing globalisation of food markets under World Trade Organisation (WTO) agreements, there has been an increase in takeover and merger proposals as firms position themselves to take advantage of the new marketing environment. Examples include the rationalisation of meat processing capacity, including the growth of foreign ownership (Rolfe and Reynolds 1999), the rationalisation of fresh milk processing (Hughes 2000), and takeovers of smaller independent food retailers by the major chains. This activity has seen the well-documented increases in the shares of various markets achieved by the larger firms. For

example, the ACCC (1999, p. 8) reports an increase in the market share of the three large retail chains in the dry grocery sector from around 40 per cent in 1975 to just under 80 per cent in 1998. Such data have been used by some to explain the increase in marketing margins as noted above.

The ACCC is required to assess the competitive implications of merger proposals, but since it is primarily an investigation and enforcement institution and not a research institution, it must rely on published evidence, as well as its own investigations, to make such assessments (ACCC 1999, p. 5). While the ACCC does use rules of thumb in deciding on whether to mount an investigation, senior members of the ACCC have expressed the need for a better filter so that investigative resources are not wasted on low-risk proposals and more detailed case study assessments can be undertaken on those proposals considered to be higher risk (Rhonda Smith, pers. comm. 1999).

Fourth, the issue of the competitive structure of the marketing chain is also important for studies on the returns to R&D and promotion, especially in estimating the distribution of potential benefits to different sectors of the market and in recommending investments funded by various producer levy or check-off schemes. Alston *et al.* (1995) cover these issues in detail while a recent empirical example is given by Cranfield and Goddard (1999).

There is also public concern in Australia about the issue of competition in the food chain as evidenced by the recent Joint Select Committee on the Retailing Sector (Australian Parliament 1999). The structure of food retailing and the agricultural marketing board system also received attention in the recently completed Productivity Commission report on the impacts of National Competition Policy on rural and regional Australia (Productivity Commission 1999). However, in spite of this public concern and the growing policy requirements for empirical evidence, the competitive structure of the food chain has not been a favoured topic among Australian economists in recent years. Little notice has been taken of Richardson's (1986) call for greater attention to be given to imperfect competition or the role of agribusiness firms (see also NSW Farmers' Association 1998). And it is not as though the potential cost of non-competitive behaviour in the Australian food marketing chain is insignificant:¹ a market power surcharge of the size found in the United States would produce a deadweight loss to the economy of at least A\$20 million per year.

¹ ABS data reported by Australian Parliament (1999, p. 7) indicate annual retail expenditure on food products of more than A\$56 billion. Given a relatively inelastic aggregate domestic demand for food, say -0.5 ; a very elastic aggregate supply of food; and food price indexed to 100 and food quantity indexed at 56; a market power reduction in equilibrium food production of only 1.5–1.8 per cent (Marion *et al.* 1979b; Park and Weliwite 1999) would produce a reduction in surplus to Australian consumers of over A\$1 billion per year including a deadweight loss to the economy of about A\$20 million per year.

This situation contrasts with that in other countries. In the United States, for example, there are several research centres focusing on this issue and it is an item of ongoing concern for various government agencies (see, for example, USDA 1996). The *American Journal of Agricultural Economics* has contained many articles in recent volumes on this topic, including invited paper sessions at the annual meetings (for example, Rogers and Sexton 1994). In Europe, although there are fewer published research studies, there has been a recent Office of Fair Trading inquiry into supermarket concentration in the United Kingdom and this matter has been referred to the Competition Commission (OFT 1999). The OECD (1997) recently reviewed the impact of regulations on the distribution sector and, in particular, the regulation of supermarket sites. Market power in the food chain is a world-wide policy issue (ACCC 1999).

It is against this background, and the greater focus on prices at all market levels with GST just around the corner, that the issue of competition in the Australian food marketing chain is addressed in this article. The article is structured as follows. The next two sections are very condensed summaries of a review of various theoretical and applied studies of competitive structures of food markets. Then follow sections summarising the main points from the recent Senate inquiry on the retail sector and the Productivity Commission inquiry on the impacts of National Competition Policy on rural and regional Australia. These four sections contain some of the material also reported in Griffith *et al.* (1999).² The broad conclusions from the material reviewed are that (a) little guidance is available from the literature for policy-makers, and (b) considerable resources in the form of detailed case studies are required to properly examine the competitive structure of any given market. Some broad-brush empirical work is then attempted which seeks to separate the more competitive from the less competitive and so provide a focus for more detailed case studies of those markets where concern is warranted. In conclusion, implications for the profession are presented including aspects of a possible research agenda and a call for greater attention to the data needed for such analyses.

2. Insights from economic theory

In this section 'market power' is defined and then some of the strands of economic theory relating to the concept are identified. In principle, one could review at least a couple of centuries of writings by economists about market power and, of course, there are many different points of view. Nevertheless,

² Longer versions of these reviews are available from the authors.

there have been some particularly useful insights that are summarised here. Because of the enormous literature that exists, little attention is given to particular studies. Similarly the 'textbook' theoretical cases are taken as read.

2.1 Defining market power

The definition of market power is often unclear in economic theory. One recent definition that has been used by the ACCC (1999, p. 26) is 'the ability of a firm to behave persistently in a manner different from the behaviour that a competitive market would enforce on a corporation facing otherwise similar cost and demand conditions'. This would include the ability to raise selling prices and depress input prices, to deter entry, to re-distribute profits to oneself from other firms and, importantly, to be able to sustain these benefits over time. This last point is most important. If a firm takes advantage of a temporary situation of power, it will have less effect on the well-being of other buyers and/or sellers than would a permanent advantage. It could be said that firm decisions are a continual effort to make the best of the present situation. Only if the advantage stays with one firm, or set of firms, is the market frustrated in allocating resources efficiently.

2.2 The structure–conduct–performance (SCP) framework

The SCP model discussed in texts on industrial organisation theory (for example, Scherer and Ross 1990) provides a means of examining market power in various institutional settings. Porter's concept of competitive advantage (see Porter 1998) gives the SCP framework a managerial focus. General statements about market power can be made using the SCP framework, such as relatively weak inferences that barriers to entry and exit are important to long-run profitability of an industry. Unfortunately, many of these barriers are actually created by rivalry between firms. Such factors as product innovation, proprietary cost-reducing innovations and resulting price advantages over potential entrants, are simply part of the competitive process. Judging that a competitive process has the result of entrenching market power is not easy. Advertising and marketing are also difficult to categorise as either worthwhile rivalry resulting in consumer benefits on the one hand, or something that merely raises barriers by increasing the size of the sunk costs of entry into the market. Researchers have to examine cases closely to come to conclusions about the net benefits to society of these forms of competition. In the present context, the SCP framework merely provides a means of ordering information requirements for case studies of the food marketing chain.

However, various regulatory authorities do publish merger guidelines concerning thresholds on market shares and the like which indicate their view of the relationship between structure and performance. For example, the ACCC (1999, pp. 27–8) state that a share of a merged firm exceeding 15 per cent in a market where the four-firm concentration ratio is 75 per cent or more, or a share of a merged firm exceeding 40 per cent no matter what the distribution of other firms, will be cause for further investigation. Rogers and Sexton (1994, p. 1144) indicate that a four-firm concentration ratio of 50 per cent is ‘a commonly used benchmark for separating markets into workable competition and non-competitive groups’. In a related vein, Rolfe and Reynolds (1999) quote a number of studies which suggest that effective oligopolistic coordination tends to break down with three or more firms. Of course the way in which ‘the market’ is defined, in terms of product, regional and/or temporal aggregation, influences the usefulness of such guidelines.

