An Alternative View of Pricing in Retail Food Markets

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The pricing mechanism of intracity retail food markets has received the attention of agricultural economists who are interested in the competitive nature of food price determination. Attention has focused on the information-theory paradigm and potential impact of publicly available comparative price reports. In this paper, a spatial economic model is developed to describe and analyze consumer choice, seller behavior, and price determination in retail food markets. Empirical evidence is then used to test hypotheses developed from the spatial model. It is concluded that the spatial model offers added explanatory power of observed food market responses to retail price reporting.

Key words: competitive behavior, food prices, food retailing, price information, spatial economics, spatial pricing theory.

The competitive nature of retail food markets and price determination have long been topics of concern for agricultural economists. The initial attempts to monitor, describe, and analyze intracity price levels were conducted by Hawkins, Warrick, and Pattison, as well as Devine and Hawkins (1970, 1972). These studies were passive in nature, primarily describing the short-run pricing behavior of firms in a market where one food chain was dominant. More recently, studies have investigated the effects of active participation in food markets by influencing the quantity and quality of food price information. Retail food price-reporting systems (RFPRS) have been utilized to publicize price levels and differences in food markets. The analytical procedure has included comparisons of price levels and dispersions between stores and chains during a RFPRS experiment to pretest and post-test price levels in that market, as well as comparison to data collected in control markets (Devine and Marion (DM) 1979; Boynton, Blake, and Uhl (BBU)). The underlying concern has been that the large number of food products and stores, frequency of price changes, differing store marketing strategies, and heterogenous product/service/price offerings of stores combine to create a confused consumer and, hence, a potential consumer information problem (Devine and Marion 1979). Because search costs are positive, consumers are potentially unable to express their product/service/price preferences accurately in the market place. This leads to price differences that supposedly reflect discrepancies due to imperfect information and resulting market power that are not explainable by cost and preference differences. In Devine’s words, “Deviating dispersions represent either conditions of monopoly profits or inaccurate reflection of preferences or both” (p. 24).

The theoretical models underlying these RFPRS studies have been devoid of spatial content, despite the fact that retail food markets are characterized by spatially dispersed firms and consumers. An obvious reason for spatial dispersion of firms (rather than spatial agglomeration) is that consumers differentiate between retail stores on the basis of locational convenience (Morrison and Newman). The cost of distance, measured in terms of both monetary outlays and the opportunity cost of a consumer’s time, can be a major expense for rural residents traveling long distances or urban residents facing traffic congestion. It
would appear that locational convenience assumes an important role in the formulation of consumers' decisions regarding the store from which they will buy food (Skinner, Crowell and Bowers, *Progressive Grocer* 1981, 1983). Furthermore, retail food firms often establish numerous widely dispersed locations within one market in order to compete for spatially distributed customers. Thus, the rapidly growing literature on "spatial microeconomics" appears to be relevant for retail food markets.

Although a spatial interpretation of RFPRS studies would appear to be justified since space is an important determinant of both buyer and seller behavior in retail food markets, there is a more fundamental reason that spatial price theory might provide a useful analytical approach. A review of the findings reported in RFPRS studies reveals empirical results that are inconsistent with (or not predicted by) the spaceless information theory model that underlies these studies. It will be argued below that reasonable explanations for existing empirical findings on the effects of RFPRSs can be derived from a spatial model. More important, however, is that spatial price theory provides explanations for empirical results that are inconsistent with, or unexplained by, the spaceless approach. Thus, existing studies of retail food markets may be utilized to provide empirical tests of hypotheses generated by a spatial competition model.

