The Economic and Social Review, Vol. 30, No. 1, January, 1999, pp. 71-90

A Rationale for Repealing the 1987 Groceries Order*

PATRICK PAUL WALSH
Trinity College Dublin and Katholeike Universteit Leuven
and
CIARA WHELAN
London School of Economics and Katholeike Universteit Leuven

Abstract: A ban on pricing below cost was implemented under the 1987 Groceries Order based on the premise that loss leading used in multi-product retail pricing distorts competition and exploits consumers in the short run, while driving a more concentrated structure and reducing welfare in the long run. Loss leading is examined for multi-product retailers selling in imperfectly competitive market niches with imperfect consumer information. We develop a theoretical argument in a simple two-stage framework that illustrates how loss leading on a subset of products is an equilibrium outcome of price competition that leaves overall welfare equal to that observed under *laissez faire*.

I INTRODUCTION

The practice of below-cost pricing in multi-product retail markets has attracted a great deal of controversy regarding its appropriate legislative treatment under competition law. The dilemma facing anti-trust authorities is evident in the differential legal treatment of below-cost pricing across different countries. Restrictions on the specific practice of below-cost pricing are in place in Ireland, Belgium, France, Luxembourg, and Portugal. No such restrictions

*Patrick Paul Walsh is a member of the Department of Economics, Trinity College, Dublin and LICOS, Centre for Transition Economics, Katholieke Universiteit Leuven. Ciara Whelan is a member of The Economics of Industry Group, STICERD, London School of Economics and LICOS, Centre for Transition Economics, Katholieke Universiteit Leuven. We are grateful to Frank Barry, Jozef Konings, Francis O'Toole, Michael Waterson and anonymous referees for their comments.

exist in Denmark, Germany, Spain, or Italy. The problem arises in distinguishing between below-cost pricing activities that are a legitimate outcome of the competitive process, and those that are inherently anti-competitive with adverse consequences for market structure and welfare. We consider this problem in the context of the Irish retail grocery market, where the practice of below-cost selling is explicitly prohibited under the 1987 Groceries Order on the basis that such pricing strategies drive a more concentrated market structure and are welfare reducing. The following section traces the structural evolution of the Irish groceries market from the 1970s to its current dual configuration, where separate "one-stop" and "convenience" markets comprise the core feature of urban areas. Within this setting, the justification for the introduction and maintenance of the ban on below-cost selling in the Irish grocery market is outlined in Section III.

In Section IV we confirm that loss leading can be an equilibrium outcome observed under conditions of imperfect competition between firms and imperfect consumer information over products. The pertinent issue is whether loss leading on "Known-Value Items" justifies intervention in the form of price controls. Is it a form of predatory pricing or price discrimination that reduces long-run welfare, or is the market self-correcting, in that rivals discipline each other through strategic interactions to leave welfare at the full information level? We consider this issue within the second best world of imperfect competition and consumer information.

II DUALISM IN THE IRISH GROCERY MARKET

Historically the Irish retail grocery market was characterised by a fragmented structure with a large number of small independent retailers competing for a common consumer base. However this sector has experienced mass structural upheaval since the development of supermarkets in the 1970s. In contrast to the structure of earlier decades, modern grocery retailing is highly concentrated with the top 5 per cent of outlets accounting for almost 70 per cent of total food turnover as illustrated in Figure 1. Market share data in Table 1 show Multiples, which describe larger supermarkets operating with several branches, dominating in Dublin and other densely populated areas around the country. Symbol Groups[1] and Independent retailers dominate elsewhere. We observe that Multiples have not entered many regional areas where the catchment market in the surrounding areas is insufficient to justify their entry on a large scale. In these areas, Symbols and Independents jointly cater for both "one-stop" and "convenience" shopping. For this reason we focus on urban areas, which account for most of the turnover

1. Symbols define a subset of Independent retailers operating franchise outlets.

in the Irish Grocery Market, in our analysis of the ban. This analysis depends strongly on the argument that "one-stop" and "convenience" shopping are fundamentally independent markets, which we now justify.

The observed pattern of rising concentration noticeable in urban areas since the late 1970s is a natural outcome of demand and supply driven forces. Large scale retailing allowed the benefits of scale and scope economies to be reaped. Bulk buying, lower supplier distribution costs, and increased retailer power over suppliers created the possibility for the provision of a wider range of products at lower prices in supermarkets as compared with the traditional outlet. Price competition between supermarket retailers over the valuable "one-stop" shopper ensured that these efficiency gains were passed on to supermarket patrons. The demand for "one-stop-trolley" shopping was stimulated by the lower prices and wider product choice offered, in addition to developing consumer mobility and increased awareness of time as a scarce resource. The expansion of these productive and allocatively efficient supermarket outlets resulted in the exit of many smaller independent outlets over the 1980s as illustrated in Figure 2. It is noteworthy that the Independent share of the total market continued to decline in the years preceding 1996, even in the presence of the ban on below-cost selling implemented in 1987.

Independent retailing in urban areas has adopted a role that differs greatly from the traditionally defined independent store catering for all consumer needs, which can still exist in rural areas. Independent retailers now target a specific "convenience" niche of the market, providing longer opening hours and greater locational convenience for the consumer. In addition, these outlets tend to specialise in a range of products which can be described as non-routine items purchased on "impulse" such as confectionery, daily routine purchase items such as newspapers, and other non-routine "top-up" items bought at irregular hours in small quantities between supermarket visits. Consumers do not tend to buy a weekly supply of these types of good in a "one-stop" supermarket shop. Independents are an important distributing outlet for these commodities, as exemplified by the sale of confectionery where it is estimated that 60 per cent of adult purchases are on impulse and 67 per cent of total confectionery sales are through Independent outlets (*Checkout*, 1996). A market niche has therefore evolved for the smaller independent outlets in the urban grocery market.