It is to be expected that financially powerful firms will invest in directions that will enhance their position. Recent contributions to industrial organisation theory make much of the strategic aspects of firm decisions. Strategic decisions can be identified by the effect they will have on raising further barriers to entry. The main evidence is that firms invest in directions that increase the level of sunk costs required for profitable operation. One example is investment in firm-specific network capital goods, such as Just-In-Time delivery systems, that have to be implemented backwards in the supply chain. Another example is the current scramble by the major food retail chains to secure supermarket sites ahead of the announced entry by the German company Aldi (Mitchell 1999).

2.3 New institutional economics

The analysis of contracts, an item of some concern in the recent retail sector inquiry, is dealt with by transactions costs economics and principal-agent relationships. Putterman and Krosner (1996) reproduce some of the important papers in this tradition and Williamson (1999) provides a recent and detailed review. Agency problems exist where two parties to a transaction have different goals, or different information, and are intent on achieving their own goals regardless of other parties. These problems can be found in transactions *between* firms, as when a producer and a buyer have different perceptions of the situation. The producer may know something about the quality of the product which is unknown to the buyer; the buyer may know something about the market in which the transaction is taking place which the producer does not know. This is known as information asymmetry. Either may hide information from the other to achieve their goals. Similar problems may be seen *within* an organisation when, for example, the goal of

a supermarket produce buyer is short-term profit contribution, while the strategic management goals of the supermarket focus on long-term supplier loyalty.

Agency and transactions costs problems can help explain particular organisational forms and structures. The nature of firms, alliances, franchises, contractual arrangements, markets and of all the various forms they take, is an outcome of economising choice. The firm is organised to enforce performance by opportunistic input suppliers in a context of information asymmetry, where no single entity can observe all aspects of performance. According to the literature in this area, the institution of the firm, and its financing, are a result of a choice of institutional form to minimise the costs of monitoring performance. The relevance to the food distribution chain is clear: many types of relationships can be observed in that chain, from vertical integration to arm's length markets. Independent retail stores band together in marketing groups, often coordinated by a wholesaler. Retail chain stores integrate some functions but outsource others; they also have contractual relationships of various kinds, formal and informal, with their suppliers. 'Own brand' producers are tied to retail chains or wholesalers by contracts which vary in the exclusiveness they demand of the producers. Processors and manufacturers also integrate backwards and horizontally to form the large, sometimes multinational, grocery and commodity companies. They also have supply contracts with farmers and other suppliers which are not simple arm's length market relationships but have a long life, and expectations on both sides of continuity, no matter whether they are more or less informal.

Problems in these relationships are suggested by some of the submissions to the recent retail sector inquiry. Contractual relationships between growers and processors or retailers vary in formality from mere handshakes to detailed legal agreements. In both cases there have been assertions of agreements being interpreted or varied in favour of the party with the greater financial power, be it a chicken processor or a retail chain. These agreements and their evolution may be interpreted as a market response to a need for two things. The first is efficiency improvement (Just-In-Time and Total Quality Management are two slogans used in this regard). The second is for the 'market makers' to construct a system which serves their needs in terms of allocating risk, preserving proprietary knowledge advantages and avoiding adverse selection of subsidiary network members. For example, an agreement between a retail chain and a broccoli grower may be silent on the question of whether the grower's price can be decreased because of marketing effort (e.g., discounting) on the part of the supermarket. Evidence was submitted to the retail sector inquiry that the grower's price was discounted by the retailer when the retail price was discounted without consultation with the grower (NFF 1999 and QFVG 1999). Does this

sharing of the marketing cost lead to improved efficiency or is it a mere shifting of profits? Analysis of the agency relationships involved, in conjunction with production technologies, should allow a statement about whether the practice is merely the exercise of market power or the adjustment to more economically or technically efficient production.

2.4 Evolutionary economics

Another strand of knowledge about market behaviour which is of relevance to the food marketing chain is that broadly known as the 'evolutionary economics of markets', or 'the resource-based theory of business strategy'. Writers in this area include Penrose (1959), Ansoff (1965), Nelson and Winter (1982) and Nightingale (1996). Knowledge is central to these theories; the knowledge of how to produce and market outputs. This is specialised to the firm in question according to this literature. Each firm has its own fine variant on doing what it does, even within a seemingly homogeneous industry. Knowledge advantages create the profit the firm can make. If all knowledge were public, above-normal profits could not be sustained and the competitive process would immediately grind all activity to a stagnant equilibrium in which no further investment or innovation would be undertaken. Private knowledge drives entrepreneurial activity, but private knowledge also leads to the potential for the exploitation of market power. Thus we see that market power and the competitive process may be considered to be interdependent, or symbiotic, both being outcomes of the drive for profit that is the central feature of modern economies.

The observation that profit rate and other performance variables differ more between firms than between industries gives some indication of the importance of private knowledge in the capitalist system (Scherer and Ross 1990, p. 650). Not all orthodox economic theories cope well with this observation, whereas evolutionary or resource advantage theories expect this to be the case, and explain why it is so.

The relevance of these ideas to the present context is in the growth and technological development of the food marketing chain. The investment in innovation, and its diffusion, which drives the firm in its quest for long-run profit and growth, are possible only where the firm is sufficiently profitable and sufficiently pressed by forces of competitive rivalry. These two conditions, the financial resources and the incentive, are the product of market processes, the selection mechanism transferring market share from the less efficient to the more efficient, and the innovation mechanism generating new varieties of technologies and products. Concentration increases if efficient firms continue to accrete market share without check from innovative moves by previously less efficient firms or from entrants.

The directions of change under these theories are conservative and predictable for most periods of time, as firms search for new efficiencies within their existing technologies. This means it is possible to make reasonably firm predictions about general directions for growth, within a context of technological forecasting. What is not possible is to predict change that is radically creative. We can be sure there will be such change sometime in the future, and that it is likely to be associated with successful entry or the equivalent of entry by reconstruction of an existing firm. The last time the food chain was subject to such a change within Australia was the entry of the variety chain stores, Woolworths and Coles, into grocery retailing in the early 1960s. Before that, the cut-price self-service methods of Flemings, Franklins and Tom the Cheap Grocer, to name the three most 'notorious' players, transformed the way groceries were sold in Australia during the 1950s. Even these changes were, at the time, generally predicted from knowledge of retailing elsewhere in the world. The manner by which well-regarded senior executives move between firms is an example of the value firms place on human capital and the potential for innovative decision-making.

In the coming decade the predictable trajectories of change include e-commerce, global horizontal integration of retailing systems and tighter vertical links in the supply chain, the latter change causing most angst for suppliers in Australia. Further entry to food retailing is likely to occur by firms with innovative ways of responding to these changes, but the possible outcomes are much less certain.

2.5 Conclusions from theory

To sum up, economic theory does not suggest any one 'blueprint' to explain the presence and extent of market power. Rather, it suggests some things to look for which might be conducive to firms being able to earn above-normal profits for a sustained period of time. These include high levels of sunk costs, particularly those associated with marketing, and asymmetric information. The presence and extent of market power have to be assessed on a case-by-case basis. Some firm characteristics such as innovative flair (cost-reducing technologies and new product development) are a means by which firms can make above-normal profits over a relatively short period of time. But these characteristics are not only desirable in the eyes of consumers but are essential to a capitalist economy. The point of contention in most of these theories is the difficulty of distinguishing types of behaviour which are manifestations of the 'normal' competitive process from types of behaviour which are the concern of the regulatory authorities.

