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Price-Matching Policies: Cut-Throat Competition or Oligopolistic Coordination?

James D. Hess and Eitan Gerstner

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DEPARTMENT OF ECONOMICS AND BUSINESS
NORTH CAROLINA STATE UNIVERSITY
RALEIGH, NORTH CAROLINA

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ABSTRACT: Promises by retailers to match the prices of their competitors give an impression of fierce price competition. On the other hand, these policies may deter rivals from cutting prices because the threat of price-matching makes it more likely that market share will not be gained. This paper empirically tests these two conflicting theories using data collected from grocery stores in a market where several stores had announced that they would match the prices of the low-price supermarket. The evidence supports the theory that price-matching policies help supermarkets avoid price competition and therefore lead to generally higher prices.

* Professor and Associate Professor, Department of Economics and Business, North Carolina State University, Raleigh, North Carolina, Telephone (919) 737-3886. The authors gratefully acknowledge financial support from the National Science Foundation under grant SES87-09669.

Retailers commonly promise to match or beat the prices of their competitors as the following advertisement from The News and Observer (Raleigh, North Carolina), March 24, 1986, demonstrates.

CHALLENGER SUPERMARKET
Matches Discount Supermarket's
Everyday
low shelf prices
FOREVER
If the low price supermarket lowers its regular prices, Challenger Supermarket will respond by matching them. If the other supermarket lowers prices again, so will Challenger. And Challenger will keep its prices low.

Appliance stores, hardware stores and supermarkets advertise such price-matching policies heavily and sometimes even offer to refund double or triple the price difference to convince customers that they do so.

What is the purpose of a price-matching guarantee? How credible is this price-matching policy? Does it help increase price uniformity among the supermarkets, and what is the effect of greater price coordination on market price levels? Does it encourage or discourage price competition? This study of price-matching marketing campaigns by leading North Carolina supermarket chains was designed to provide answers to these questions. Studying the price patterns of the supermarkets in response to a price-matching policy will improve our understanding of such marketing strategies and their effects on market prices.

We will first outline the alternative theories of price-matching behavior and then describe the data set we have collected to test these theories. Our data provide evidence that the announced price-matching policy is consistent with a higher degree of price coordination among the supermarkets. Finally, we

investigate whether the increased price coordination resulted in lower prices both for the market as a whole and for the specific store that was the target of the price-matching policy.

1. Theoretical Considerations

The simplest explanation of a price-matching policy is that the store really is initiating cut-throat competition, perhaps because it thinks it has a cost advantage or because it wants to build market share at the expense of current profit margins. The retailer may use this marketing policy to convince customers that they will find low prices if they visit the store. Therefore, the price-matching policy leads to price reductions. Furthermore, price-matching policies might encourage consumers to intensify search for bargains, which can help lower prices for the entire market (Golding and Slutsky 1986).

Price-matching behavior recently has attracted the interest of theorists, who have focused mainly on two alternative explanations: oligopoly coordination and price discrimination.

Price-matching policies can help retailers avoid a prisoner's dilemma (see (Luce and Raiffa 1957) and (Rapoport and Chammah 1965)). When all other retailers maintain high prices, an individual retailer is tempted to reduce price to gain significant market share. The consequence of all retailers simultaneously following this reasoning is that market shares remain constant and profits of all sellers decrease. Price-matching policies deter rivals from cutting prices because they increase the probability that competitors will follow suit. Grocery stores in particular are likely to face a prisoner's dilemma because total demand for food seems to be price inelastic

((Blanciforti and Green 1983), (Wohlgenant 1984)). That is, price reductions by one supermarket may attract customers away from other stores, but they do not substantially increase the amount of food purchased by households.

Macgregor (1983), Anderson (1985), Belton (1986), Kalai and Satterthwaite (1986) and Salop (1986) go a step further. They argue that sellers view these policies as signals to raise prices to a level that would maximize joint profits. That is, a price-matching guarantee is thought to be a collusive practice that helps oligopolists maintain monopoly prices.

Png and Hirshleifer (1987) and Doyle (1987) offered yet another motivation for price-matching policies. They modelled stores that promise to refund price differences to customers who bring proof that a competitor has a lower price, and they showed that this strategy is profitable because the stores price discriminate between well-informed and ill-informed consumers. Since refunds are made to customers only when they can show that lower prices are available at other stores, ill-informed customers actually are charged high prices, contrary to advertised claims. Conversely, well-informed customers who might otherwise shop elsewhere are given special discounts through refunds of price differences to attract them away from the competition. This price discrimination theory, however, is not particularly relevant to the case described in this paper, since the supermarkets did not offer refunds on previous sales. They only "promised" to match prices of the lowest priced supermarket.