It is clear that Multiples offer an entirely different product and target a different consumer base from the Independent sector. As a result, the grocery market in urban areas has evolved to a mature efficient dual structure where competition between Multiples in the "one-stop-trolley" market is largely separable from the smaller independent retail outlets who operate in their own "convenience" niche. Since the dual structure ensures the independence of these niches, we model competition between retailers operating within their relevant

"one-stop" or "convenience" niches of the market in our theoretical analysis of the Groceries Order.[2] It is a maintained assumption throughout this paper that the evolution of structure in the "convenience" niche is unaffected by the nature of competition between larger outlets selling into the "one-stop" market. As we highlight in the following section, this approach differs greatly from proponents of the ban who base their arguments on the assumption that both Multiples and Independents compete within the same market segments. While this may be the case in rural regions, these areas account for only a small proportion of total grocery turnover.

III MOTIVATION FOR THE BAN ON BELOW-COST SELLING AND THE IMPLICATIONS OF DUALISM

The presence of dualism in the Irish Grocery Market undermines the whole rationale behind the introduction of the ban. The persistent rise in concentration and the widespread practice of pricing below-cost on certain commodity items by large retailers led many to question the role which market forces actually played in the changing face of Irish grocery retailing. Many felt that larger retailers were using below-cost pricing, or a practice known as loss leading, to manage the market, leading to the exit of many medium and small retailers and reducing welfare in the long run. Loss leading occurs where a multi-product retailer earns very low/negative margins on certain items, which are compensated for with additional mark-ups on other products sold in the store. Due to the large range of items sold in a supermarket, up to 20,000 (*Checkout Ireland*, 1996), the consumer will only know the prices of a small proportion of these goods before entering a store. These goods are henceforth referred to as "Known-Value Items" (KVIs). The KVIs exhibit a high degree of consumer price awareness and are generally characterised by frequently purchased or staple products. The prices of all other goods, non-KVIs, are unknown to the consumer prior to entering a particular outlet. The information costs that are associated with finding out the relative price of non-KVIs in different outlets become a component of the switching costs for consumers. Once consumers have entered the outlet therefore, switching costs result in spatial market power that allows the retailer to extract large price-cost mark-ups on non-KVIs. These features allow retailers to sell certain items below-cost in an endeavour to attract consumers into the store, and to charge higher prices on other goods once the customer has entered.

The minority view of the Fair Trade Commission (FTC) in the 1991 enquiry to the Groceries Order felt that below-cost selling is "an artifice, a trick, or a

2. This assumes no competition between Multiples and Independents. Clearly there may be some degree of interdependence in urban areas, but this is small and not a predominant feature of the market.

gimmick … the purpose [of which] is essentially to mislead the customer" (Fair Trade Commission Report, 1991, pp. 117-118). The ability of larger retailers to price below cost in the years up to 1987 was thought to have had "distorting and anti-competitive effects" (FTC Report, 1991, p. 101). The 1980 Restrictive Practice Commission enquiry to the grocery trade concluded that should "concentration in the grocery trade advance in the future, …, then all factors which might increase the degree of concentration, including the practice of below cost selling, would have to be seriously reconsidered" (RPC Report, 1980, p. 34). The demise of H. Williams from the market and the spate of supermarket price wars that followed, finally instigated a ban on below-cost selling under article 11 of the 1987 Groceries Order in an effort to halt the spiral of rising concentration.[3] The pricing strategies of larger retailers and the predicted adverse effect that these may have for smaller outlets was the driving force behind the implementation of the ban. Proponents of the ban claimed that larger retailers manipulate consumers' imperfect information through competing aggressively on KVIs in order to attract market share, and compensating with higher margins on non-KVIs once the consumer has entered the store. This was deemed to be essentially predatory in effect, driving a more concentrated structure and reducing welfare in the long run.

The current mature dual configuration of the groceries market suggests that such a marketing device does not affect the structure of the Independent "convenience" niche in urban areas. Those who favour a prohibition of loss leading in the "one-stop" market in an endeavour to protect the "convenience" sector from annihilation are fundamentally flawed in their broad definition of the market, which assumes close competition between both of these niche segments. As argued above, this is not representative of the structure of the national market. The structure of the national market is an outcome of efficient restructuring induced by demand and supply side forces. These forces ensured the continued restructuring of the grocery market, even in the presence of the ban.

IV A THEORETICAL RATIONALE FOR LOSS LEADING

The analysis of the market in terms of its dual configuration dictates whether the ban on below-cost selling can be justified on sound economic principles. Can loss leading be considered a predatory activity that has adverse consequences for concentration structure and welfare within "one-stop" or "convenience"

3. With the exception of "best before" goods which have expired before the date of minimum durability and "seasonal" goods, article 11 applies to all grocery products that fall within the scope of the Order. These include (i) all goods for human consumption excluding fresh fruit and vegetables, fresh and frozen meats, fresh and unprocessed frozen fish; (ii) intoxicating liquor for consumption off premises and (iii) other household necessities usually purchased in a grocery shop.

segments of retailing? This is the real issue surrounding the desirability of a ban on below-cost selling. New theories on price discrimination in imperfectly competitive markets suggest that price dispersion across different market segments/products may in fact be a legitimate by-product of a competitive process.