3. Insights from empirical studies

In the previous section some of the general strands in the theoretical literature and the insights they give us about competitive structures were identified. In this section specific empirical studies are reviewed, but again the literature is voluminous and in what follows only a sample of studies are cited. In particular, the literature on marketing margins *per se* is not covered, although both the theoretical (see, for example, Gardner 1975) and empirical studies in this area (see for example George and King 1971; Griffith 1974; Wohlgenant and Mullen 1987; Lyon and Thompson 1993) have implications for the competitive structures of the markets of interest. This topic has been recently and comprehensively reviewed by Wohlgenant (1999).

3.1 Traditional structure–conduct–performance studies

There has been a huge number of empirical studies aimed at finding a relationship between structural characteristics of industries and profit levels. Profit measures were typically accounting profit rates or price-cost margins. Structural characteristics of industries were typically four-firm or eight-firm concentration ratios, with controls for other elements of industry structure (and conduct). As early as 1974, Weiss (1974, p. 193) conjectured that the relationship between profits and industry structure ‘must be one of the most thoroughly tested hypotheses in economics by now’.

Weiss (1974) tabulated 46 mainly manufacturing sector-wide studies and cited another eight (his Table 11). He concluded that the large majority of studies showed a significant positive effect of concentration on profits or margins, and that this relationship was quite robust across different time frames, countries, measures of structure and performance, other variables controlled for, units of observation, data sets and data sources. North American sector-wide studies along the same lines but completed after the earlier Weiss survey, say in the period 1975–85, generally confirm the earlier findings (Weiss 1990).

A reasonable number of studies examined the structure-performance link specifically for the food chain. In an oft-cited study, Collins and Preston (1966) analysed cross-section data for 32 US food manufacturing industries and concluded that average industry price-cost margins were positively related to the degree of concentration. They found this relationship to be continuous and non-linear.

Several studies during this period examined performance in food retailing. In a major study, Marion *et al.* (1979a) used quarterly data on the net profits and grocery prices of 17 large US food chains to examine the effects of concentration on price and profit performance. They found both net profits

and prices to be positively and significantly related to market concentration and market shares, irrespective of the form of concentration ratios used. Their conclusion was that the higher observed profits were largely due to the higher prices chains were able to charge in less competitively structured markets, not to greater efficiency and lower costs. In a related report, Marion *et al.* (1979b) estimated the monopoly surcharge attributable to these higher prices. They found an average surcharge of about 1.5 per cent in the 31 regional markets that they studied, but the surcharge reached almost 7 per cent in some markets.

A rather dated, but still often cited, SCP study on the exercise of market power in US markets for fruits and vegetables reminds us that supply responsiveness at the farm level is a crucial determinant of the incentive for collusive buying behaviour (see Helmberger and Hoos 1965, pp. 129–30):

Greater elasticity in the supply function tends to decrease the difference between average and marginal resource cost and facilitates independent conduct in the sense that output variation on the part of any one firm [read buyer] will tend to have a correspondingly smaller impact on price.

But there is another sense in which supply responsiveness at the farm level is of interest. The more responsive is supply, the greater the ease with which resources can be diverted to other uses. A buyer's ability to force down farm-level prices is inversely related to the degree of supply response. The general finding from the Helmberger and Hoos study was that farmers, through their co-operative bargaining associations, have more likelihood of gaining lasting benefits if they concentrate their efforts on negotiating non-price terms of trade, such as delivery methods, time of payment and quality measurement.

Several Australian studies in the 1960s and 1970s followed the US literature and examined the standard concentration-profits relationship in the context of the domestic manufacturing sector. Again, most were at the sector-wide level. For example, Round (1975) found an insignificant relationship between average industry profit and concentration in 33 Australian manufacturing industries. However, his findings also gave support to the hypothesis that, in any particular industry, rates of return were higher in large firms because of greater efficiency, rather than collusive conduct or abuse of market power.

In the case of Australian food industries, only a few studies of the relationship between profitability and industry structure have been undertaken. Griffith and Gill (1984) investigated whether the changing structure of pigmeat marketing in the early 1980s had any impact on pigmeat price spreads. Concentration variables were not found to have any consistent or significant separate impact on price spreads in pigmeat marketing. In a

similar vein, Corbett (1998) recently examined whether the rising proportion of beef sold by supermarkets relative to butcher shops in NSW, as a measure of increasing concentration in meat retailing, was able to explain any of the increase in the beef farm-retail price spread. The concentration variable generally was found to be statistically insignificant.

3.2 New Empirical Industrial Organisation (NEIO) studies

The focus of the NEIO literature is on the conduct of firms within a particular industry, where the industry is allowed to depart from the competitive model. Two important concepts in these studies are 'conjectural elasticities', which refer to assumptions a single firm makes about how other firms in the industry will respond to changes it makes in output volumes or input purchases, and 'effective' marginal revenue and/or marginal factor cost, which allows divergence from the standard price equals marginal cost first-order condition.

Bresnahan (1989) compared the estimated price-cost margins from various US and Canadian studies which used this approach. These studies covered manufacturing, retail and service industries. The estimated price-cost margins ranged from about 5 per cent to about 90 per cent. He drew three conclusions from that review: (a) there is a great deal of market power, in the sense of high price-cost margins, in some concentrated industries; (b) one significant cause of high price-cost margins is anti-competitive conduct (some of the studies found conduct well towards the collusive end of the spectrum, but there were substantial differences between firms in some industries); and (c) only a very little has been learned from the NEIO methods about the relationship between market power and industrial structure (that is, most studies have focused on the concentrated end of the industrial spectrum, and even though market power can now be more easily and consistently measured, we still don't know very much about its causes).

There have been many US studies using these methods with a direct focus on agriculture/food markets. With respect to food processing, the meat packing sector has been the focus of a substantial amount of research activity in the last decade or so. Many studies found market power in the purchase of finished cattle and/or in the sale of packed beef but very recent research casts doubt on these findings (Muth and Wohlgenant 1999a, 1999b). Moreover, Paul (1999a, 1999b) stressed the need for a rigorous treatment of the cost structure of the industry when attempting to measure market power effects. She concludes:

Increasing concentration in the US meat packing industry seems justifiably to have emerged from cost economies, which appear in turn to be

primarily transmitted to suppliers and demanders of cattle and meat products rather than generating excessive profits for the plants or firms.

(Paul 1999a, p. 629)

With specific regard to food retailing, Holloway (1991) found no major departures from competition in the whole farm-retail marketing chain for eight major US food groups, Ailawadi *et al.* (1995) found no concrete evidence confirming an increase in market power exercised or accumulated by grocery retailers, and Messinger and Narasimhan (1995) found that neither accounting nor stock market data clearly indicated a shift in channel profitability from manufacturers to retailers.

In the most recent and most rigorous treatment, Park and Weliwite (1999) use aggregate retail industry data obtained from official and trade sources to examine whether there has been any evidence of market power in US food retailing. They find price taking behaviour in US food retailing prior to 1983, but some evidence of market power since then following an increase in merger activity.

The UK Office of Fair Trading has recently completed an inquiry into food retailing (OFT 1999). On the basis of their findings, the Office has referred a formal competition inquiry to the Competition Commission. The four reasons given for the referral were that the level of profitability of the four largest chains was high, that there were significant barriers to new competitors, that grocery prices were often set to match competitors rather than to undercut them, and that suppliers, including agricultural producers, were adversely affected.