**Spatial Competition**

Consideration of costly distance has two important implications for the study of retail food markets generally and RFPRSs specifically. First, spatially distributed consumers who incur travel costs do not make their demand and patronage choices solely on the basis of prices set by firms. Locational convenience also has a major impact on consumer choices. Second, competition among spatially distributed sellers for spatially distributed consumers must be characterized in an oligopoly framework (Greenhut). Even when large numbers of sellers exist in a market, any one seller typically considers only his nearest rivals to be major competitors for the consumers in that vicinity; thus, spatial competition is really a linked oligopolistic competition. One advantage of considering the impact of RFPRSs in the context of oligopoly models is that such models stress seller behavior under conditions of uncertainty. In nonoligopoly models, price and output decisions consider only costs and revenues, but oligopoly adds a third consideration—expectations of rival reactions to a pricing policy (price conjectural variations).

In the model developed below it is assumed, for simplicity, that firms are homogenous in every respect except location. Obviously, this is not the case (Handy and Padberg). Actually full prices include such convenience (or inconvenience) costs as store layout to reduce (or increase) in-store shopping time, time delays in check out, assistance (or lack of assistance) in carry out, and so on. However, this should not necessarily be considered a major drawback to the model. After all, several writers have adopted spatial models to characterize nonspatial dimensions of product variety (e.g., Scherer). Thus, consideration of multiple dimensions of differentiation may simply reinforce the conclusions drawn from this model.

In order to illustrate the role of costly distance in consumer choices and the potential impact of oligopolistic interdependence in a spatial retail food market, assume initially that a single retail food store is located at point $A$ in figure 1. This firm is selling to spatially dispersed consumers located along the line $AB$ who must pay full prices consisting of the firm's prices plus delivery costs to their location. In the case of retail food markets, delivery costs represent the costs a consumer bears in traveling to the firm and hauling purchases home. For simplicity, it is assumed that the consumers buy only one product from this (and any other) store although a multiproduct purchase decision model could be developed without changing the basic conclusions of interest here.

Consumers are assumed to be evenly and continuously distributed over the line $AB$ in figure 1. Each consumer has an identical linear demand given by

$$P = a - bq,$$

with $P$ denoting delivered price, $q$ representing an individual consumer's quantity demanded, and $a$ and $b$, constant parameters. The full or delivered prices ($P$) paid by these consumers imply that effective demand is

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1 The empirical evidence in Crowell and Bowers suggests that the direct monetary cost associated with distance has a minimal effect on supermarket choice. However, they found that the addition of time costs reduced the number of necessary store visits to acquire a lowest cost food basket.
Therefore, assume a second firm locates at point B (in figure 1) to compete for the consumers between A and B.

Price setting now involves oligopolistic interdependence. In order to illustrate the role of such interdependence, replace $U$ in equation (3) with $U'$ where $U'$ represents the service area of firm A (or portion of the market over which firm A sells) such that $U' < U^*$. Also let the total distance between A and B be $D$ so the firm at B sells over market segment $D - U'$. Profit maximization for A now becomes

$$
\frac{d\pi_A}{dm_A} = U'(a - 2m_A + c - \frac{tU'}{2})
+ \frac{dU'}{\frac{dm_A}{(a - m_A - tU')(m_A - c)} = 0.}
$$

The price conjectural variation enters this equation as $dU'/dm_A$. Several conjectures have been used in various spatial competition models, some of which are examined below. However, for the present, the most widely used conjecture will be utilized. This conjecture, referred to as Löschian competition, is that a seller believes his service area boundary is fixed ($dU'/dm_A = 0$) under the expectation that his rival will match any price change he makes. Solution of equation (8) for $m_A$ then yields

$$
m_A = \frac{1}{2} (a + c) - \frac{tU'}{4}.
$$

A similar procedure for $B$, given Löschian behavior and that $B$'s costs are identical to A's, provides

$$
m_B = \frac{1}{2} (a + c) - \frac{t(D - U')}{4}.
$$

Note that one consequence of entry and reduced market concentration is that A's price under competition is higher than his monopoly price was, since the only difference between the prices in (7) and (9) is that $U' < U^*$. In a spatial market a reduction in ownership concentration can lead to higher mill prices (Ohta), even though average full prices may