Empirical research aimed at testing these theories is scarce, and yet testing is important to the government policy-maker and the retailer alike. If price-matching policies have the effect predicted by the implicit price collusion theory, then implementing a price-matching strategy may have the

surprising implication of raising price levels. This paper is based on a unique data set that is used to test the conflicting theories.

2. The Data

We chose to study an actual price-matching marketing campaign initiated by a North Carolina supermarket chain (referred to in this paper by the fictitious name "Challenger Supermarket"). This case is of special interest because a Price List of over 9000 items was published weekly that specified the Challenger's prices that were to match those of its low price rival, called here the "Discount Supermarket." The Price List was available for all customers at all of Challenger's locations and was heavily advertised in newspapers and television. Such a price list could lead to lower prices because customers are better able to compare prices but, on the other hand, might facilitate price coordination among competitors, thereby leading to higher prices.

Data collection began after the Challenger Supermarket initiated its price-matching program, so detailed price data were not available for the period preceding the price-matching period. However, in January 1985 a third grocery store chain, called here "Dixie Supermarket," began advertising that it too would match the prices of the Discount Supermarket, and for few weeks it also provided a price list. For purposes of comparison, data from three other stores besides Challenger and Discount Supermarkets had also been collected, and fortunately, one of those other stores was Dixie Supermarket. As a result our data set does contain "before" and "after" data for Dixie Supermarket. The market shares as of November 1983 for these stores were Challenger -- 34.1

percent, Discount -- 26.3 percent, Dixie -- 25.2 percent, Store 4 -- 5.8 percent, and Store 5 -- 0.6 percent.

Two groups of products were selected. The first group consisted of 79 frequently purchased products (Progressive Grocer 1980) that were included in the Price List of the Challenger. The second consisted of 35 products excluded from the Price List (perhaps because of wholesale price fluctuations or legal issues). Products not included by the Challenger in the Price List were not guaranteed to match those in the Discount Supermarket. The purpose of collecting the two samples was to learn whether price coordination is enhanced for products specifically included in the Price List vis-à-vis those products excluded. A list of products in both groups is given in the Appendix. Throughout this paper those 79 products subject to the price-matching policy will be referred to as "included" products since they were included in the Price List. The other 35 products will be called excluded products.

Because of limited resources, data were obtained only in selected weeks when research assistance was available. All stores were visited within a period of 24 hours in each week sampled. Thirty-three visits to five stores (twelve weeks were sampled in 1984, twelve in 1985 and nine in 1986) have produced data that provide useful information about price-matching policies as shown below.

3. Price-Matching Policy and Price Coordination

Did the price-matching policies of the Challenger and Dixie stores actually lead to a higher degree of price coordination between these supermarkets and their major rival Discount Supermarket? How did they influence stores not involved in the price-matching contest?

Tables 1 and 2 were constructed to dramatically demonstrate the high level of price coordination reached for products included in the Price List. Price comparisons are made for the first and last week in which data were obtained on ten products selected randomly from the two product groups.

The price dispersion apparent in the first week significantly diminished by the last week for products subject to price-matching policy. In the first week only 13 of 40 possible price matches occurred, while in the final week 28 of 40 possible prices matched. By the last week 40 percent of the included products were priced identically to within a penny in all five supermarkets, up from 0 percent in week one. Only 10 percent of the products excluded from the Price List had identical prices in all stores by the last week.

Table 3 gives the percentage of products in each store that had prices exactly identical to those in the Discount Supermarket. These percentages were calculated separately for each product group; products included in the Challenger's Price List are given in Part A and products excluded (and therefore not covered by the price-matching guarantee) are given in Part B.

The first column of data gives price matches between the Challenger and Discount store. The percentage of identical prices in these two stores is very high for "included" products (Part A). Because data gathering began after the institution of Challenger's price-matching policy, it is hard to say how much

this extraordinary matching is due specifically to the price-matching policy. However, these Challenger-Discount price matches are consistently and significantly higher than those between of other stores throughout all of 1984.

Furthermore, comparison with excluded products (Part B) shows that price matches are consistently higher for products covered by the price-matching policy than for those excluded. Table 3, Part B also shows that for products excluded from the Challenger's Price List, price match percentages between the Challenger and Discount store were initially high relative to those of other stores.