Borenstein (1985) and Holmes (1989) outline the potential importance of both "Competitive-Type" and "Monopoly-Type" price discrimination in an imperfectly competitive market. A monopolist selling into markets differentiated by the elasticity of industry demand can increase revenues by price discriminating in favour of more industry elastic consumers. Pricing thus only takes into account the density of consumers that decide to buy, or not to buy, for a range of prices in the different market segments. In imperfectly competitive markets however, price discrimination can also reflect heterogeneity in consumer cross-price elasticities as dictated by the willingness and ability of consumers to switch between suppliers over a range of prices. This will lead to price discrimination favouring consumers with higher cross-price elasticities in an endeavour to protect market share. Where cross-price effects dominate pricing strategies in imperfectly competitive markets therefore, price discrimination is used as a means of defending market share rather than an instrument for extracting additional rent from the market.[4]

In the context of the Irish groceries sector, it is the ability of consumers to switch between alternative retail outlets that dominate pricing strategies. In the "one-stop" market, retail outlets are selected on the basis of value for money. Consumers display a high degree of price awareness and tendency to switch outlets on the basis of KVI prices. As a result, competition over the consumer base may induce price discrimination favouring the more cross-price elastic KVIs to protect market share. While retailers within the "convenience" niche are insulated from competition with other outlets to a certain degree by virtue of their location, "impulse" goods such as confectionery are less likely to be protected from competing forces than other "top-up" items. Independents are the main channel for the distribution of "impulse" items and contribute significantly to retailer turnover. For these types of good, most outlets carry a full range of brands that are closely monitored by the manufacturer. Consumers are able to switch between alternative brands and retail outlets at low cost and display a price sensitivity to this range of goods that is not present for other "top-up" items sold in Independent stores. Consumers exhibit a very low degree of price awareness on non-routine "top-up" products. As a result many Independent

4. The influence of consumer switching costs on resale pricing in imperfectly competitive markets is examined in Katz (1984), Borenstein (1991) and Shephard (1991). For an empirical distinction between competitive and monopolistic price discrimination, see Borenstein and Rose (1994), Guilietti and Waterson (1997) and Walsh and Whelan (1999).

retailers price very close to marginal cost on the cross-price elastic "impulse" products in an endeavour to maintain their customer base, while charging higher margins on more cross-price inelastic "top-up" items to earn rent. Multi-product retailers thus display a tendency to loss-lead on a certain range of cross-price elastic products as a strategy for maintaining the consumer base rather than as an instrument for extracting rent.

Bliss (1988) indicates that under the assumption of full consumer information, where all products are assumed to be KVIs, loss leading is not an equilibrium outcome that one should expect in a competitive environment among retailers. The question is whether this is an equilibrium outcome we can model, and if so, is it an outcome that is welfare reducing? As compared with Bliss (1988), we model competition between retail stores explicitly. Rather than just using a value for money constraint, we model competition between retailers over the consumer using the location model of Salop (1979) as our basic framework.

We adopt Sutton's (1991) two-stage framework in which the sub-game equilibrium solutions are derived through a process of backward induction. In the second stage we model price competition between multi-product retailers for a given number of outlets in the market niche. We focus on the impact of customer switching costs on pricing behaviour, since cross-price effects dominate retailer pricing strategies in order to maintain the consumer base in both the "one-stop" and "convenience" markets. Salop's (1979) circular road model is very conducive to modelling this effect in a multi-product setting. By setting the industry demand elasticity equal to zero, the circular road model allows prices to be driven purely by the cross-price elasticity of demand, which reflects the tendency of consumers to switch outlets. We exploit this to see how prices may vary over different product ranges supplied within the "one-stop" and "convenience" niches. The first stage of the game models the entry decision of potential entrants to the market. The potential entrants are assumed to fully anticipate both the irrecoverable fixed set-up costs and post-entry profits derived in the final stage.

The benchmark case derives the equilibrium outcomes under conditions of perfect consumer information where consumers are assumed to know the prices of all goods when choosing between the different outlets. We then examine the impact of imperfect consumer information on the equilibrium average price, concentration, and total welfare in the loss leading case, when retailers are free to loss-lead on a subset of goods. Finally, we examine the equilibrium outcomes in the imperfect information case in the interventionist case, where there are restrictions on price competition imposed by a ban on below-cost pricing. We use the terminology KVIs and non-KVIs in our description of the model to denote the cross-price elastic and cross-price perfectly inelastic commodities respectively.

The Benchmark Case

In the final stage of the game retailers select optimal prices for a given number of outlets in the market. We assume that N identical multi-product retailers each sell M different products within their defined niche. While the individual prices of these M goods may differ, they have an average price P and earn a payoff of π. Retailer surplus is thus defined as profit net of the exogenous sunk costs of entry, σ,

$$RS = \pi - \sigma; \quad \sigma > 0 \tag{1}$$

Consumers are located uniformly on a circle with a circumference equal to one where the density of consumers is assumed to be unitary around the circle. The outlets are located symmetrically around the circle and the corresponding distance between outlets is thus equal to 1/N. Consumers are modelled to have a transport cost, t, per unit of distance travelled, d, to each outlet located on the circle. Once a customer has selected an outlet they commit to purchasing one unit of each of the M goods sold. The utility of the representative consumer is given by,

$$U = \overline{C} - PM - td \tag{2}$$

This describes the marginal utility per basket of goods net of expenditure and transport costs, where $\overline{C}$ is the consumer reservation price for the basket of goods.