1 The geographic area over which a firm sells is referred to as a service area in order to distinguish this space from the competitive geographic market area. It is demonstrated elsewhere that the competitive market and the firm's market are two different concepts in spatial competition (Benson 1980b).
fall. (The empirical studies on RFPRSs all look at mill prices). Sellers are subject to demand elasticities which relate to the net market price (net of transport cost) not the total price paid by consumers (delivered price). With linear demand, elasticity at any given firm price increases when transport costs are subtracted from consumer demand. Thus, the elasticity of aggregate demand decreases at each price as a firm loses its most distant customers (Benson 1980a), and the resulting price effect is upward.³

The increase in price following entry seems counterintuitive when expectations are based on spaceless price theory. However, notice two occurrences. First, additional consumers are being served (those between U* and B in Figure 1). Consequently, there is an increase in effective market (as opposed to firm) demand. Second, many consumers now pay lower delivery costs than they previously did (those between U' and U* who shifted patronage from A to B). Again there is an increase in effective demand as less transport costs are netted from these consumers’ demands. In other words, an increase in the number of spatially dispersed sellers increases both supply and demand (Benson 1984), so price may rise with entry and reduced concentration in the market.

The firms share a common service area boundary which occurs at the point where delivered prices are equal. Therefore,

\[ m_A + tU' = m_B + t(D - U'). \tag{11} \]

Simultaneous solution of (9), (10), and (11) provides the equilibrium values for the three unknowns, \( m_A, m_B, \) and \( U' \):

\[ U' = \frac{1}{2} D, \tag{12} \]

\[ m_A = \frac{1}{2} (a + c) - \frac{tD}{8}, \tag{13} \]

\[ m_B = \frac{1}{2} (a + c) - \frac{tD}{8}. \tag{14} \]

Because \( m_B = m_A \), both firms set prices which exceed the spatial monopoly price.

Price conjecture assumptions other than Löschian behavior have been proposed for spatial models (e.g., see Capozza and Van Order; Greenhut, Hwang, and Ohta; Ohta). The implications of one alternative assumption, Hotelling-Smithies (HS) behavior, will be examined briefly without formally deriving the results. An HS competitor believes his rivals will not change their prices. Thus, by lowering his price, the HS seller expects an expansion of his service area (and resulting increase in quantity) that is larger than a Löschian price would anticipate. This can be seen by solving equation (11) for \( U' \), so

\[ \frac{dU'}{dm_A} = \frac{1}{2t} \left( \frac{dm_g}{dm_A} - 1 \right). \tag{15} \]

Clearly, the HS expectation of \( dm_g/dm_A = 0 \) implies \( dU'/dm_A = = -1/2t \) (while the Löschian \( dU'/dm_A = 0 \) implies \( dm_g/dm_A = 1 \)). The demand perceived by an HS competitor is more elastic than the Löschian demand so the HS competitor tends to set a lower price.⁴ If all sellers have identical expectations, all firms set lower prices under HS behavior than they would with Löschian behavior. In fact, the Löschian conjecture yields a higher price than any behavioral assumption used in spatial models (Ohta).

Löschian competition also provides the highest (short-run) profits for a given number of firm sites (Ohta). Consequently, it leads to the largest number of entrants and, in the long run, yields the largest number of selling sites possible with the lowest average transport costs for consumers. The lower transport costs mean that the relatively high prices are not necessarily undesirable (unless there is not free entry).⁵ The existence of high concentration ratios in a local retail market does not necessarily imply high prices (nor high profits, since relatively high levels of concentration may simply imply HS or some other non-Löschian behavior). In fact, causality is likely

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³ Note that a non-Löschian price conjecture or another demand function shape could generate falling prices with entry (Benson 1980a). However, the point is that without a priori knowledge of consumer demand and seller behavior the relationship between concentration and price cannot be predicted.

⁴ Actually Hotelling-Smithies entrepreneurs may either raise or lower price after entry of a distant rival, depending upon the size of the market area and the firm’s cost functions (Capozza and Van Order). Thus, formal solution for the HS price requires more explicit definitions of distance variables. Because of space limitations, this solution is not provided.