In a study of the Australian meat industry, Hyde and Perloff (1998) found that the domestic retail meat market was competitive for beef, lamb and pork and that market power had not increased over time. Zhao *et al.* (1998) modified the model developed by Holloway to account for trade and applied it to the Australian beef market. When the domestic and export markets were separated, no evidence was found of non-competitive behaviour in the domestic beef market. Paul's view of the importance of processing cost economies is echoed by Rolfe and Reynolds (1999), who argue that for the Queensland meat processing sector, because of demonstrated large-scale economies (Morrison 1997), fewer but more efficient firms would reduce processing costs and may increase prices paid for livestock.

A particular area of concern in Australia in recent years has been retail fluid milk markets, and the extent to which retail prices might change because of concentration in food retailing following deregulation in the various states. For the product of primary interest, carton milk, O'Donnell (1999) found significant evidence of market power but he was unable to quantify its precise magnitude or cause.

3.3 Time series methods

Another recent theme of research has been in the time series econometrics area, where the statistical properties of the major price series in a particular food chain are examined to infer industry behaviour from market outcomes. For example, Reed and Clark (1998) used these methods to reach the conclusion that analysts are more likely to reach a finding of non-competitive market behaviour if they do not correctly account for the (statistical) characteristics of the data series they are using. These authors also make the point that 'deciding whether markets are competitive rests not on whether an industry establishes a gap between price and marginal cost but on whether the gap is maintained over time and as capital moves in and out of the sector' (1998, p. 1142).

Goodwin and Holt (1999) were particularly concerned with the causal direction of US price changes and on whether responses were symmetric to price rises and price falls. They found uni-directional price transmission, from farm to wholesale to retail, which does not imply the existence of market power at higher levels of the chain. They also found that the responsiveness to price shocks had increased in recent years and they suggested that this result may imply that markets have become relatively more efficient in transmitting information through vertical marketing channels.

Similar studies have been conducted for European countries (e.g., Palaskas 1995; Dawson and Tiffen 1997) with mixed results concerning price causality. A problem in using these statistical methods in European studies is the confounding impacts of agricultural policy measures which are in place to influence and supplement farm prices. In Australia, Chang and Griffith (1998) found that the farm, wholesale and retail prices for beef moved together over time, all responding to exogenous shifts in demand and supply curves which is evidence in support of competitive price determination.

3.4 Conclusions from the empirical studies

Does the empirical evidence tell us much about the relationship between concentration levels, consumer prices and prices received by farmers? The first point to make is that very few empirical studies of the type reviewed here have been done in the Australian food marketing chain. Three manufacturing sector studies done in the 1970s were inconclusive, several studies of the meat industry have suggested competitive conduct while two studies of the dairy industry have indicated non-competitive conduct (although there are policy interactions in this industry). For a broader perspective, we have to look to studies done in North America and Europe for guidance.

In the United States the manufacturing sector is regarded as the 'chain leader', although that may be changing, so most policy attention has been on food processing and manufacturing industries. The conclusion drawn from the older US SCP literature was that the large majority of studies showed a significant positive effect of concentration on profits or margins, and that this relationship was quite robust across different time frames, countries, measures of structure and performance, other variables controlled for, units of observation, data sets and data sources. Thus, industries which had small numbers of large firms were more profitable than industries which had larger numbers of small firms. Similar conclusions were made for food retailers.

Conversely, the conclusion drawn from the US NEIO literature is that no such generalisation is possible. Certainly there is evidence of non-competitive conduct in some manufacturing industries, but the evidence also varies with which industry is studied (since there is an element of self-selection), with definition of market (national or regional) and over time (as market conditions change). There are several studies which produce opposite conclusions for the same industry over the same data period.

Kinsey (1998) reviews the evidence about the effect of increased concentration in food retailing on consumers. Over forty studies are cited, the earliest having been published in 1939 and the most recent in 1998. The results are mixed, especially with regard to the question of whether greater concentration of retail food firms in local markets increases food prices and firms' profits. She says:

Concentration tends to be associated with both increased and decreased prices. Recent work indicates prices tend to increase in dry grocery items, but not in fresh and chilled foods . . . Profits of the parent company generally rise with concentration, but the reason is unclear. Most studies conclude it is due to lower costs made possible by economies of scale in procurement or vertical coordination with suppliers and better use of information technology. There was no evidence that retailers' profits are increasing faster than food manufacturers' profits.

(1998, p. 1)

The more recent study by Park and Weliwite (1999) does conclude that there is a small but significant market power premium in US retail food prices.

USDA (1999b) describe recent changes in the 'industrialisation' of US agriculture and conclude that increased concentration may result from industrialisation but not necessarily so, and high concentration does not necessarily imply large firm size. Importantly, it is pointed out that 'high concentration can lead to less competition . . . but does not always reduce competition'. This overview seems consistent with the observations made above.

One trend in the results is that a greater proportion of studies is finding no evidence of non-competitive behaviour in recent years. This could be due to the evolution of analytical work over time, as more detailed theories and empirical methods are brought to bear on the problem. The recent studies of Paul (1999a, 1999b) and Muth and Wohlgenant (1999a, 1999b) are in this mould, and they cast doubt on the long-held view that the US meat processing industry is non-competitive. There are other explanations, however. One is to state the obvious — that firms operate in a dynamic environment and they are continually reacting and adjusting, not only to their competitors, but also to supply and demand changes in the external environment, including changes in the regulatory environment. A greater regulatory presence in the United States in the 1990s compared to the 1980s would surely have some influence on the strategic directions that firms take in industries which have a ‘reputation’ for non-competitive behaviour.

In the United Kingdom, the retailing sector tends to be the chain leader, although that too may be changing, so most policy attention has been on food retailing. Although the number of published research studies is small, there has been a recent Office of Fair Trading inquiry and the consensus is that the major supermarkets do have market power. This matter has been referred to the Competition Commission. However, there is also evidence that the degree to which the major supermarkets have been able to exert market power has varied over time as new competitors have entered the market and as industry conditions have changed. Thus, barriers to entry are seen as a very important inhibitor on the ability of firms with market power to maintain non-competitive behaviour over time.

4. Review of the retailing sector

4.1 General

The Joint Select Committee on the Retailing Sector which reported in August 1999 (see Australian Parliament 1999) was asked to inquire into and report on: (a) the degree of industry concentration within the retailing sector in Australia, with particular reference to the impact of that industry concentration on the ability of small independent retailers to compete fairly in the retail sector; (b) overseas developments with respect to this issue, highlighting approaches adopted in OECD economies; and (c) possible revenue-neutral courses of action by the Federal Government (i.e. courses of action that do not involve taxation reform).

The evidence used by the Committee to reach its conclusions and make its recommendations was a combination of factual data on market shares and price changes and largely anecdotal evidence about firm conduct derived

from submissions and hearings. No formal empirical studies were undertaken as part of the inquiry. There is some mention in the reported submissions and in the discussion of developments in other OECD countries.

Regarding the existence of market power, there is considerable debate in the Report about how to measure market shares, and such measurements for mid-1999 for the three major retail chains range from 80 per cent for the dry/package grocery market (AC Nielsen 1999) to 43 per cent for all food and grocery spending including cafés, restaurants, hotels and taverns (Woolworths 1999). Whichever measure is used, however, the evidence is that the share of the major chains is growing over time at the expense of the independents (ABS commissioned research).