A utility maximising consumer with *full information* chooses an outlet based on the relative levels of expenditure on the M goods and transport costs incurred. The consumer becomes indifferent in her/his choice of outlet when the sum of these factors are equal for alternative outlets either side of their location on the circle. The equation of the indifferent consumer is thus given by,

$$P_i M + td - \overline{C} = PM + t\left\{\frac{1}{N} - d\right\} - \overline{C} \tag{3}$$

The number of consumers that enter each store is equal to 2d. This will include all consumers located close to an outlet up to the indifferent consumer either side of the outlet. Hence the number of consumers, E_i, that enter a representative $outlet_i$ can be solved from Equation (3) as,

$$2d = E_i = \frac{1}{N} + \frac{M(P - P_i)}{t} \tag{4}$$

For simplicity we set the variable cost of production equal to zero. The payoff for outlet i can thus be written as,

$$\pi_i = P_i ME_i \tag{5}$$

Under a Bertrand strategy, all outlets select prices simultaneously and independently. Holding the average price P in all other outlets constant, an outlet selects P_i to maximise (5). The profit maximising first order condition may be written as,

$$\pi_{i_{P_i}} = P_i ME_{i_{P_i}} + E_i M = 0 \tag{6}$$

In a symmetric equilibrium $P_i = P$. The resultant solution function for the optimal average price charged for individual M goods derived from (6) is given by,

$$P_i^o = \left(\frac{t}{N}\right)\frac{1}{M} \tag{7}$$

Hence total expenditure on the basket of M goods is equivalent to t/N. Since N identical outlets are located symmetrically on the circle, each outlet has an equal share of the market, 1/N, and the average price-cost mark-up on each of the M goods is the same in every outlet operating in their relevant niche. From Equations (5) and (7) therefore, we solve for equilibrium profit as the following,

$$\pi_i^o = \left(\frac{t}{N^2}\right) \tag{8}$$

A critical point in this price competition stage is the result that total consumer expenditure on the entire basket of M goods is equivalent to customer switching costs. Bertrand competition for market share induces aggressive price undercutting by retail outlets that are differentiated only in terms of their location on the circle. This competitive process prevents retailers from extracting a premium above consumer willingness to pay for locational convenience as determined by the proximity, and hence the number, of outlets on the circle and transport costs per unit of distance travelled. In this model of full information the total transport cost in moving from one outlet to another, t/N, defines the level of switching costs for each consumer and hence the total premium which may be extracted from each consumer in equilibrium. This in turn is allocated between the M goods. It is possible that the individual mark-up on each of the M goods can vary. Under perfect information, Bliss (1988) predicts that

constrained price discrimination based on Ramsey pricing rules determine pricing. This paper does not concern itself with this issue but models explicitly what is an exogenous value for money constraint in Bliss's paper.

In the first stage of the game we solve for the equilibrium number of outlets where the entry decision is made in full anticipation of the post-entry equilibrium profit received and the sunk costs, $\sigma > 0$, associated with entry. The last entrant to the market is indifferent between entering and not, as post-entry profits π_i just cover the exogenous sunk costs of entry σ_i. Given this condition and the expected profit levels set out in equation (8), we solve for the long run equilibrium number of outlets that will exist in the market as the following,

$$N^o = \sqrt{\frac{t}{\sigma}} \tag{9}$$

The larger the per unit transport cost, t, the more post-entry equilibrium profit and hence the more fragmented the industry becomes over the long run. The exogenous sunk cost, σ, acts as a barrier to entry in the market. Long run welfare resulting in this industry is equal to the sum of retailer and consumer surplus, as derived from Equations (1) and (2), aggregated over each of the N outlets. In equilibrium, total expenditure on the basket of M goods, given by Equation (7), is equal to t/N. Outlets are located symmetrically around the circle and charge the same price per basket of goods. The distance travelled by indifferent consumers, x and y, either side of an outlet is $\frac{1}{2N}$. Total welfare for the representative outlet, O_i, in equilibrium can thus be depicted in Diagram 1.

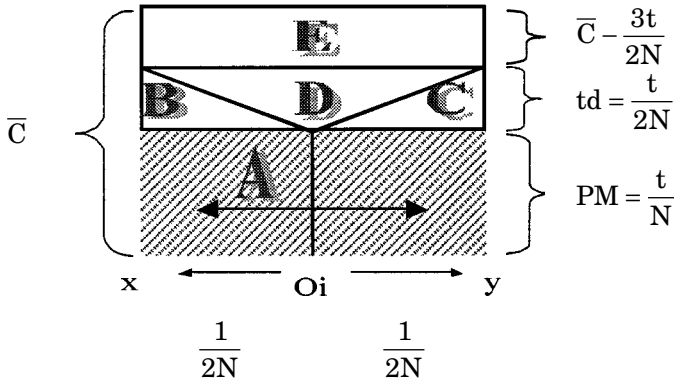

Diagram 1: *Welfare Analysis for the Representative Outlet*

Outlet i captures all consumers located up to the indifferent consumers, x and y, on either side of the location. Total retailer surplus is given by area A net of the sunk costs of entry. Net consumer surplus is represented by the sum of areas D plus E. This illustrates total consumer surplus net of transport cost areas B plus C. In equilibrium, the welfare for an individual outlet as given by expressions (1) plus (2) can be written as the following,

$$\textit{Welfare} = CS + RS = \left(\frac{t}{4N^2} + \frac{\overline{C}}{N} - 1.5\frac{t}{N^2}\right) + \left(\frac{t}{N^2} - \sigma\right) \qquad (10)$$

Total net welfare is equal to the sum of retailer and consumer surplus, as defined in (10), times the number of outlets in the market in equilibrium. Multiplying (10) by N and substituting from Equation (9) that expresses N in terms of t and σ , we solve for overall welfare as follows,

$$W = \overline{C} - 1.25\sqrt{\sigma t} \qquad (11)$$

Imperfections in the market induce a gap between social and private net benefits in *laissez faire* retailing. Total welfare, W, is bounded between the first best outcome, $\overline{C}$, and zero when switching costs on the circle equal reservation expenditure. Transport costs and exogenous barriers to entry result in equilibrium price divergences from marginal cost being sustained in the long run. In the absence of these factors total consumer surplus on the circle is $\overline{C}$ which defines our bliss point or first best outcome in terms of total long run welfare. Higher transport and exogenous sunk costs push welfare outcomes towards zero.