⁵ It is demonstrated elsewhere (e.g., Benson 1984) that, given free entry to zero profits, Löschian behavior yields a Pareto-optimum allocation of resources since price equals the full (social) marginal cost of spatial production when output is altered through a change in the number of locations. Of course, a relevant question is whether free entry into the market exists. For an interesting discussion of market preemption in the retail food industry see West (1981a,b).
to be reversed over the long run—high prices at one point in time will lead to low concentration ratios in the future, given free entry. A relevant question, then, is which type of behavior best fits the spatial entrepreneur in the long run? Naturally, any type of behavior might be conceivable over some short-run period.

HS competition is the spatial equivalent of Chamberlin’s monopolistic competition. That is, each seller assumes no other firm will react to his price change because each firm is so small, relative to the market, that the entrepreneur expects his pricing policy to go unnoticed. This is not the case in spatial competition. Chamberlin himself described the spatial market as linked oligopoly rather than monopolistic competition (pp. 103–4). The primary effect of entry in a spatial world is that profits fall and firms become more cognizant of their competitors (rather than less as in monopolistic competition).

Löschian pricers recognize that the best they can expect is to split the geographic space into equal (or approximately equal) shares and profit maximize like a monopolist within their service area. The Löschian assumption can be restated as “firms recognize the actual demand situation they face and profit maximize accordingly” (Benson 1979, p. 12). Almost any type of behavior may exist for some relatively short period. However, it would seem that sellers should realize that their expectations are incorrect after a few (or perhaps a large number of) observations and eventually adopt a Löschian conjecture.

Market concentration is affected by more than simply the number of retail outlets, of course. Consider a situation in which a single firm owns and controls several spatially dispersed outlets in a local market. The multiplant firm’s decision maker has the same goal as independent firms (i.e., profit maximization), but now there is one firm with separate submarkets—the requirement for effective price discrimination. Because the Löschian price is the profit-maximizing price in each service area, the long-run price will not be altered. Either marginal cost or marginal revenue must differ for the multiplant firm if price is to differ in this spatial setting.

One explanation for differences in prices associated with ownership concentration is a difference in costs due to multiplant scale economies. Suppose A’s costs are lower then B’s because A is part of a relatively efficiently managed chain. Thus \( c_A < c_B \). In fact, assume \( c_B = c_A + X \). Substitution of these values into (9) and (10) and simultaneous solution with (11) yields

\[
U^{**} = \frac{1}{2} D + \frac{1}{3} \frac{X}{t}
\]

\[
m^{**}_A = \frac{1}{2} (a + c_A) - \frac{tD}{8} - \frac{X}{12}
\]

\[
m^{**}_B = \frac{1}{2} (a + c_B) - \frac{tD}{8} + \frac{7X}{12} - \frac{1}{2} (a + c_B) - \frac{tD}{8} + \frac{X}{12}
\]

The relatively efficient firm has a lower price and larger geographic market share than the other firm or than either firm had when the costs were identical. Note, however, that the high price firm still survives because it remains as the low full price firm for many consumers. In fact, only a small patronage shift occurs in the face of such a price difference. This brings up an important point: price dispersions may be observed and may persist for any number of reasons in a spatial market that need have nothing to do with market power or consumer ignorance. Production cost differentials are but one example.6

Spatial Patterns in Retail Food Competition

The analysis of buyer and seller behavior in spatial markets is possible using the spatial competition model developed above. In particular, the response of buyers and sellers to changing market conditions (including information changes) can be described and predicted.