While before-after price comparisons were not possible for the Challenger Supermarket, it was possible for Dixie Supermarket's price-matching policy that began in January 1985. As can be clearly seen in Table 3 there was a dramatic increase in the percent of products in the Price List with identical prices in Dixie and Discount Supermarkets, from roughly 4 percent in 1984 to 70 percent in 1985. This is statistically significant at the 1 percent level. The corresponding change for products not covered by the price-matching policy was not nearly as large and is not significant at the 5% level.

This evidence leads to the following conclusion:

(A) The price-matching policies are credible. That is, they result in a high degree of price coordination between the announcing supermarkets and their targeted rival.

Did the price-matching policy eventually result in a higher degree of price coordination among all stores in the market? Significant increases over time in price matches would indicate higher price coordination for both product groups. More frequent matches for products subject to price-matching policies

would indicate that the Price List of the Challenger helps all supermarkets better coordinate there prices.

Table 3 shows clearly that the percentage of products with identical prices in the Discount Supermarket and the other stores (numbered 4 and 5) increased from roughly 18 percent to over 40 percent for the entire sample period. Furthermore, the increases for products included in the policy are in general more significant than for those excluded.

The evidence just presented leads to the following conclusion:

(B) The price-matching policy resulted in greater price coordination among all supermarkets.

4. Price-Matching Policy and Price Level

How did the price-matching policy affect market price level? Did the increased price coordination lead to cut-throat price reductions as conventional wisdom predicts? Did it help the supermarkets avoid the price cutting spiral typical for prisoner's dilemma situations or even increase the market price level as the implicit collusion theory predicts? How did the store targeted by the price-matching policy respond? In this section the impact of the price-matching policy on overall market prices is studied. In the next section we will look in more detail at the behavior of the Discount Supermarket to understand better the overall market response.

To answer the above questions, one would like to have data on prices before and after implementation of the price-matching policy. Although we do have price data prior to Dixie's policy (the data for 1984), data prior to the

Challenger's price-matching guarantee are not available. As a result, the effect of Dixie's policy on market outcomes is more easily determined.

To analyze the effect of the price-matching guarantee on the overall market price, it is necessary first to construct a price index for the many products included in our sample. Consider first Figure 1 where the dollar expenditure needed to purchase a typical basket of goods from the "included" product group is displayed for the observation period. The typical basket of goods was established by using the weights for equivalent products from the Consumer Price Index (see Appendix for details). In Figure 1 this price index is given for the weighted average of the five stores using their market shares given above. Figure 2 gives equivalent information for products excluded from the Price List.

If the price-matching guarantee policy signals cut-throat price competition, one would expect more significant price reductions or more moderate price increases for products under price guarantees than for products not under guarantee. That is, the following ratio will fall:

$$\text{Relative Price} = \frac{\text{Average Price (Included)}}{\text{Average Price (Excluded)}} . \qquad (1)$$

Comparing Figures 1 and 2, one can see clear tendency for the average market prices to increase during the observation period for products covered by the price-matching policy. This is not the case, however, for products not included in the guarantee. Figure 3 shows that the relative price in (1) has indeed increased during the observation period.

To explain variation in the five store average price level, we will use regression analysis. Our first model uses a dummy explanatory variable: POLICY variable = 0 in Dixie's "before-policy" period, 1984, and POLICY variable = 1 in its "after-policy" period, 1985-86. The results are given in Table 4. The coefficient of the POLICY variable is positive and significant at the 1% level, indicating that introduction of a price-matching policy increases the market's average price.

In itself, however, the announcement of the policy may not be taken seriously by rivals. To convince competitors that the policy is credible, the retailer must actually match or even beat prices. Table 3 shows that the Challenger and Dixie matched most prices. Therefore, to capture degree of commitment price match percentages are used as explanatory variables (the results below are not changed if the explanatory variables reflect equal or lower prices). This is accomplished by comparing the price-matching for products included in the Price List with what it would otherwise be for excluded products. The ratio of percentage of identical prices of included products (the weekly equivalent of Table 3, Part A) to that of excluded products (the weekly equivalent of Table 3, Part B) is calculated for each week:

$$\text{Relative Match} = \frac{\text{Matching Percent (Included)}}{\text{Matching Percent (Excluded)}} . \qquad (2)$$

The larger this ratio, the more coordinated are the two stores' prices over those products identified by the price-matching policy. These ratio variables were calculated for Challenger Supermarket and for Dixie Supermarket (both matched with Discount Supermarket). An increased magnitude of price-matching

ought to reduce the price level if the price-matching policy triggers cut-throat price competition.