The Loss Leading Case

In the above two-stage game there was an explicit assumption that consumers had full information on the average price of the M goods in each outlet when making their optimal outlet choice. The desire to maintain the consumer base ensures that total rent earned on the basket of M goods purchased by each consumer will not exceed the switching costs of travelling to another outlet. We now examine the equilibrium outcomes for the profit maximising retailer when consumers are assumed to have imperfect information on the prices of the basket of M goods in making an outlet choice. More precisely, consumers have zero information on one subset of items and full information on another.

In the final stage of the game, N identical retailers sell M different products that may be segmented into KVIs and non-KVIs. Of the M goods, a fraction, Φ, are classified as KVIs and are sold at an average price P. All remaining goods, $(1-\Phi)$, are non-KVIs sold at an average price of $P^{\bullet}$. We assume that the value of

Φ is predetermined by factors such as the frequency of purchase and hence is exogenous in our model. Since the consumer has no information on non-KVIs before entering a store, it is assumed that expenditure on KVIs, as well as transport costs, determines their choice of outlet. We assume that once a customer commits to an outlet they will buy one unit of each of the M goods, including non-KVIs, providing total expenditure does not exceed their reservation expenditure for the basket of goods. Another way of thinking of this, is that finding out information on non-KVIs in alternative outlets incurs information costs and transport costs that exceed reservation expenditure. Switching outlets and incurring information costs is not a feasible option for the consumer in this scenario. We modify this assumption in the next section. The retailer, as an extreme assumption, is handed localised monopoly power over the pricing of non-KVIs. The question is whether the retailer is able to extract maximum rents up to the reservation expenditure for the basket of goods from his consumer base, $\overline{C}/N$?

Under conditions of imperfect information, consumers choose outlets based upon relative levels of expenditure on KVIs and transport costs. The equation of the indifferent consumer may be written accordingly,

$$P_i \Phi M + td - \overline{C} = P\Phi M + t\left\{\frac{1}{N} - d\right\} - \overline{C} \tag{12}$$

This allows us to solve for the number of consumers, E_i, that enter an outlet as the following,

$$2d = E_i = \frac{1}{N} + \frac{\Phi M(P - P_i)}{t} \tag{13}$$

Equation (13) represents the augmented demand function an outlet faces when consumers lack price information on the full range of products in an outlet. The payoff for a representative outlet is decomposed into revenue from KVIs and non-KVIs. Assuming zero variable costs for simplicity, the payoff for outlet i can now be written as,

$$\pi_i = P_i \Phi M E_i + P_i^{\bullet}(1 - \Phi) M E_i \tag{14}$$

As before, the average price of KVIs is simultaneously and independently determined in all outlets on the circle. An outlet chooses P_i to maximise (14), given the prices of non-KVIs, $P^{\bullet}$ and $P_i^{\bullet}$, and holding the average price of KVIs in all other outlets, P, constant. The first order condition may be written as follows,

$$\pi_{i_{P_i}} = P_i \Phi ME_{i_{P_i}} + \Phi ME_i + (1-\Phi) MP_i^{\bullet} E_{i_{P_i}} = 0 \tag{15}$$

In a symmetric equilibrium where $P_i = P$ and $P_i^{\bullet} = P^{\bullet}$, the solution function for the optimal average price for each KVI is derived from (15) as,

$$P_i^o = \left(\frac{t}{N} - (1-\Phi) MP_i^{\bullet} \right) \frac{1}{\Phi M} \tag{16}$$

Since N identical outlets are located symmetrically on the circle, each has an equal share of consumers, 1/N. Using the equilibrium prices obtained for KVIs in Equation (16), we can re-express Equation (14) as,

$$\pi_i = \left(\frac{t}{N} - (1-\Phi) MP_i^{\bullet} \right) \frac{1}{\Phi M} \Phi ME_i + P_i^{\bullet} (1-\Phi) ME_i \tag{17}$$

In a symmetric equilibrium with each outlet attracting 1/N consumers, this reduces to,

$$\pi_i^o = \left(\frac{t}{N^2} \right) \tag{18}$$

Thus, we observe that for any combination of $P^{\bullet}$ and P the total rent earned by each outlet remains equal to (8) in the full information benchmark case. While (18) is not a closed solution, it is a binding constraint on the pricing of KVIs that prevents retailers from earning premiums above the transport costs of each consumer. The presence of imperfect information and the assumption that once a consumer commits to an outlet there is no incentive to switch to alternative stores at first sight appears to give retailers an opportunity to extract consumers reservation expenditures in equilibrium. However, Bertrand price competition induces aggressive price undercutting strategies on KVIs. This ensures that any additional premiums generated by information costs associated with non-KVIs are fully dissipated by price cuts on KVIs in equilibrium. Once again, consumers only pay a premium equivalent to switching costs in the full information case as determined by the degree of horizontal differentiation between outlets on the circle. All outlets would benefit from co-operative restraints on loss leading. However the option to utilise price to manipulate imperfect information induces a strategic rival response which in turn increases short-run competition in an imperfectly competitive market. This turns out to be beneficial to welfare as the overall payoff that an outlet can extract in equilibrium, even in the presence of imperfect information, remains equal to that extracted under perfect consumer information.