Buyer Behavior

The explicit recognition of distance-associated cost in the theoretical model presented above allows predictions of buyer behavior in response to price changes at retail food outlets. These price changes may occur for a number of reasons including normal competitive behavior, cost changes, and retail price report-

6 Another is that the retail market may be characterized by functional specialization so core distributors emphasize economical chain brands while other retailers rely on nationally advertised brands with reputations for quality (Handy and Pudberg). This too could yield price dispersions which would be correlated (possibly inversely) with concentration ratios.
ing. The cause of changes in relative price levels (and hence price dispersions) is not of importance. However, because the focus of this paper is directed at retail food price reporting, implications directly arising from RFPRSs will be explicitly considered.

The spaceless rationale for expecting reduced prices from relatively high-priced outlets after implementation of a RFPRS is that large numbers of consumers should shift patronage from high-priced to low-priced retail outlets, thus reducing demand and market power at the previously high-priced outlets. At the same time, increased demand at low-priced outlets might be expected to lead to higher prices at these stores, causing a substantial narrowing of the price dispersion across stores. Therefore, patronage shifts from relatively high- to low-priced stores would appear, in the spaceless context, to stimulate a narrowing of price dispersions. In the case of a RFPRS, access to a new information source (published food prices) decreases the cost to individual consumers of price comparisons and, therefore, allows them to enforce discipline in the food market through patronage decisions.

Now consider what a spatial model predicts about patronage shifts and price dispersions, perhaps resulting from a RFPRS. First, recall that the location of a retail food outlet is likely to be a prime determinant of patronage choice. Price levels determine how much each consumer buys from his chosen retail outlet, but only consumers near service area boundaries are likely to be influenced by relative prices in their choice of outlet. Consider figure 2 and suppose that initially stores A and B had prices of \( m_A \) and \( m_B \) (note that \( m_A \) is relatively high and A has a relatively small geographic market). Then, because of a RFPRS, prices fall to \( m'_A \) and \( m'_B \), respectively (reasons for falling prices are considered in the following discussion of seller behavior). Because \( m_A \) fell more than \( m_B \), the price dispersion narrowed and a patronage shift occurred. However, only a very small portion of the consumers actually changed stores (those between \( U_1 \) and \( U_2 \) in figure 2). Thus, a narrowing of price dispersions leads to a small patronage shift. Notice that the causal flow (a reduction in price dispersions causes patronage shifts) runs in the opposite direction to the causation implied by reasoning from a spaceless perspective and that the magnitude of the predicted patronage shift differs for the two models.

![Figure 2. Patronage shifts in a spatial market](image)

**Seller Behavior**

The spatial model developed above explicitly incorporated a seller behavior assumption in the form of a price conjectural variation. In spatial oligopoly models the anticipated response of rivals to price changes is a critical factor in the solution of the model for equilibrium prices and market areas. Therefore, any event that changes seller behavior or expectations about the response of rivals is likely to cause changes in the pricing decisions of sellers. The spaceless rationale for retail food price reporting is that improved information to consumers alters demand conditions and reduces the market power of retail food stores (and particularly chains) because of consumer ignorance. However, the spatial model presented above suggests another important consequence of the price reporting experiments—an alteration in the information going to sellers, with a resulting short-run change in entrepreneurial behavior caused by confusion generated by the price reports.\(^7\)

Recall equations (8)–(14). Solution of the model required an explicit behavioral assumption (in this case the Löschian \( dU/dm_A = 0 \))

