Antitrust analysis of supermarkets: global concerns playing out in local markets

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This paper reviews the basic components of antitrust analysis for the supermarket industry, including definition of product and geographic markets and the measurement of market power. The analysis of prices and profits in a market structure context remains important, especially in countries such as Australia with very high supermarket concentration. Firm and brand level New Empirical Industrial Organisation models of demand and oligopoly pricing also provide insights for evaluating antitrust claims. Recent research on vertical pricing games and price transmission expand the analysis to market channel pricing issues, including coalescing power by supermarkets and food manufacturers. The issues and approaches explained in this paper are relevant for policy-orientated research on supermarkets worldwide, including Australia.

Key words: market concentration, market definition, Nash–Bertrand conduct, price–cost margin, price transmission rate, unilateral and coordinated market power.

1. Introduction

Supermarkets are truly a global phenomenon. Over the past decade, food systems seem to be converging towards a hybrid of North American and European practices. European researchers predict that as few as three or four truly global multinational supermarket companies, for example, Carrefour, Royal Ahold, and Wal-Mart, will serve as channel captains for the distribution of food to consumers worldwide (e.g., Wrigley *et al*. 2005). Whether or not this degree of consolidation occurs remains an open question. Given the trend towards few large supermarket firms in many developed economies, one has an increasing need for antitrust analysis. Trusts (monopolies and cartels) at the advent of the 20th century gave rise to the antitrust movement in law and economics. Antitrust analysis is more specific than research on pricing and general industry performance. It is directed at analysis of the status of competition with the intent to enforce a country's competition laws.

The primary thesis of this paper is that antitrust analysis of supermarkets is a global concern; however, a common economic approach plays out in local markets rather than the global economy. There is considerable research on the Australian situation. Griffith (2004) and the Parliament of the Commonwealth of Australia (1999) review supermarket performance and discuss

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policy options. The Australian supermarket industry is now dominated by two large chains, Coles and Woolworths. Although Australia is a very large country, only a relatively small area is densely populated and at 20 million, its population is less than half that of Great Britain or California. When combined with the prerogatives of distribution efficiency and management scale economies, it is not surprising that the Australian supermarket sector is highly concentrated. One can find similar concentration levels in similar-sized population areas of the USA and UK.

Antitrust or competition laws are designed to deter non-competitive conduct in such industrial structures. A key issue is the definition of relevant 'antitrust markets', which can be different from the general conception of the scope of an industrial market. The size of the market to a large extent determines firm market shares that in turn can influence the pricing power that firms have. Antitrust analysis is also concerned with possible efficiencies and variations in quality, including product variety that may come with large-scale, even dominant firms.

This paper reports on antitrust research in the USA and UK and suggests avenues for research on Australian supermarkets. It is organised as follows. First, horizontal antitrust analysis is reviewed. Important subtopics include product and geographic market definition, market structure, and the measurement of unilateral and coordinated market power in empirical models that can also measure the price impact of cost efficiencies and variation in the quality of the retail offer.[1] Then the focus is on vertical market channel issues. This includes vertical market pricing, vertical foreclosure, the exercise of buyer power by supermarkets, and price transmission in imperfectly competitive market channels.

2. Measurement of horizontal market power in the supermarket industry

Market power allows a firm to set price and other terms of trade rather than responding to price and other terms that are set by the market's 'invisible hand'. Market power is an issue in horizontal and vertical merger policy in nearly all countries. Mergers that tend to substantially lessen competition, that is, increase the exercise of market power, are often prohibited (US DOJ 1984; FTC and DOJ 1997; ACCC 1999; Commission of the European Communities 2004). Monopolisation and anticompetitive pricing practices, including dominant firm pricing and price fixing cartels, are other areas of concern.