The Report takes a strong structural perspective in deciding on the existence of market power. For example: 'the market is heavily concentrated and oligopolistic in nature, where a small number of major chains (Woolworths, Coles and Franklins) each have a significant degree of economic influence or market power' (Australian Parliament 1999, p. x) and 'The Australian grocery retailing industry is oligopolistic in nature. That is, the market structure is characterised by a small number of firms, each of which possesses a significant degree of economic influence or market power' (*ibid.*, paragraph 2.16).

Somewhat inconsistently, given the comments above about an *oligopolistic* structure, the major winners from this expansion of market share by the major chains were said to be consumers, in terms of deregulated trading hours; a greater product choice; lower prices; and the convenience of one-stop shopping. The Report stated that:

At the consumer level, competition in the retailing sector appears to be healthy, with retailers vigorously competing with one another on price and choice. This is evidenced by declining real prices of many grocery items over the last decade, and a massive expansion in product range to the point where major supermarkets now offer over 40,000 different items in their larger stores.

(Australian Parliament 1999, p. 2)

The Report also recognises that the growth of the chains has led to significant economies of size and scope and that these savings have been, at least in part, passed onto consumers in the form of lower prices. An implication of this is that market power on the selling side is not a big issue.

The two groups who have lost from this structural change in food retailing are the small independent competitors, and in many cases, suppliers. The National Association of Retail Grocers of Australia (NARGA) has been concerned that the major chains have increasingly established themselves

throughout Australia in competition with traditional family-run stores. According to the Report, this expansion by the major chains has seen the demise of hundreds of small grocery stores, butchers, bakers, florists, green-grocers, pharmacists, newsagents, liquor outlets and other small retailers as a result. However, there has been significant growth in other types of retail outlets, such as the many forms of convenience stores.

Farmers in particular are concerned that the market power of the major chains enables them to drive very hard bargains in the purchase of produce, which is often done in an aggressive manner. Members of some farm organisations report instances of what they believe to be abuses of market power, including significant added costs being imposed on suppliers via enhanced labelling and packaging requirements; the use of various tactics to limit the establishment of brand names by suppliers; breaches of contract; the 'flexible' use of quality standards as grounds for product rejection; the use of what is said to be exclusive supply agency arrangements in certain markets; and unfair negotiating practices (NFF 1999; QFVG 1999).

4.2 ACCC submission

The ACCC submission to the retail sector inquiry provides a useful perspective. It points to the changing nature of relationships in the food marketing chain, emphasising the increased use of contractual arrangements, and the development of exclusive contracts with producers in particular. It warns how attempts by supermarkets and manufacturers/processors to earn higher returns can impact adversely on farmers and notes that the sale of raw farm products is now more competitive because of the demise of marketing boards. In relation to whether in fact the supermarket chains have market power, the submission states as follows:

One preliminary issue is whether in fact it can be said that the chains indeed have substantial market power. While collectively they are clearly a significant voice, individually none of the chains has more than 35 per cent of the market for warehouse withdrawals. A firm's market power is related to the structural or behavioural conditions of a market. Whether a firm has substantial market power in any given case will depend on the circumstances.

(ACCC 1999, p. 37)

The ACCC goes on to mention a few issues that it claims justify its close watch over the grocery sector. For example, it is stated that:

An oligopolistic market structure at the wholesale/retail level of the grocery industry imposes backward pressure on the agricultural and

manufacturing sector which depends on the chains for the majority of their sales. This causes profits to be squeezed at the producer level and, to the extent that it drives otherwise viable and competitive players out of the business, results in a misallocation of resources.

(ACCC 1999, p. 37)

While the ACCC points to various dangers of increased concentration in food retailing, it also points to some of the benefits from growth of the supermarket chains such as the ability to cater for consumers with varying income levels, new product development and the convenience of one-stop shopping.

4.3 Recommendations of the Report

A significant body of evidence presented to the Committee alleged instances of predatory pricing, where it was said that the major chains were prepared to lose money indefinitely in certain stores to wipe out the competition. While the major chains denied these claims, the Committee thought that the evidence was consistent and widespread, with the common complaint being that the difficulties lie in establishing predatory conduct under the current provisions of the Trade Practices Act. The Committee believed that the evidence clearly reveals a need to address the issue of predatory pricing, with a recommendation that the ACCC be given wider powers to bring representative actions, and to seek damages on behalf of third parties under Part IV of the Trade Practices Act.

Many complaints received during the course of the inquiry raised issues not formally covered by the Trade Practices Act. Therefore the Committee saw the need to establish a mechanism outside the ACCC through which retail industry participants can bring complaints or queries for speedy resolution. The Committee believed that an appropriate dispute resolution mechanism should take the form of an independent Ombudsman, to be funded by government, who could attempt to resolve all sorts of complaints brought by businesses in the retailing sector.

The Committee recommended the establishment of a Retail Industry Ombudsman who would be backed by a mandatory Code of Conduct to regulate conduct in vertically integrated relationships throughout the supply chain. Being mandatory, the Code of Conduct would enable the courts to take into account provisions of the Code in determining whether or not business conduct has been unlawful.

It was also recommended that the Committee should be reconstituted in three years time to re-examine the retail sector. All of these recommendations have since been accepted by the Federal Government (ABC 1999).

5. Review of NCP on rural/regional Australia

The Productivity Commission's (1999) report on the effects of National Competition Policy on rural and regional Australia discusses two broad areas of concern directly related to the topic of this address. First, it reports concerns on the part of farmers that the dismantling of the marketing board system that is currently underway is undermining the ability of farmers to exert countervailing power in their dealings with large corporations. But the Commission did not view this concern as a reason for slowing down reform in agricultural marketing. It points out that concentration does not necessarily imply lack of competition in purchasing agricultural products.

Second, it reports concerns about the expansion of retail chains in country Australia; in particular, that this could result in the demise of smaller players. But the Commission states that retailing is highly competitive and quotes from the Access Economics submission to point to low entry barriers. Moreover, it states that the former Industry Commission found that profit levels for small and medium food retailing enterprises in 1993–94 and 1994–95 were higher than for larger enterprises and this was inconsistent with the notion that large food retailers exercise significant market power.

The Commission did not make any specific recommendations with respect to market power issues, viewing such issues as being the responsibility of the ACCC. However, it does have a chapter on the topic 'National Competition Policy and the Marketing of Rural Products' that is particularly instructive about the legislative reform process now underway in relation to marketing boards. Among other things it emphasises the need for case-by-case assessment of the benefits and costs associated with marketing boards as is occurring under national competition policy.

6. Some new empirical results

Given the paucity of empirical evidence on the competitive structure of the food marketing chain in Australia that is available to assist policy-makers, an attempt is made here to add to the stock of knowledge. The objectives in undertaking this research are to take a broad sweep across all sectors from farm gate to the consumer and across a wide range of fourteen food products of varying levels of processing; and to use a modelling framework which was broadly applicable across these products using readily and publicly available data. It is hoped that the study will provide the sort of filter requested by ACCC and others, so that detailed case studies on the competitive structure of the marketing chain do not have to be undertaken on every single deregulation or merger proposal.

6.1 Method

A marketing margins framework is adopted as the basis for the study, and of the many alternative models available (recently reviewed by Wohlgenant 1999), the structural NEIO framework developed by O'Donnell (1999) is used. The idea is that the observed marketing margin for a food product potentially contains three components. The first is the costs of providing the marketing services required to transform the agricultural input into the food product. The second is any rent due to non-competitive buying behaviour in the relevant input market, due to any divergence between input price and marginal factor cost, and the third is any rent due to non-competitive selling behaviour in the relevant output market, due to any divergence between price and marginal revenue.