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\(^7\) Note that BBU recognized this when they wrote, "this market information appeared to influence retailers’ pricing decisions directly without reinforcement from consumers. This market response was attributed to the publicity and anticipatory effects of the price reports" (p. 27). Devine also recognized that entrepreneurial behavior could play a role in explaining observed results when he wrote that "theoretical ramifications of improving information ... reveal a wide range of possibilities associated with various interdependency assumptions" (p. 28), but he ignored these ramifications when interpreting his results and drawing policy conclusions. Similarly, DM noted that behavioral changes in the long run might lead to impacts of a RFPRS that would differ from short-run results (1979, p. 236). However, they ignored the possibility of immediate changes in conjecture as a consequence of the RFPRS.
assumption). For price to fall, all that is needed is that conjectures (dU/dm) fall in value. If sellers start at the Löschian level of dU/dm = 0 (or the HS value of dU/dm = −1/2t or anywhere else), then any drop below that value will lead to lower prices even with no change in actual demand conditions. Similarly, an increase in the value of the conjecture will cause prices to rise. In the immediate period, given the confusion caused by the RFPRS, there could be experimentation with many different conjectures rather than similar changes by all stores. Falling conjectures implies falling prices; but if conjectures of different retailers fall by different amounts, then price dispersions also change. There is no compelling reason to expect that the change in conjectures would be uniform across firms, stores within firms, entire markets, or between markets. In light of the very short periods during which RFPRS were in place (six to twelve weeks), sellers need not have had sufficient time to experiment with conjectures and adopt any uniform expectations. Of course, a change in price dispersions is not necessary for explaining falling prices, as it is in the spaceless model.

During the initial period of uncertainty and experimentation to determine the reaction of rivals to price changes, it might be expected that falling conjectures would thereby cause prices to fall. If each retailer initially expects no price reaction by rivals (dm_b/dmA = 0) he will lower his price with the expectation of a larger market area. Naturally, if all or most adopt this (or a close) conjecture, the result will be lower prices but modest changes in market areas and, hence, small patronage shifts. After a period of experimentation retailers are likely to perceive that their expectations are not being realized. Therefore, an ensuing return to pre-RFPRS conjectures is likely. If, as argued in the preceding theoretical section, Löschian competition characterizes long-run competitive equilibrium, then a subsequent rise in price levels can be expected as conjectures are revised upward to the Löschian value of dU′/dmA = 0.

The Impact of RFPRSs—A Review

Table 1 summarizes hypotheses developed from the spatial pricing model presented above and empirical findings of previous retail food price reporting systems. Notice that the main hypothesis of falling prices can also be developed on the basis of the information theory approach, while the remaining results are unexpected from the theoretical perspective of past RFPRS studies.

Empirical evidence supports the first hypothesis since price reporting appears to exert downward pressure on food prices in test markets. This finding was first observed by Devine and Hawkins (1972) and later confirmed by Devine and Marion (1979), and BBU on the basis of more formal procedures.

From a spatial perspective, it is hypothesized that price levels fall due to the short-term confusion and uncertainty (hence falling conjectures) interjected into the market by the RFPRSs. For instance, Devine and Marion noted that “during the information-publishing period, retailers phoned the Food Price Review Board daily to check on their standing or to complain about losing sales... retailers and their lawyers addressed the Board en masse to complain about the cutthroat competition being imposed upon them. Some threatened lawsuits. It was obvious to anyone in the market that something dramatic was happening” (1980, p. 268). Cutthroat competition is a behavioral concept, of course. Similarly, to stress the confusing consequences and short-run nature of such reports, consider the result of an effort to report prices detailed in Devine and Hawkins (1972). Shortly after consumers began to receive reports, “retailers began to react... A store manager from a major supermarket... wanted to know exactly what was being done, how to get on the mailing list, how many consumers were already receiving price data, why his store ranked 'unreasonably high,' and when the service would be terminated” (p. 195). Clearly, retailers were uncertain as to how to react in the face of the reports and were concerned about their duration.

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8 After all, the DM study involved only a five-week-reporting period, while BBU's reporting periods varied from six to twelve weeks. During these very short time periods, retailers demonstrated considerable confusion and uncertainty.