2.1. Market definition and concentration in relevant antitrust markets

The relevant market for measurement of horizontal market power has two dimensions: product and geographic. The US Federal Merger Guidelines

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[1] A more comprehensive review would include research on barriers to entry (Cotterill and Haller 1992) and the effect of financial leverage on product market competition (Chevalier 1995).

find a set of products or a geographic area to be an antitrust market if a hypothetical monopolist who controls all commerce in the set or area can elevate price by a small, but significant non-transitory amount in a profitable fashion. (FTC and DOJ 1997, p. 6). In other words, buyers lack alternative sources of supply that would defeat the price increase.

Since 1979, the US Federal Trade Commission (FTC) has maintained that supermarket sales are the relevant product market for supermarkets, not some broader category of food purchases. Today, the supermarket sales product market definition includes the supermarket component of hypermarkets, such as Wal-Mart supercentres, but it does not include sales from wholesale or club stores, such as Sam's, Costco, or BJ's, or limited assortment stores, such as Aldi. The UK Competition Commission has confirmed a similar product market definition process for analysis of market power questions in the UK supermarket industry. 'We conclude that the market is for one-stop grocery shopping carried out in stores of 1400 square metres (about 15 000 square feet) or more' (Competition Commission 2000, p. 2).

The Australian Parliament's study of food retailing 'Fair Market or Market Failure' took no position on the relevant product market, but noted that it had a strong influence on the position of the nation's top three chains. The Woolworths, Coles, and Franklin supermarket chains captured only 43 per cent of 'total take-home food and liquor' (The Parliament of the Commonwealth of Australia 1999, p. 41). The Parliament of the Commonwealth of Australia (1999) used census data to find that the (then) top three supermarkets had 75.4 per cent of the grocery market (includes smaller stores and convenience stores) in 1997–1998. Neither of these conforms to current US or UK product market definition for supermarkets. In 2005, with the demise of the third ranked chain, Franklins, the top two, Coles and Woolworths, account for over 75 per cent of grocery sales and an even higher share of supermarket sales in Australia.

Geographic markets for the sale of supermarket products are inherently local, not regional or national. Most consumers frequent supermarkets within a few kilometres of their home. 'One-stop shopping patterns are primarily local with consumers rarely traveling more than 10 min in urban areas and rarely more than 15 min elsewhere to do their main weekly shopping' (Competition Commission 2000, p. 2). Store trading areas, however, overlap in urban areas. Geographic barriers such as rivers, demographic barriers such as racially segmented urban neighbourhoods, and the population density in urban areas are features that define geographic markets that are larger than individual store trading areas but smaller than large metropolitan areas. Newsprint advertising circulation areas can also affect the geographic scope of supermarket competition. Some large metropolitan papers have different advertisement sections for different sections of the metropolitan area.

As in other countries, Australia's supermarket concentration in many cities is even higher than national concentration (see The Parliament of the Commonwealth of Australia 1999, p. 14 chart). Further research to refine product

and geographic market definition in Australia is critical for analysis of competition. Consumer surveys that analyse where groceries are purchased and consumer switching conduct among large supermarket, convenience stores, and other food outlets are feasible and desirable. One must also measure price and quality perceptions and correlate them to switching behaviour to obtain insight on the ability of any groups of firms in a particular area to elevate price profitably. In the USA and Europe, A.C. Nielsen and Information Resources Inc. maintain very large household panel databases that are useful guides to market definition. Supermarket operators also routinely analyse the trade area for individual stores to determine where and under what conditions consumers shop at the store. Without access to such databases, a researcher can conduct on-site, mail, or telephone surveys targeted to a particular metropolitan area to determine the market landscape. A researcher can also examine supermarket advertising conduct in newspapers to obtain insight on market scope and pricing conduct.

2.2. Competitive effects analysis

Only recently have European and Anglo-American analysis of market power effects converged to a common framework. Traditionally, Anglo-American analysis focused upon what is now called coordinated effects (FTC and DOJ 1997). Today in Washington, the unwritten rule is that one needs at least three firms in an antitrust market for effective competition, that is, no coordinated effect problem. Ivaldi *et al*. (2003a) describe how US and European Union antitrust agencies currently analyse coordinated effects. High concentrations, with high barriers to entry, are necessary but not sufficient to establish tacit collusion. The agencies look for facilitating practices that have no justification in a competitive market as evidence of deviation from competitive conduct.