Since the overall rent earned under imperfect information with price discrimination in favour of certain items remains equal to the benchmark case, the equilibrium number of outlets that exist on the circle as determined by forward looking outlets, remains equal to the full information endogenous outcome described in Equation (9). Hence, retailer and consumer surplus remain unchanged as in (11). This provides our first proposition:

> **Proposition One**: In the optimal pricing of multi-product retailers under conditions of imperfect consumer information, loss leading on a subset of products is an equilibrium outcome used to protect market share which leaves retailer surplus, welfare, and the structure of the market at full consumer information levels in the long run.

Equation (16) illustrates that loss leading in the groceries market is an equilibrium outcome under imperfect information. Products in this model are segmented by heterogeneities in the cross-price elasticity. This forces competitive price discrimination in favour of KVIs/"impulse" to maintain the customer base, which does not generate additional rents for the retailer. In this sense, the strategic response of rivals makes the *laissez faire* outcome self correcting. Intervention in the form of price controls is not justified on the basis of improving welfare to *laissez faire* full information levels. In the "convenience" sector, price leading can take place by pricing closer to marginal cost on some ("impulse") products contributing significantly to turnover in the Independent outlet, relative to other ("top-up") products on which the retailer maintains rents. In the "one-stop" market, loss leading under conditions of imperfect information acts as a signalling device used to convey information to the consumer on the overall value for money to be obtained from the total basket of M goods.[5] It is a commitment on behalf of the "one-stop" retailer to ensure maximum value for money in a particular outlet. Moreover, Equation (16) indicates that loss leading on KVIs in the "one-stop" market may involve below-cost pricing. This is due to the opportunity that the "one-stop" retailer has to recuperate these losses through higher pricing on the vast range of non-KVIs in the store. The average price of KVIs will be less than marginal cost providing total expenditure on non-KVIs exceeds that of KVIs, which is likely given the features of the market. The analysis of the ban on below-cost pricing undertaken in the next section will

5. An alternative mechanism available to process information involves the conversion of non-KVIs to KVIs through expenditure on promotions or advertising. This would lead to an increase in sunk costs and a more concentrated market structure in the long run. The equilibrium outcome in the final stage of the game would be unaffected however, as profits remain equal to (8) for any value of Φ. Since loss leading can achieve the same outcome at no additional cost to the retailer, the conversion of non-KVIs to KVIs by retailers would not be an equilibrium outcome.

therefore only apply to the implications that this has for competition within the "one-stop" niche.

The Interventionist Case

Developing the previous section, we consider a blanket prohibition on below-cost selling and the repercussions this has for equilibrium profits and corresponding concentration and welfare levels in the market. As illustrated in Equation (16), this analysis only applies to the "one-stop" niche where the wide range of non-KVIs sold at higher prices is likely to induce a loss leading equilibrium that involves selling below cost.

In the final stage of the game, our analysis is augmented by restricting the multi-product retailer to pricing KVIs at or above marginal cost. The price of non-KVIs is now endogenised to explicitly incorporate the information costs involved in finding out the value of the basket of goods in each outlet. Switching costs now include both transport and information costs. We assume that information costs are proportional to the transport cost of moving from one outlet to another. In contrast to the loss leading scenario however, it is now assumed that information plus transport costs do not exceed consumer reservation expenditure $\overline{C}$.[6] Once a consumer enters an outlet they have the option of switching to alternative stores if total expenditure exceeds the costs of switching, transport plus information costs. Overall switching costs are represented by $\delta(t/N)$ where $\delta>1$. Higher values of δ reflect greater information costs for the consumer. If $\delta = 1$ there are no informational costs to the consumer and switching costs are equivalent to those in the benchmark case. The total rent earned from consumer expenditure in a symmetric equilibrium with each outlet charging the same price and attracting an equal market share of 1/N is equal to the total switching costs of consumers in equilibrium and is thus expressed as,

$$\pi_i^o = \left(\delta \frac{t}{N^2}\right); \quad \delta > 1 \tag{19}$$

Restricting retailers to pricing KVIs at or above marginal cost prevents the additional rents earned on non-KVIs from being dissipated fully by price cuts on KVIs. Rather than allowing competition on KVIs as a mechanism to disperse information to the consumer, consumers now have to incur information costs. Restricting competition on KVIs allows consumer imperfect information to be

6. In the previous section the results were derived on the basis of a stricter assumption that consumers would not have the incentive to switch outlet by incurring information costs. This simply reinforces the power of the results in the loss leading case.

manipulated and results in higher equilibrium rents for firms.

In the first stage of the game we solve for the equilibrium number of outlets where the entry decision is made in full anticipation of the ex-post entry profit received. The last entrant enters until the exogenous sunk costs, σ, just equals equilibrium post-entry profits described in Equation (19). Hence, solving for the long run equilibrium number of outlets yields,

$$N^{o} = \sqrt{\frac{\delta t}{\sigma}} \tag{20}$$

Equation (20) is equivalent to the equilibrium number of firms that exist in the benchmark case if $\delta = 1$, or if $\delta > 1$ and there is loss leading. For values of $\delta > 1$ where there are restrictions on price competition, the market will evolve to a more fragmented structure in the "one-stop" niche. More outlets, or branches of Multiple retail outlets, on the circle will reduce the degree of horizontal product differentiation in the market and overall transport costs for consumers. However, the average prices which consumers must pay for their basket of M goods increases with a restriction on price competition under imperfect information.