9 Further support for the uncertainty and changing conjectures argument, as opposed to the consumer information approach, comes from a non-RFPRS study. Hawkins, Warrack, and Patison monitored retail food prices and observed an event which resulted in behavior much the same as for the Devine-Marion- and Boynton-Blake-Ull studies. During their study, the Canadian government issued the Batten Report, which contained a recommendation to investigate grocery retail pricing in western Canada.
## Table 1. Summary of RFPRS Hypotheses and Results

<table>
<thead>
<tr>
<th>Hypotheses</th>
<th>Finding</th>
<th>Study</th>
<th>Strength of Evidence in Support of Spatial Model Relative to Spaceless</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Reduction of price levels in test markets(^{a,b})</td>
<td>Prices fell</td>
<td>Devine and Hawkins (1972)</td>
<td>Equivalent</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Devine</td>
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<td>Devine and Marion (1979)</td>
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<td></td>
<td></td>
<td>Boynton, Blake, and Uhl</td>
<td></td>
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<tr>
<td>2. Potential for falling prices with or without reduction of relative price dispersions(^{a,c})</td>
<td>Reduction</td>
<td>Devine</td>
<td>Strong</td>
</tr>
<tr>
<td></td>
<td>No reduction</td>
<td>Devine and Marion (1979)</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Boynton, Blake, and Uhl</td>
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<td></td>
<td></td>
<td>Lesser and Bryant</td>
<td></td>
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<tr>
<td>3. Potential for falling prices with or without patronage shifts(^{a,c})</td>
<td>Significant shifts</td>
<td>Devine and Marion (1979)</td>
<td>Strong</td>
</tr>
<tr>
<td></td>
<td>Insignificant shifts</td>
<td>Boynton, Blake, and Uhl</td>
<td></td>
</tr>
<tr>
<td>4. Potential price declines in control markets(^{a,c})</td>
<td>Declines</td>
<td>Devine</td>
<td>Strong</td>
</tr>
<tr>
<td>5. Rapid price rise following termination of reporting(^{a,c})</td>
<td>Rapid rise</td>
<td>Devine and Marion (1979)</td>
<td>Strong</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Boynton, Blake, and Uhl</td>
<td></td>
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<tr>
<td>6. Significant impact of market concentration on price(^{b,d})</td>
<td>Insignificant</td>
<td>Boynton, Blake, and Uhl</td>
<td>Strong</td>
</tr>
</tbody>
</table>

\(^{a}\) Predicted by spatial pricing model.
\(^{b}\) Predicted by spaceless model.
\(^{c}\) Not predicted by spaceless model.
\(^{d}\) Not predicted by spatial model.

The relative price dispersions between stores and food chains tend to decrease with price reporting, according to DM (1979) and Devine. However, this conclusion is somewhat questionable. Devine and DM actually reported RFPRS-induced reductions in price dispersions, but differences between stores and chains remained statistically significant during the reporting period. Lesser and Bryant, in their reexamination of the DM study, concluded that "price reporting did not have a clearly positive effect on reducing price spreads among stores" (p. 266). Furthermore, Boynton, Blake, and Uhl were unable to detect any reduction of price dispersions between stores or chains in their study. Reductions in price dispersions are required to explain falling prices in a spaceless consumer information model but not in a spatial model.

Differences in production costs or in relative levels of consumer preference for different outlets are likely to generate price dispersions. If the prime cause of reduced prices during the price-reporting experiment is uncertainty and experimentation with conjectures, then the spatial model does not necessarily predict that price dispersions will disappear. They may narrow some (or expand) depending upon the shape of cost and demand functions and the conjectures tried by each seller, but as long as these factors do not
change, the dispersions should persist. Thus, as indicated in the previous section, a spatial model would predict very small patronage shifts to reflect only minor adjustments in price differences. This is precisely what was found in the BBU study. DM's results seem to conflict, but this conflict could arise from the survey procedure used in their study. (See Boynton, Blake, and Uhl for additional discussion of this point.)

Another reason for expecting that changing price conjectures were the source of lower prices during the reporting period is that the RFPRS induced price decreases in control markets as well as in the markets where price reports were made (Devine). Consumers in control markets were not given any additional information about prices within their market area. However, sellers were given somewhat confusing information about the pricing behavior of other sellers, some of whom were perhaps faced in the test market as well. Each might consequently react by experimenting with alternative conjectures (e.g., perhaps expecting that they can lower price slightly and capture a much larger market share as with HS behavior). Because this uncertainty is likely to be only a short-run phenomenon, the control market sellers should learn that their conjectures are wrong and ultimately move toward the Lüschan solution described in the previous section of this paper.