In the European Union, the original antitrust focus was on what is now called unilateral effects. Recently, the dominant firm approach has been generalised to analyse margins and more generally market power in differentiated product markets (Ivaldi *et al*. 2003b). As the number of firms (brands) in a differentiated product market declines, a firm's perceived demand curve becomes less elastic and the optimal price and price–cost margin increases. A firm (brand) manager unilaterally elevates price, thereby creating an antitrust injury without tacit or explicit collusion. Hausman *et al*. (1994) demonstrates how to estimate and use elasticities to determine whether a merger is between brands that are close substitutes and so leads to elevated prices. This model is sufficiently flexible to include estimates of merger-related cost savings and their impact on pricing. As we show below, this approach to differentiated product pricing can address supermarket as well as food manufacturer pricing power.

Returning to the retail supermarket industry, empirical analysis over the past 30 years illustrates how much, or how little, we know about coordinated

and unilateral effects in local antitrust markets and how analysis of market power has evolved. Marion *et al*. (1979) designed a study of the supermarket industry for the Joint Economic Committee of the US Congress to evaluate the Demsetz efficiency as well as the market power hypothesis. Using local market price–cost margins for individual chains, they estimated several concentration–profit models. They generally found positive and significant relationships in several different datasets, including one that focused upon the profitability of a single firm's operations (A & P) across many local markets. Such intrafirm studies focus most squarely on local market power and efficiency effects because they abstract from interfirm variation in accounting and financial practices, managerial practices, vertical integration, buying power, and also quality and product variety issues such as private label, store layout, and merchandising practices.

To determine whether the higher profits in more concentrated local markets was due to market power or the Demsetz efficiency of large firms, Marion *et al*. (1979) constructed and analysed local market price indices and found a positive and significant relationship between a firm's price level and concentration.[2] Higher prices, not Demsetz efficiency, was the source of higher profits in larger firms in more concentrated markets.

Since then, concentration–price studies in several other local market industries report similar results. In response, Demsetz and others advanced what has become known as the Demsetz quality critique. They note that a positive concentration or market share price relationship could be due to larger firms having higher quality products in a differentiated product industry such as food retailing (Anderson 1993). Cotterill (1986), however, finds a strong intrafirm share–price relationship for each of two supermarket chains that operated in several local markets. Since 'quality' is reasonably uniform across a chain store's operations in several local markets, these share–price correlations are not due to quality. Cotterill (1999) explicitly modelled quality (store characteristics and service levels) jointly with prices in a simultaneous equations system to test the Demsetz quality and market power hypotheses. Controlling for quality effects, concentration, and market share continued to be positively related to price.

Very few of these concentration–price studies controlled for market structure endogeneity. Yet Froeb and Werden (1991) found that the bias in price studies likely results in an understated concentration–price relationship.

In *FTC v. Staples*, no relationship was found between market share and price at the store level; however, a strong positive relationship existed when the market was defined as a larger urban geographic area (Baker 1997). The

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[2] Many commonly available price indices, such as the US Consumer Price Index, are not constructed in a fashion that measures antitrust price phenomena. One must measure prices on a fixed set of products, and one must aggregate them into weighted price indices that reflect the importance of each product in the representative consumers' grocery basket. Geithman and Marion (1993) is an excellent source for understanding price aggregation procedures.

UK Competition Commission curiously tested only store-level models. They report that local market structure matters for pricing at Tesco, but not Safeway. Sainsbury, the other leading UK chain, submitted no store-level price data (Competition Commission 2000, p. 128). Intrigued by the Competition Commission's finding, Dobson and Waterson (2005) have developed a model that identifies strategic conditions that determine when a chain will set 'national' prices that apply uniformly across all of their stores. Uniform national pricing is *de facto* evidence of the exercise of pricing power because it ignores local market demand and cost conditions.