We examine the impact that a ban on below-cost pricing has for overall welfare using Diagram 1 and our new equilibrium outcome values. Total consumer expenditure on the basket of goods, PM, now equals $\delta \frac{t}{N}$. With all outlets located symmetrically around the circle and charging the same price per basket of goods, the distance travelled by indifferent consumers, x and y, to the nearest outlet remains $\frac{1}{2N}$. Welfare in each outlet is equal to the sum of retailer and consumer surplus in each outlet. We express welfare in each outlet as the following,

$$\textit{Welfare} = CS + RS = \left(\frac{t}{4N^2} + \frac{\overline{C}}{N} - (\delta + 0.5)\frac{t}{N^2} \right) + \left(\frac{\delta t}{N^2} - \sigma \right) \tag{21}$$

Total net welfare is equal to the sum of retailer and consumer surplus times, the number of outlets in the market in equilibrium as defined in Equation (20). This solves as,

$$W = \overline{C} - (\delta + .25)\sqrt{\sigma t} \tag{22}$$

Thus, welfare under the interventionist case where restrictions are imposed on price competition declines at an increasing rate towards zero with δ. In one limiting case welfare can be zero where switching costs between outlets just equal consumer's reservation expenditure. In the other limiting case, welfare would capture full reservation consumer expenditure. When $\delta = 1$, we get the

same expression for welfare as in the second best outcome of (11), the benchmark or imperfect information loss leading welfare outcomes. Welfare here is a third best outcome compared to the bliss point and the outcome in (11). With the restrictions on price competition consumers can no longer use prices on KVIs as an indicator of value for money. Information costs and the ban on loss leading allow firms to extract more of consumers' reservation expenditure compared to just transport costs.

> **Proposition Two**: Compared with the laissez faire outcomes, the prohibition of below-cost selling in the pricing of multi-product retailers under imperfect consumer information and imperfect competition ensures that welfare declines to a third best outcome.

Price intervention has the effect of imposing a distortion on the market that alters market structure and long-run welfare and produces a third best outcome. Contrary to the objectives of anti-trust policy, implementing price restraints under imperfect information actually reduces overall welfare as compared with *laissez faire* full information and loss leading outcomes, rather than pushing outcomes toward first best levels.

V CONCLUSION

Below-cost pricing by larger retailers in the Irish retail grocery market was considered to be an unfair means of competition in the short run that drives a more concentrated structure and is welfare reducing in the long run. The main foundations for these views rest on the sharp decline of the Independent retailing sector with the growth of larger supermarkets since the 1970s and the characteristic feature of imperfect consumer information in the groceries market. However, implementing a ban on below-cost selling with the objective of protecting the smaller independent sector and halting the rise in concentration is based on a misplaced rationale. Closer analysis illustrates an evolution of the urban retail groceries market to a dual structure that is a natural outcome of the market.

Within the "one-stop" or "convenience" market the desirability of loss leading as a pricing strategy hinges on the ability of the retailer to extract rents from the consumer through exploiting the imperfect information and switching cost features of the market. Our theoretical framework examines pricing strategies of retailers in the same market niche. Loss leading, involving price discrimination in favour of a subset of cross-price elastic products, is shown to be a competitive tool used by multi-product retailers to protect market share rather than an instrument for extracting additional rent from the market. Competition for the consumer base results in aggressive price cutting on KVIs to attract consumers

into the store, until all rents earned on the non-KVIs are dissipated. In our model loss leading in the presence of imperfect information is an equilibrium outcome that leaves prices, welfare, and market structure in the long run equivalent to the full information benchmark outcomes. The strategic response of rivals makes the *laissez faire* outcome self correcting. Placing restrictions on price competition, through a prohibition on below-cost selling, distorts the competitive process and unambiguously reduces overall welfare.

Given our theoretical framework we feel that the removal of the ban on below-cost selling and exposure of the groceries retail market to the disciplines of the 1991 Competition Act would be beneficial for the national market. Under the Act, loss leading would be allowed unless this has as its "object or effect the prevention, restriction, or distortion of competition", in which case liability under section 4 would render this practice undesirable.[7]

REFERENCES

BLISS, C., 1988. "A Theory of Retail Pricing", *Journal of Industrial Economics*, Vol. 4, pp. 1-17.

BORENSTEIN, S., 1985. "Price Discrimination in Free Entry Markets", *Rand Journal of Economics,* Vol. 16, pp. 380-395.

BORENSTEIN, S., 1991. "Selling Costs and Switching Costs: explaining retail gasoline margins", *Rand Journal of Economics,* Vol. 22, pp. 354-369.

BORENSTEIN, S., and N. ROSE, 1994. "Competition and Price Dispersion in the US Airline Industry", *Journal of Political Economy*, Vol. 102, pp. 653-683.

CHECKOUT IRELAND, 1996. "Yearbook and Buyer's Guide", Checkout Ireland Ltd.

FAIR TRADE COMMISSION, 1991. "Report of the Review of the Restrictive Practices (Groceries) Order", Dublin: Stationery Office.

GIULIETTI, M. and M. WATERSON, 1997. "Multiproduct Firms' Pricing Behaviour in the Italian Grocery Trade", *Review of Industrial Organisation*, Vol. 12, pp. 817-832.

HOLMES, T., 1989. "The Effect of Third Degree Price Discrimination in Oligopoly", *American Economic Review*, Vol. 79, pp. 244-250.

IBEC COMPETITION COUNCIL, 1996, "Submission on the Groceries Order".

KATZ, M., 1984, "Price Discrimination and Monopolistic Competition", *Econometrica,* Vol. 52, pp. 1453-1471.

RESTRICTIVE PRACTICES COMMISSION, 1980. "Report of Enquiry into the Retail Sale of Grocery Goods Below Cost", Dublin: Stationery Office.