Following the notation set out by O'Donnell, let p_m be the price of the food output m , w_m the price of the agricultural input m , q_m the aggregate quantity of output m and x_m the aggregate quantity of input m . An inverse demand function operates in the output market of the form $p_m = f(q_m)$. Agricultural marketing firms combine agricultural inputs x_m , with input supply functions of the form $x_m = f(w_m)$ and non-agricultural inputs z , to produce q_m . Making the common assumptions of fixed proportions, and constant returns to scale (as, for example, Hyde and Perloff 1998), specific assumptions about functional forms for the demand, supply and cost functions, and aggregating over all n firms in the industry, the first order condition from the profit maximisation problem eventually results in an estimable equation for the marketing margin of the following form (full details of the derivation and the estimation model are given in O'Donnell 1999):

$$m_j = a_j + \sum_{k=1}^K c_{jk} z_k + \beta_j q_j + \sum_{m=1}^M \gamma_{jm} x_m / w_m, \quad (1)$$

where, for any product j

$m_j = p_j - w_j$, is the industry marketing margin;

z_j = non-agricultural input prices and trend and seasonal factors if required;

$\beta_j = -\theta_{qjj}/\eta_j$, where η_j is the slope of the market demand function for product j and

θ_{qjj} = the conjectural elasticity of the average firm in the output market with respect to aggregate output;

$\gamma_{jm}/w_m = \theta_{x_mj}/\varepsilon_{jm}$, where ε_{jm} is the slope of the input supply function for agricultural input j and θ_{x_mj} is the conjectural elasticity of the average firm in the input market with respect to aggregate inputs, and where there may be more than one input m contributing to output j .

From theory and the assumptions made, the β_j , γ_{jm} and c_{jk} coefficients must also be non-negative.

Thus the industry marketing margin for a food product can be expressed as a linear function of the prices of marketing inputs and two expressions containing the quantity of the agricultural input (or output). These latter two expressions represent output and input market power, respectively. If output and input markets are competitive, the conjectural elasticities are zero and the margin equation reduces to the familiar condition of the price of marketing services equals the marginal cost of supplying them. Thus a test of competitive behaviour in a particular food product market or agricultural input market is simply a test of whether the β_j and γ_{jm} coefficients respectively are positively significantly different from zero. No direct estimates of the conjectural elasticities are provided if these coefficients are significant, but they can be inferred if estimates are available of the demand and supply elasticities.

The modelling approach undertaken was to estimate a set of equations of the form given in equation 1 for the products of interest with the non-negativity restrictions imposed using the nonlinear regression command in TSP. Single equations and SUR systems were estimated, with and without a dummy variable (1987 onwards = 1) to try and account for the greater concern with concentrated markets in the last decade, and using production data as the measure of throughput. The results reported below are for the SUR product group systems, without dummy variables, and with an aggregate cost index in place of individual cost variables because of multicollinearity problems. The dummy variables did not produce results much different from those reported.

6.2 Data

For any one product, the only data required are farm and retail prices, the quantity produced, the costs of supplying marketing services and the price of all other goods (CPI) for the normalised cost function. Annual data on these required variables for the fourteen food products listed in table 1, over the period 1970 to 1997 where possible, were taken from readily available sources as detailed in Appendix 1.³ All price variables were converted to real terms so the dependent variables in the regressions are real margins. Some comment is required on the restrictions that data limitations placed on the analysis, and this is done below.

³ Dairy products were included in an earlier version of this article, but have now been removed due to the extensive regulation of prices of these products over the sample period.

Table 1 Constrained SUR estimates

Food Product	Cost index coefficient	Output conjecture coefficient	Input conjecture coefficient	Trend coefficient
<i>Meat products</i>				
Beef	228.5	0.00**	0.00**	-0.70
Lamb	23.41	0.00**	0.00**	-4.98**
Pork	45.56	0.00**	0.00**	-4.31**
Chicken	0.00**	0.00**	0.00**	-8.33**
<i>Grains products</i>				
Rice	63.73*	0.00**	0.00**	-2.57**
Bread	61.62**	0.00**	0.06 (.26)	2.03**
Margarine	230.0**	0.00**	1.70**	-8.27**
Breakfast cereal	0.00**	0.00**	1.06 (.21)	9.19**
<i>Fresh fruit</i>				
Oranges	39.04	0.00**	0.00**	2.35**
Bananas	0.00**	0.00**	0.00**	-1.04
<i>Fresh vegetables</i>				
Potatoes	34.36	0.00**	0.00**	-0.40
Tomatoes	0.00**	0.00**	0.00**	-1.75
Carrots	0.00**	0.00**	0.00**	-0.06
Onions	108.9**	0.00**	0.00**	1.55

Note: *significant at the 10 per cent level, ** significant at the 5 per cent level, one-tail test for the potential constrained coefficients, two-tailed for the time trend

Figures 3 and 4 reveal quite different patterns of real margins over time compared to the equivalent nominal margins. For most of the fourteen food products, real margins are non-increasing. Further, as shown in Appendix 2, for most of the products the relative variability of these margins is quite low. Two of the three products which show the highest coefficients of variation are those with strongly declining real margins.

6.3 Results

The results of estimating equation 1 are quite striking (see table 1). First, there is a large proportion of corner solutions where the constraints on both the input and output conjecture coefficients were binding at zero. Thus the null hypothesis of a competitive market in both output and input markets could not be rejected for any of the meat products, fresh fruits or fresh vegetables.

The result in relation to these output markets matches the conclusions from the Joint Select Committee noted above and the views of the Prices Surveillance Authority (PSA 1994), which regarded the markets for meat