Today, the cross-section concentration–price method still has traction, and as explained below is a serviceable approach for Australia. Supermarket price research in Australia might begin by determining whether, and how, a chain varies prices among its stores and the urban areas where it operates. If scanner data are not available, one can assemble prices on a basket of food items to compute a price index by resorting to survey research. One could construct a consumer panel and track food purchases. Alternatively, one can price check different stores, or monitor media advertisements to measure the degree of competition via trade promotions in different local market areas. When combined with measures of market share, concentration, and other market characteristics that are more readily available, one can provide case studies if not cross-section econometric analysis of competitive vigour in the Australian supermarket industry.

With the advent of New Empirical Industrial Organisation (NEIO), reduced form analysis of market, structure profit and price relationships such as those discussed above fell out of favour. The Fisher–McGowan critique of accounting measures of profitability – essentially an assertion that one can never use accounting profits to measure economic profits – was one of the primary reasons for the advance of structural econometric NEIO models of demand and cost conditions to estimate price–cost margins and use them as indices of market power. NEIO research is often classified as first or second generation. First-generation studies focus upon the following: homogeneous products aggregated to the national level, and a census industry category that is often larger than the relevant antitrust product market. Readily available data, rather than economic theory or the policy issue, typically drive this choice. Such aggregate NEIO analysis requires restrictive assumptions that limit its usefulness for antitrust analysis. To aggregate across firms, one must assume a homogeneous product and Gorman polar firm level cost functions wherein firms have constant and identical marginal costs. If one relaxes the Cournot conduct assumption to estimate a conjectural variation (CV) parameter, or more generally a 'market power parameter', to avoid the recent critique of CV models (e.g., Kim and Knittel 2004), all firms in these aggregate homogeneous product models in equilibrium must have the same CV parameter value. The constant cost and CV power parameter assumptions imply equal market shares. In fact, in most industries market shares are not equal. Some CV models estimate a conjectural elasticity parameter. Then, in

equilibrium, the product of a firm's market share and its CV parameter are equal across firms. This means that a large share firm must have a lower CV, also an unattractive constraint.

Often NEIO studies must make other assumptions to accommodate aggregate data. For example, in an analysis of market power in the Australian retail meat sector Hyde and Perloff (1998) assume that Sydney retail and wholesale meat prices measure national prices to analyse national meat disappearance data. For a study of retail market power, one would have a more relevant study if they had found quantity data for Sydney, and analysed market power in that well-defined market. This study implicitly assumes that Sydney meat prices hold in all other Australian cities.

Recent 'second-generation' NEIO research goes beyond homogenous product markets and aggregate industry-level estimation to analyse individual firm- and brand-level pricing conduct in differentiated product markets. This is the unilateral effects approach introduced earlier. Firm- and brand-level scanner data for food products permit estimation of a brand-level price elasticity matrix. To date, most studies focus upon only unilateral effects by using an estimated demand system to recover price–cost margins and simulate a merger impact assuming Nash–Bertrand conduct. Early examples that focus on market power at the manufacturer level are Hausman *et al.* (1994) for beer and Cotterill (1994) for breakfast cereal. These two studies and many subsequent brand-level studies (e.g., Nevo 2001) use panel data features to specify retail prices in other cities as instruments for endogenous retail prices.[3] They do not specify and estimate the supply side (first-order conditions) of the oligopoly problem. If one specifies the supply side, that is, uses classical exogenous cost-shift variables to identify the demand system, then one can measure coordinated as well as unilateral power effects (e.g., Cotterill and Samson 2002). Coca Cola, for example, may elevate prices because it knows others will follow its lead in addition to elevating prices because of brand loyalty captured by relatively inelastic demand, holding other prices constant. In models with a 'supply side', one can also test for alternative pricing games, including Nash–Bertrand or Stackelberg conduct.