SALOP, S., 1979. "Monopolistic Competition with Outside Goods", *Bell Journal of Economics*, Vol. 10, pp. 141-156.

SHEPHARD, A., 1991. "Price Discrimination and Retail Configuration", *Journal of Political Economy,* Vol. 99, pp. 30-53.

7. Section 4(1) of the Competition Act prohibits and renders void "all agreements between undertakings, decisions by associations of undertakings, and concerted practices which has as their object or effect the prevention, restriction, or distortion of competition in trade in any goods or services in the State, or in any part of the State".

SUTTON, J., 1991. *Sunk Costs and Market Structure: Price Competition, Advertising and the Evolution of Concentration* , MIT Press.

WALSH, P.P. and C. WHELAN, 1999. "Modelling Price Dispersion as an Outcome of Competition in the Irish Grocery Market", forthcoming in the *Journal of Industrial Economics*.

APPENDIX

Table 1: *Regional Market Share Data*

	Total State				*Reg. I*[1]	*Reg. II*	*Reg. III*	*Reg. IV*
	1990	1994	1995	1996	1996	1996	1996	1996
All Multiples	**49.6**	**57**	**53.8**	**53.7**	**79.6**	**55.2**	**42.0**	**27.3**
Powers[2]	20.9	24.5	25.3	26.6	41.9	29.3	17.8	11.5
Dunnes Stores	20.4	22	21.3	18.3	20.5	18.7	17.8	14.4
Superquinn	4.2	5	5.4	6.5	14.0	7.0	2.2	0.1
Roches	1.7	1.5	1.8	2.3	3.0	0.1	4.1	1.4
L&N	2.5	4						
All Symbols	**25.7**	**24**	**27.5**	**27.3**	**8.8**	**24.9**	**38.4**	**43.9**
Musgraves[3]	14.2	15	18.7	18.6	5.0	20.1	30.0	20.9
Spar	4.6	4	3.6	3.7	1.6	0.9	4.1	10.2
Mace	2.8	2	1.9	1.9	0.1	0.8	3.0	4.7
Other Symbols	4.2	3	3.3	3.0	1.5	3.1	1.3	8.1
Independents	**24.7**	**19**	**18.7**	**19**	**11.6**	**19.9**	**19.6**	**28.8**
All Grocers	**100**	**100**	**100**	**100**		**100**		

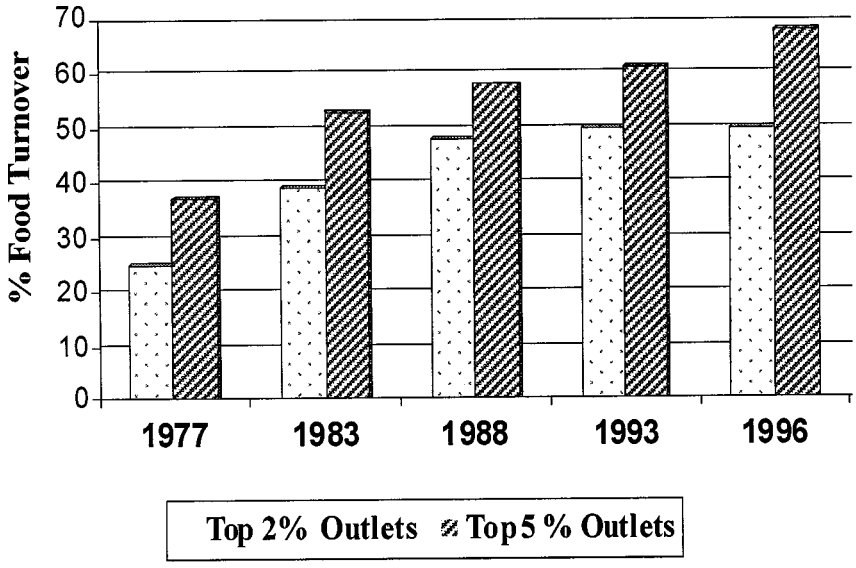

Figure 1: *Retail Food Concentration, 1977-1996*

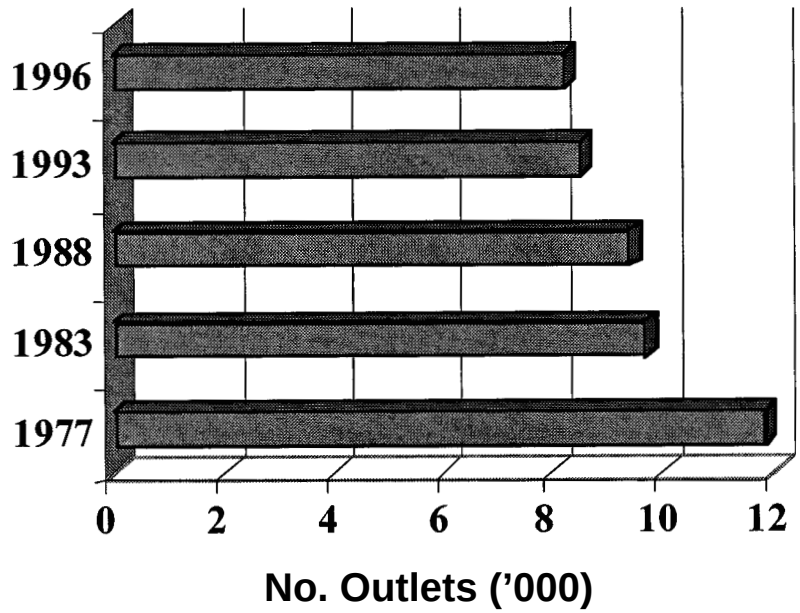

Figure 2: *Number of Independent Outlets*