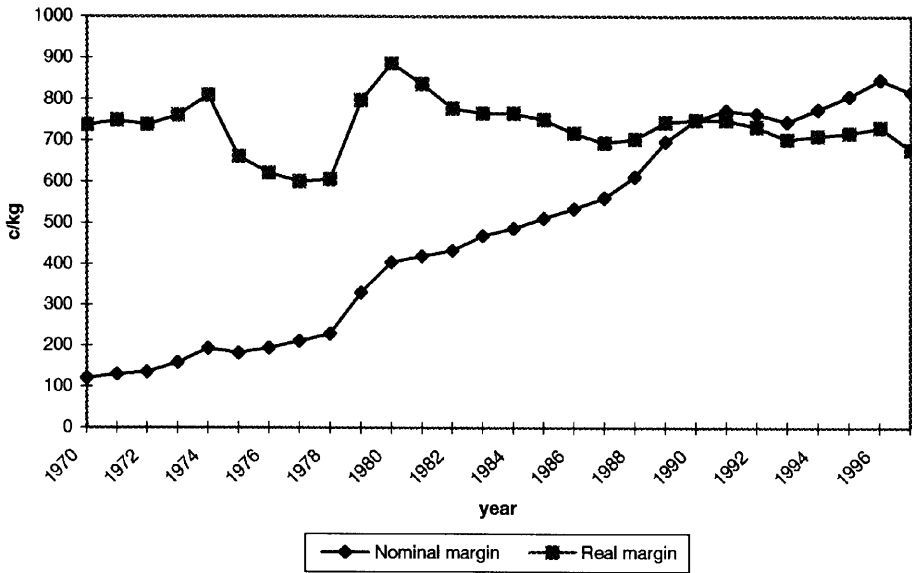


Figure 3 Nominal and real beef marketing margins, 1970–97

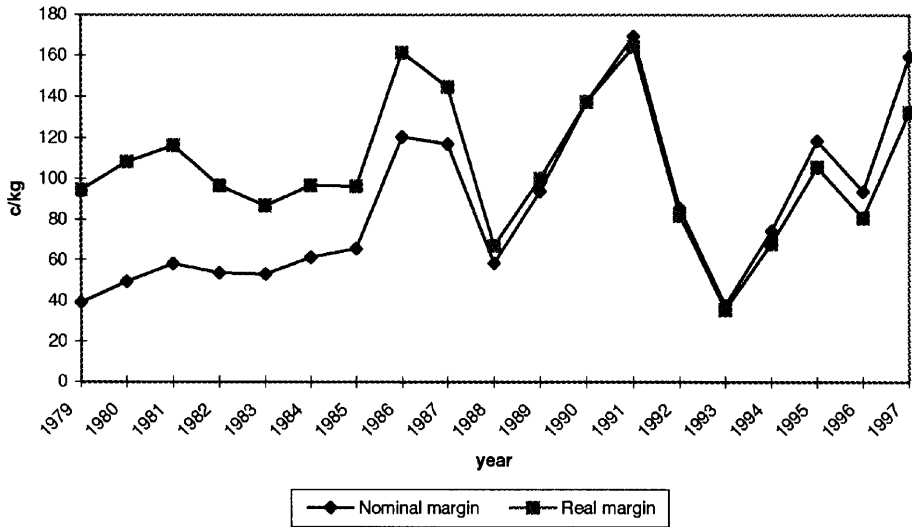


Figure 4 Nominal and real banana margins, 1979–97

and fresh fruit and vegetables as ‘competitive’ (p. 14). It also accords with previous evidence on meat products (Zhao *et al.* 1998; Hyde and Perloff 1998). The result in relation to input markets is consistent with the evidence for meat products in Chang and Griffith (1998), but is somewhat contrary

to the tenor of submissions to the Joint Select Committee in relation to the fresh fruit and vegetable sector.

In the processed grains and oilseeds sector of the food market, the output conjecture coefficients are not positively significantly different from zero and thus indicate a competitive consumer market for the relevant food products, as suggested by the Joint Select Committee. However, three of the input conjecture coefficients are positive, one is highly significant and the other two are significant at just over the 20 per cent level. This provides some evidence of a non-competitive buying market for the relevant farm commodities. Given the assumptions made, and the fact that the estimated coefficients reflect average behaviour over a 20-year period, these results suggest that non-competitive activity has been a persistent feature of this market sector.

This result also accords with the views of the Prices Surveillance Authority (PSA 1994), which regarded the markets for products contained in the Breakfast Cereals and Cooking Oils and Fats indexes as 'not effectively competitive' (p. 14) and consequently maintained price surveillance on the major firms in this product group (at the time Arnotts, Kelloggs, Uncle Tobys and Sanitarium).

The high proportion of corner solutions (also found by O'Donnell 1999) requires comment. The equations were re-estimated without the non-negativity constraints, and for only two of the products, rice and bread, did the unconstrained equations produce positive signs on all the coefficients required to be non-negative. It is no surprise that these products are both in the grains and oilseeds processing sector. In all other cases, at least one of the quantity-related coefficients, and in some cases the cost index coefficient also, was estimated to be negative and significantly different from zero. Therefore, the estimated margins equations strongly suggest a negative relationship between margins and throughput. This implies a declining average cost curve for the processing and distribution sector for these food products, which questions the constant returns to scale assumption. This adds further weight to the call by Paul (1999a, 1999b) for greater attention to be paid to underlying cost structures when examining the competitive nature of the food chain. Of course, more detailed data sets are required for this, and a broad coverage of food products as undertaken here may no longer be possible.

Another comment concerns the general significance of the trend coefficients. These trends were included to account for factors, apart from those formally specified, thought to have an influence on the pricing of market services — the increased demand by consumers for additional market services as well as deregulation and take-over and merger activity. The mix of positive and negative trend coefficients suggests that there are different

balances of these factors across the food markets studied. Again, knowledge of the market is important.

A final comment is that studies such as reported here, based on average representations of market behaviour over some long historical period, may not be very useful in identifying episodes of non-competitive behaviour in a timely manner, *when required* by regulatory authorities. This general problem with time series-based models suggests that even more attention should be given to monitoring and understanding the institutional detail of the market in question, and to attempting to apply those models having variable market power indexes. If variations in the use of market power can be related to particular changes in the environment facing the firm or market in the past, such changes can be taken as leading indicators of possible variations in the use of market power in the present and in the future.

7. Implications for the profession

The primary implication of the literature review part of the article is that future research into market power issues in the Australian food market should be in the form of intensive case studies. These will allow development of the institutional detail sufficient to reveal the nature and significance of market power in those chains and how and why it ebbs and flows over time. However, such resource-hungry analyses cannot be undertaken for every market faced by a merger or deregulation proposal. The implications of the empirical part of the article are that (a) attention should be focused on the supplier side, not on the consumer side of the market (an implication fully supported in the Joint Select Committee report); and (b) the sector providing the most likely payoffs from greater research effort would be the grains and oilseeds processing and distribution sector. Given these implications are likely to continue to be relevant into the near term future at least (Australian Parliament 1999), a suggested research agenda follows.

The first component is that the preliminary evidence of the potential to achieve persistent supernormal profits in the grains and oilseeds marketing sector needs to be confirmed by more detailed case studies. This could be done by application of the more detailed NEIO techniques, such as the latest work on the US meat processing industry by Paul (1999a, 1999b) and Muth and Wohlgenant (1999a, 1999b). These methods incorporate variable market power indexes, where the degree of market power, if any, is allowed to vary over time as external influences change, and several also allow separation of operational efficiency gains due to scale and scope and technical innovation. Alternative methods include the new time series models as reviewed above, and models of non-cooperative games. There have been few applications of these types of models in food markets (see Koontz *et al.* 1993) although they

are more frequently used in other retail markets (Phlips 1998). The choice of method will depend on the chain characteristics and on the available data. Baker and Bresnahan (1992) and Hyde and Perloff (1995) examine the advantages and disadvantages of various methods. However, innovative collections of firm-level data and 'industry' information (from trade magazines and the like) are likely to be required if detailed case studies are to be completed.

While the preliminary model reported above has examined the food marketing chain as a single entity, in reality there are many points of exchange along this chain and this raises some specific research questions. If there is market power in the chain, where are the available profits taken? Is it the major retail chains or the national manufacturers? And to what extent is this location related to the resource advantages enjoyed by these firms? Other questions could relate to barriers to entry and exit, the role of IT innovations and efficient consumer response, and the influence of past and present government regulation in determining the competitive structure of food markets. A more detailed account of these possible research questions is given in Griffith *et al.* (1999).

One important point to make regarding measurement of market power concerns the influence of trade. Australia is a small country which exports a significant share of farm output and imports a smaller but still significant share of food requirements. World market prices do matter in the Australian food chain, and the export parity price can often be regarded as a floor for products that have only a minor degree of processing. However, most of the formal models reviewed have been constructed in the context of the US and European markets where trade, and the link between domestic and world prices, is not nearly as important. Any more detailed empirical models developed to test market power in the Australian domestic market should properly account for the trade status of the industry being studied.