Two second-generation NEIO studies have addressed supermarket pricing power. Cotterill *et al.* (2000) analysed the demand for aggregate national brand and private label products with a huge and very comprehensive dataset from 125 food categories (nearly all packaged grocery products) and 59 local markets. To pool and compare prices across categories such as apples and oranges, they used a logarithmic first difference model. These data measure percentage change between 1991 and 1992 in price, quantity, and other variables, and thus can be pooled across products. On the supply side, they estimate reaction functions to analyse pricing interaction between branded and private

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[3] For a critique of this approach see Bresnahan (1997).

label products. Four-firm grocery concentration is specified in both reaction functions to test for higher price levels in more concentrated local retail markets. They report a positive and significant (5 per cent) relationship between the percentage change in branded price and the change in grocery concentration between 1991 and 1992. For private label price, the relationship is positive and significant at the 1 per cent level. Moreover, the coefficient in the private label equation is twice the coefficient in the national brand equation. Supermarket retailers in more concentrated markets use their market position to increase profits from the sale of private label. This result is consistent with leading supermarket chains using private label to bargain for lower wholesale national brand prices and thus optimising profits in the category by increasing brands prices less than private label.[4]

In another second-generation NEIO study, Smith (2004) adapts the discrete-choice demand model to analyse spatial unilateral pricing power at the store level by supermarket chains. Smith combines data on known firm price–cost margins for the total UK with two other datasets, one on store characteristics for each supermarket in a smaller study area and the other on the food shopping behaviour of 115 000 consumers in the study area. He estimates the equilibrium price for each store as well as own and cross-price elasticities at the store level. Smith finds that demergers in local markets (splitting up multistore holdings of a chain in local markets) reduce prices between 2 per cent and 3.8 per cent in the UK markets that he investigates. Mergers between various pairs of firms increase prices as much as 7 per cent.

To close his model, Smith makes several restrictive assumptions. For example, he assumes that a consumer makes only two shopping trips each week, one to a supermarket for main needs and one to a convenience store for fill-in needs, and that these two trips are independent events (Smith 2004, p. 240). How sensitive his model is to such assumptions is unknown.

This study rejects the Fisher–McGowan critique and uses accounting profits to estimate prices.[5] The use of aggregate (at the national UK level) accounting-based price–cost margins to estimate pricing in individual supermarkets, however, is a far reach. His analysis would benefit from access to disaggregate local firm-in-market level accounting price–cost margins.

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[4] Most recent research on national brand (NB)–private label (PL) pricing does not focus on the impact of supermarket concentration or a chain's market position in a local antitrust market. It analyses the impact of private label share of category sales on private label and national brand prices (Bontemps *et al*. 2005 and papers cited therein). One exception is Bonnano and Lopez (2005). They analyse NB–PL pricing at the chain level with panel data (24 chains in 10 markets for 58 quad-week periods) and they do specify a chain's local grocery market share, a measure of the chain's market position. Their study, however, is only for one product category, milk. They find no relation between market share and PL or NB whole milk prices. They find that larger market share firms have significantly lower NB prices for reduced fat milk, but PL prices are unaffected.

[5] Nevo (2001) and Hausman (1997) also use accounting price cost margins, but in a different fashion.

Smith's resurrection of accounting price–cost margins, however, suggests that examination of price–cost margins at the store, firm, and market level and their relationship to market structure is useful if carefully performed. The impediment of course is access to such sensitive data. Research in this area, however, is possible if a governmental agency obtains such data and wishes to have it analysed for policy purposes.

3. Vertical market power

The sequence of markets and industries between farmers and consumers also has important implications for antitrust analysis. As in the horizontal dimension, the two primary dimensions of performance are efficiency and market power.