Attributing reductions in price levels and dispersions to increased consumer information during the reporting period implies that rapid price increases upon report termination should be attributed to reduced levels of information. It is not clear, in the context of the arguments employed by various writers, why consumer information (if it were the primary causal agent) would be of such limited duration. Since consumers became "informed" about relatively high- and low-priced stores and were able to match preferences with store offerings, they should continue to be able to do so until the relative product/service/price offerings between stores change substantially. However, if confusion on the part of sellers and the resulting behavioral changes were the source (or at least an important source) of the price reductions, then all that need occur is a return to prereporting conjectures for the prices to rebound rapidly.

Unfortunately, the evidence with regard to the effect of market concentration on RFPRS price reaction is quite limited. Boynton, Blake, and Uhl found concentration ratio to be insignificant in a regression equation to explain price. This finding is not at all surprising when the markets are examined from a spatial perspective. Some economic forces may generate higher prices in relatively concentrated spatial markets (e.g., relatively strong demand for the product of a multilocation firm), while others may have a downward impact (e.g., multiplant scale economies). Some factors, in fact, will cause price to rise at one location and fall in another within a single market when concentration levels change. None of these price impacts need have anything to do with uninformed consumers or a concentration-collusion (or price leadership) causal flow; and in a spatial setting it appears likely that they do not, at least in the long run. While a direct correlation between price and concentration in spatial models is theoretically possible, an inverse relationship is also theoretically explainable. The actual relationship within a market, or across markets, depends upon the relative magnitude of numerous conflicting factors. There is no a priori reason to anticipate any particular relationship to hold unless a good deal is known about relevant demand and cost conditions in the industry.

Finally, note that Boynton, Blake, and Uhl wrote, "Shopper surveys prior to the reporting period indicated that consumers in the test markets were reasonably accurate in their perceptions of food store price rankings as shown by the surveys" (p. 27). Lesser and Hall directly tested the hypothesis that users of a price-reporting system paid lower prices than nonusers. This hypothesis was rejected. Further, they found no evidence that report users were more efficient price searchers than nonusers. If consumers are aware of relative price differences and those price dispersions persist, they must arise because of some factor other than misinformation (e.g., differences in

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10 For that matter, this result is also not surprising when the industry is viewed from an institutional framework. See Handy and Padberg, Padberg, and Padberg and Thorpe for discussion on this point.

11 The insignificance of concentration ratios in retail food markets is not unique to RFPRS studies. Following their attempt to monitor, describe, and analyze retail price levels, HWP wrote, "the economist is rightfully puzzled by the paradox of a highly concentrated industry exhibiting many of the symptoms of a highly competitive market" (p. 138). However, direct inclusion of locational convenience into a consumer choice model of retail food outlets indicates that this finding is really not all that puzzling. See Morris and Newman for further discussion of this point.
costs or demands). With homogenous store offerings, price dispersions would be eliminated if it were not for the importance of store location to consumers and their efforts to minimize shopping costs.

Conclusion

The typical analysis of retail food price-reporting systems has ignored many of the heterogeneities which characterize this market, including those arising from consumer differentiation on the basis of locational convenience. One exception is the study by Lesser and Hall which directly incorporated opportunity cost as an explanatory variable. Unfortunately, data problems severely limited their analysis. Empirical findings have supported some of the resulting hypotheses derived from the spaceless structure-conduct-performance framework but not others. In fact, many characteristics of retail food markets appear to be inconsistent with the spaceless analytical framework. Therefore, this paper employed an alternative approach to explain existing empirical findings regarding retail food pricing. This alternative approach applies spatial microeconomic theory and provides reasonable explanations for virtually all the observed phenomena, especially those which appear to be inconsistent with the spaceless structure-conduct-performance framework.

[Received September 1983; final revision received April 1984.]

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