Another important point concerns the implication from the empirical work of increasing returns to scale and non-optimal plant sizes in many industries over the sample period. While this situation seems to be changing rapidly, especially in meat and milk processing, further research needs to examine in detail the shape of cost curves and returns to scale in these industries (Paul 1999a, 1999b).

Even though no evidence across other sectors was found in the empirical work, the extensive anecdotal evidence on problems with supply contracts submitted to the Joint Select Committee would seem to be too pervasive to ignore (see, for example, NFF 1999 and QFVG 1999 as well as many other submissions). Thus the second component of a research agenda would examine the issue of supplier contracting as an effective barrier to or response to non-competitive behaviour by purchasers (see, for example,

Iskow and Sexton 1992; USDA 1999a). Here it would seem useful to investigate the extent of the use of contracts in Australian farming; the nature of those contracts; and the desirable features for contracts given the particular circumstances of Australian agriculture (such as a relatively high level of climatic risk) relative to overseas contract design experience. Case studies could be conducted of primary products in which contracts are a significant issue, including long-established or emerging industries, and should include horticultural enterprises since they were the focus of the above submissions. Some of the questions to be addressed could include: Are agency problems and information asymmetries important? How should contracts be designed? Is there a role for grower co-operatives? Are there viable alternative institutional relationships? As responses to agency and information problems, why have some cases seen vertical integration, others franchising and others the outsourcing of specific production tasks (as in the chicken meat industry)? What role does supply responsiveness play in a buyer's ability to force down farm-level prices? There would seem to be scope for more studies of supply response and one focusing on vegetable crops would be a suitable starting point given that farmer-supermarket relationships for vegetables have received attention in recent inquiries.

The final component of a research agenda relates to data quality and availability. The issue of data availability has emerged frequently in the above discussion, particularly in relation to the constraints placed on the use of preferred methods. In the empirical work reported above, a partial listing of deficiencies in publicly available product-level data would include the absence of retail prices for some products and short sample periods for others, absence of wholesale prices for a greater range of products, absence of farm prices from direct sales, absence of marketing cost indexes, inconsistencies in data availability between calendar and financial years, and the use of fixed proportions assumptions to calculate prices and quantities at various market levels. Equally important are deficiencies in sector-level data, such as the absence of concentration ratios on a consistent basis, absence of manufacturing industry data in markets where there are only a few firms (as confidentiality provisions prevent publication), and absence of firm-level data in those industries of interest.

Thus, on the one hand, we have greater legislative requirements on government agencies to consider the competitive behaviour of food markets, calls for economists to contribute more to these enquiries by undertaking research, and developments in empirical methods which require more disaggregated data series. On the other, we have a public data collection and distribution system which is being continually wound back, and confidentiality restrictions preventing the publication of data which are likely to be

most useful for the type of research outlined here (in spite of some of that same data being more commonly released in annual reports and the like). These developments are increasingly constraining the ability of economists to make any empirical contribution. And it is somewhat ironic that the grains and oilseeds processing and marketing sector, the one sector suggested by the preliminary empirical work as definitely worthy of closer scrutiny, is one of the sectors where the available data are most restricted.

This situation is in stark contrast to that in other countries where market information is treated as a more valuable commodity. As a case in point, in the United States there is a growing number of firm level data sets (Paul 1999b), there are concentration ratios published for a very wide range of quite disaggregated products (down to the level of 'Canned olives, incl. stuffed') (Rogers and Sexton 1994, Table 1, though confidentiality restrictions can prevent publication of census data at the local and regional level), and legislation has recently been passed to require the reporting of all direct-to-plant livestock sales as well as a range of other enhancements to market reporting (NSW Farmers Association 1998). The situation is also in contrast to recent pronouncements of safeguards following implementation of the National Competition Policy (PSA 1994, p. 1): 'Prices surveillance will remain an integral part of the new competition regime.' Members of the profession can have a significant role here in pointing out the value of public data collection services which have extensive uses in public policy debates as well as contributing their analytical expertise to these debates.

So there are some ideas for further research in the general area of competition in the Australian food marketing chain. There are likely to be many others as well, but as a wiser person once said, 'There's enough to be getting on with'.

Appendix 1: Definitions and sources

General data

Consumer Price Index, Australia, all groups, base 1980/81, both calendar year and financial year, both rebased to 1990, ABS 6401.0 and ABARE.

Population, Australia, million, both calendar year and financial year, ABS and ABARE.

Wages Index, Australia, all adults weekly, base 1980/81, both calendar year and financial year, both rebased to 1990, ABS.

Interest rate, Australia, 90 day bank bills, financial year, calendar year calculated, ABARE. Electricity cost index, Australia, base 1990, financial year, calendar year calculated, ABS 6411.0.

Marketing cost index, calculated as $(0.75 * \text{Wage}) + (0.1 * \text{Electricity}) + (0.15 * \text{Interest})$, both calendar and financial year, base 1990.

Meat products data

Retail prices for meat, c/kg, calendar year, ABARE.

Farm prices for livestock except chicken, c/kg, calendar year, ABARE.

Farm price for chicken, average unit gross value of livestock slaughterings, poultry, financial year, A\$ per bird, converted to c/kg by average carcass weight and to calendar year, ABS 7503.0.

Production and aggregate domestic consumption, kt carcass weight, calendar year, ABARE and MLA.

Meat models estimated on a calendar year basis.

Grains and oilseeds products data

Retail prices, price for various pack sizes converted to c/kg, converted to financial year, ABARE and ABS 6403.0.

Farm prices, unit gross value of production, A\$/t converted to c/kg, financial year, ABARE and ABS 7503.0.

Production and aggregate domestic consumption, kt, financial year, ABARE (no reliable consumption data for rice or maize).

Grains and oilseeds models estimated on a financial year basis.

Fresh fruit and vegetable data

Retail prices, c/kg, financial year, ABARE and ABS 6403.0.

Farm prices, average unit gross value of principal crops, A\$/t converted to c/kg, financial year, ABS 7503.0.

Production, kt, financial year, ABARE and ABS 7503.0.

Aggregate domestic consumption, apparent per capita consumption, kg/head, financial year, converted to aggregate consumption, ABARE and ABS Fruits Australia.

Fruits and vegetables models estimated on a financial year basis.

Appendix 2: Summary statistics of real marketing margins, c/kg, base 1990

	Mean	Std Dev	Minimum	Maximum	CV
<i>Meat products, n = 27</i>					
Beef	733.64	65.92	606.26	901.90	0.09
Lamb	440.94	40.09	366.52	536.05	0.09
Pork	483.71	45.40	398.65	563.17	0.09
Chicken	189.00	55.83	84.55	260.21	0.30
<i>Grains products, n = 21</i>					
Rice	106.52	25.29	79.24	151.42	0.24
Bread	173.90	9.86	150.95	192.16	0.06
Margarine	296.41	61.35	230.21	472.20	0.21
Breakfast Cereal	410.14	64.12	327.27	504.85	0.16
<i>Fresh fruit, n = 17</i>					
Orange	111.13	14.71	89.03	141.28	0.13
Banana	104.20	35.30	34.84	164.22	0.34
<i>Fresh vegetables, n = 17</i>					
Potato	60.25	12.33	42.49	79.59	0.20
Tomato	225.92	31.14	172.27	302.03	0.14
Carrot	97.79	22.03	79.10	158.35	0.23
Onion	77.06	18.48	51.41	118.52	0.24

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