3.1. Vertical pricing games

Vertical pricing strategies can take several different forms. The simplest vertical models are those that assume fixed or proportional mark-up conduct by retailers. In these models (e.g., Hausman *et al*. 1994 and Sexton *et al*. 2005), one uses estimates of the retail demand function to obtain up-channel-derived demand estimates without formally testing for retail pricing strategy. Froeb *et al*. (2004), however, explain that the FTC now rejects fixed and proportional retail mark-up models when analysing mergers between branded product manufacturers. They declare: 'Retailers do not play the passive role … , i.e., simply marking up the wholesale price of goods to cover their costs' (p. 368).

Cotterill and Putsis (2001) test for proportional retail mark-up, vertical Nash, or manufacturer Stackelberg conduct for national brand and private label products in each of six categories across 59 local markets for 1991 and 1992. They generally reject proportional mark-up behaviour by retailers and find that vertical Nash conduct is more common than manufacturer Stackelberg conduct for private label than branded products. This is consistent with the general understanding that brand manufacturers have more knowledge about retailers and more pricing power than private label manufacturers. Several recent studies formally specify and test alternative vertical pricing models. Cotterill and Dhar (2003) find, for fluid milk, that vertical Nash pricing is not significantly different from a fully coordinated (vertically integrated) model of pricing. Villas-Boas (2005), for yogurt, rejects vertical Nash and fully coordinated price in favour of a non-linear pricing model where manufacturers price at cost on the margin, but extract higher returns from inframarginal units via fixed fees or a quantity discount scheme. Asker (2005) examines exclusive dealing contracts in the US beer distribution channel and finds no vertical foreclosure effects that damage brewers that do not have exclusive distribution systems.

3.2. Vertical pricing: coalescing power and buyer power

With his theory of countervailing power, J.K. Galbraith (1952) argued that the solution to power on one side of the market was to develop power on the other side. In the resulting bilateral monopoly situation price, and other terms of trade, are indeterminant but for bargaining. Walter Adams (1987) and others, however, have argued that concentration on both sides of a market would produce coalescing power, that is, the adversaries would combine to effectively increase the exercise of power against others in markets up or down the market channel.

Dobson and Waterson (1997) analyse these two competing hypotheses for the UK supermarket industry. Their theoretical analysis begins with the premise that manufacturers and supermarkets are locked in a bilateral monopoly situation in the wholesale market, that is, countervailing power exists. When supermarkets also have market power in the retail market, they demonstrate that coalescing power is the outcome in the wholesale market and consumers pay higher prices (p. 428). They did not analyse the symmetric issue for the raw product market; however, if manufacturers have buyer power there one would expect a symmetric result. Coalescing power between retailers and manufacturers would lower raw product prices to farmers.

There are relatively few empirical studies of supermarket buying power. Recently, Sexton *et al.* (2005) analysed supermarket buyer power in perishable fresh produce markets where growers sell directly to supermarkets. They assume that retailers sell in competitive markets and that retailing marginal costs, except for the wholesale produce price, are fixed and constant for the duration of their 2 year sample. Thus, the derived wholesale demand curve is parallel to the retail demand curve. With this 'no power at retail' channel specification they specify a countervailing power bargaining model of imperfect competition in the wholesale produce market. It predicts, and they empirically observe, that the retail–wholesale (farm) price spread increases with the volume of produce marketed. In their model this is due to increased supermarket buying power when supplies are ample. Sexton *et al.* (2005) had scanner data for 20 chains in six cities; however, they aggregated it to national time series data. A disaggregate, chain-level analysis would provide interesting detail on the type of chain that is able to exercise buying power. Also, if one relaxes the perfect competition at retail assumption, their estimated imperfect competition parameter would capture seller as well as buyer power. In that case, their positive share margin could also be due to seller power.

The exercise of supermarket buyer power against farmers through food manufacturers is even more complex. Consider the possibilities of vertical market foreclosure. First, we describe how vertical foreclosure can affect consumers. Then we will consider its impact on farmers.

A dominant retail firm can extract cost concessions from a food processor that effectively force a dominant processor to charge other retailers higher

wholesale prices. Rather than use its cost advantage to start a price war at retail to damage competitors, the advantaged dominant retailer can elevate prices so that competitors, whose costs are higher, make more not less profits than before. The dominant firm's price leadership scheme also increases its own profits and the profits of the processor (from higher priced sale to the retail fringe firms). This is a coalescing power result against consumers.

This situation has existed in the New England fluid milk market in the USA since 2000 (Cotterill *et al*. 2003). Royal Ahold, via its Stop and Shop supermarket chain, has had a dominant market share at retail (50 per cent) primarily because of horizontal mergers during the 1990s. In 2000, it closed its milk plant and negotiated a 20 year strategic alliance with the Dean Foods milk processing company that thereafter supplied over 80 per cent of New England supermarket milk.

In 2003, Stop and Shop paid the raw market price plus 53 cents per gallon for milk delivered into its stores. Competing supermarket chains pay 10 cents per gallon more for the same supply. Stop and Shop has led prices up so that retail margins over the past 5 years are $1.50 per gallon. In-store marginal costs are 20–25 cents per gallon and fully allocated costs are 40–50 cents per gallon. Therefore, all supermarket chains are capturing approximately $1 per gallon as a power premium and the processor earns a share as well.

This coalescing power was also used against farmers. Big Y, a large regional supermarket chain that initially opted to receive its milk from the number three fluid processor, recently threatened to switch to the dominant processor if it could not pay a lower wholesale price. The demand was so substantial that the processor went to its farmer cooperative supplier and demanded a lower raw milk price. Agri-Mark, the threatened regional co-op with over 1400 members, could not sell to Dean Foods because a competing national cooperative has a nationwide full supply contract with that dominant processor. To keep their fluid market, in this situation, farmers in the regional cooperative cut price. This is positive proof that when it comes to the exercise of buyer power against farmers, the truth may often be found in analysis of the institutional details at the firm level in relevant antitrust markets, rather than in aggregate national analysis.

3.3. Price transmission in an imperfectly competitive market channel

When farm prices drop and retail prices do not follow, policy concerns about non-competitive food marketing channels surface in agricultural and antitrust policy areas. For example, this is a major concern of dairy farmers in the USA (Cotterill *et al*. 2003) and in Australia. In the UK, one of the main reasons for the Competition Commission study of supermarket retailing was 'a public perception of … an apparent disparity between farm and retail prices … which is seen as evidence by some that grocer multiples were profiting from the crisis in the farming industry' (Competition Commission 2000, p. 3).

In his classic article, Gardner (1975) develops the price transmission model for a competitive market channel. Gardner demonstrates that even if farm production and the marketing industry are perfectly competitive and if constant returns to scale exists in marketing, there is not a unique and stable relationship between farm and retail prices. In other words, there is no sound economic reason to expect that retail prices should be related to farm prices. One response to Gardner has been a concerted effort by empirically orientated economists to ascertain under what more restrictive conditions one could estimate the relationship between farm and retail prices and be confident that the empirical result captured economic behaviour.

The most common approach is Hein's (1980) model. Hein assumes perfect competition, constant returns to scale, and fixed proportion production technology in the marketing industry. He also assumes a perfectly elastic supply of non-farm inputs to the marketing industry, unidirectional shocks to the system that emanate from shifts in the farm supply curve, and static equilibrium.

Under these conditions, Hein constructs a fixed-mark-up model for aggregate (vertically integrated) market channel firms that process and retail product to consumers (Hein 1980, pp. 11, 14). Since the model has a fixed mark-up, the price transmission rate depends only on the Leontieff production coefficient for the agricultural input. If it takes one unit (0.5 units) of raw product to produce a unit of finished product (e.g., milk) then the price transmission rate is 100 per cent (50 per cent).

McCorriston (2002) was among the first to present a model of price transmission in a non-competitive multistage market channel. He specified two successive industries, manufacturing and retailing in a NEIO quantity CV model; however, he continues to assume a homogeneous product. With linear demand and constant marginal costs, double marginalisation in this type of model produces a 50 per cent transmission rate for each monopolist and a 25 per cent channel transmission rate. Logarithmic demand with constant own price elasticity in conjunction with constant marginal costs always produces price transmission rates in excess of 100 per cent.

Cotterill (1998) uses Bertrand conduct oligopoly models to analyse price transmission in a differentiated product market. Price, rather than quantity, is the strategic choice variable. In these models, a second-order derivative, the derivative of the own price elasticity, determines whether price transmission in an oligopoly is less or greater than 100 per cent. Cotterill also finds that price transmission is always greater than 100 per cent in non-competitive markets where a firm chooses to maximise brand sales given a desired target level of profits, including a loss leader strategy.

Two important conclusions follow. First, for policy analysis if one assumes perfect competition in constant cost industries, all benefits of agricultural policy deregulation flow to consumers when in fact a significant portion may remain with non-competitive channel firms. Second, one must use a more flexible demand system to measure market power and price transmission than the linear, logarithmic, or semilog demand specification that is used in

many NEIO models. Using an LA/AIDs model and estimation results for the carbonated softdrink industry, Cotterill (1998, p. 12) shows that cost pass through rates range from 73 per cent for Royal Crown cola to 107 per cent for Coca Cola and 110 per cent for private label. Kim (2004) specifies and estimates a discrete choice demand model for brands of American cheese in the USA. He reports price transmission rates as low as 30 per cent.

Another functional form that nicely fits price transmission analysis is the generalised Box–Cox demand model. One can estimate the Box–Cox transformation parameter, λ, and different values give different functional forms ranging from linear (50 per cent) to semilogarithmic (100 per cent) to log–log (greater than 100 per cent), cost pass through rates. Bettendorf and Verboven (2000) specify a model with a Box–Cox demand form for the Dutch coffee industry; however, they were not able to estimate λ. Instead they fix it at the linear, quadratic, and full logarithmic demand form values, estimate and compare results. Moreover, their results are not at the brand or firm level and the coffee industry is clearly differentiated. They use a Cournot conduct, homogenous product model at the market level to analyse price transmission because only aggregate data were available.

4. Implications for research

Clearly, the most important conclusion from this review of market power in food marketing channels including the supermarket industry is the need for disaggregate analysis at the relevant product and geographic market level and at the firm or brand level in those antitrust markets. Econometric studies are certainly desirable; however, case studies of firm conduct in relevant antitrust markets also provide credible evidence. If products are differentiated, this feature should also be incorporated into either type of study.

The Fisher–McGowan critique of accounting profits has always been questionable. After all if accounting profits say nothing about economic profits then the world's capital markets are a fantasy and capitalist economies are rudderless. Recently three leading NEIO studies have used accounting price–cost margins. Although out of fashion for 25 years, careful analysis of price–cost margins at the brand, or firm, as well as the market level can provide insight on market power, quality, and efficiency questions. Reduced form models that analyse price levels in local market industries such as supermarket retailing have never gone out of style; however, relatively little research has been carried out in this area over the past 10 years in Australia or elsewhere. The marginal return for research based on manual price checking of a few firms across a few local markets could be significant.

Research needs to identify and examine the vertical pricing games being played and evaluate the impact on manufacturer and retail margins, farmers and consumers. Most of the business-orientated literature on vertical strategic alliances and value chain management focuses only on efficiency and ignores market power.

Price transmission in non-competitive market channels needs considerably more research. One way to proceed would be to compute the price transmission rates that are implicit in NEIO studies that estimate price–cost margins as power indices. It would be interesting to reveal the constraints on price transmission in these models. Future NEIO models should be sufficiently flexible to allow for price transmission above or below 100 per cent.

The changing structure of the Australian supermarket industry and changes in Australian agricultural policies, including deregulation of milk prices, provide ample opportunity for policy-orientated research along the avenues discussed in this paper. The performance of large food firms and markets in the farm-to-consumer channel is of interest to all stakeholders: farmers, food firms of all sizes, consumers and government oversight agencies.

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