To statistically test the cut-throat competition theory against the implicit collusion theory, the following empirical model was specified:

$$\text{Relative Price} = a + b\ \text{Relative Match}_{\text{Challenger}} + c\ \text{Relative Match}_{\text{Dixie}}. \quad (3)$$

The variables are always ratios of products included in the Price List to those of products excluded from the Price List and the dependent variable is the overall market price of the five stores. Results of the ordinary least squares regression are presented in Table 5.

Consider first the estimated coefficient for the relative match of Dixie with the Discount Supermarket. The Dixie Supermarket had high prices initially and reduced them to match prices with the low price Discount Supermarket during the period that data were gathered (see Table 3). There is a natural tendency for the market price to fall because Dixie has over 25 percent of the market sales and has reduced its prices. Despite this, the estimated coefficient significantly shows that with more commitment to price-matching, the products targeted by the policy are made relatively more expensive compared to excluded goods.

The coefficient of the Challenger Store is negative and marginally significant. This provides some evidence supporting the cut-throat competition theory. However, as we will see in the next section when the Challenger (the oldest rival in the price-matching competition) reduces prices to match those of the Discount Supermarket, there is little response by Discount. So the

average price of the five store retail market falls because Challenger alone has reduced its prices.

This statistical analysis of the data leads to the following conclusion:

(C) A credible price-matching policy limits price competition and the overall market price level rises relative to products not covered by the policy.

One might infer that the target of the price-matching policy, Discount Supermarket, must have raised its prices and by such a large amount that the average price in the marketplace rises. This is exactly what the oligopoly collusion theory would predict, but is it an empirically valid inference? We investigate this question in the following section.

5. Price-Matching Policy and Targeted Store's Response

The evidence from overall market price response given above suggests that the low price store targeted by the price-matching guarantees may have increased its prices. As shown in Table 6, the nominal prices of the Discount Supermarket rose in 1985 over those of 1984 in both the included and excluded categories but subsequently dropped slightly in 1986. However, the crucial ratio of included to excluded prices rose each year, indicating that the Discount Supermarket allowed the included products' prices to drift higher relative to those excluded from the policy.

To test this we first regressed the relative price of the Discount Supermarket on the POLICY variable associated with the introduction of Dixie Supermarket's price-matching policy. In Table 7 one can clearly see that the

introduction of a price-matching policy leads to significant increases in the relative price of included products at Discount.

As before, to incorporate credibility in the test, the model of equation (3) was estimated with Discount Supermarket's relative price as the dependent variable. The results are found in Table 8. The coefficient of the price match ratio for Dixie is positive and statistically significant at the 1 percent level. This indicates that the more committed to price matching is Dixie, the higher is Discount Supermarket's prices for products included as compared to products excluded. This is contrary to conventional wisdom.

It is not surprising to see that the coefficient for Challenger is negative but statistically insignificant, since the data set does not have "pre" price-matching samples for the Challenger. The percent matches were high in the first week of observation and stayed uniformly high through out the sample. Possible collinearity with the intercept term makes it hard to measure this coefficient accurately.

We conclude that

(D) A credible price-matching policy induces the targeted store to raise its prices for products included relative to products excluded from the policy.

6. Conclusions

In this paper we empirically tested the impact of price matching policies by supermarkets. Price data collected from grocery stores supports the theory that a credible price matching policy helps competitors relieve the downward price pressure typical of oligopolies. We find no evidence of cut throat competition.

As a time series quasi design, our study is subject to sources of biases related to the specific history. For example, the North Carolina market for grocery products could have been subjected to demand or cost shocks that generated the observed price increases. An ideal experiment would hold such forces constant or include them in a multivariate model of prices.

There are other ways to correct the price variable for confounding demand sources of variation. If a price deflator for North Carolina was available on a weekly basis, one could correct the prices in Figure 1 for inflation by taking the stores' prices relative to this deflator. We have chosen to use a different price deflator: the price level of goods that were not part of the price matching strategy. We have computed the ratio of the price level of included products relative to the price level of excluded products, and such a ratio will wash out any inflationary bias.

Higher grocery prices might be driven by higher costs. The simplest way to account for cost increases as a source of retail price increases is to correct for variation in wholesale prices. Unfortunately, we do not have a comparable time series of wholesale prices for included and excluded products. However, we are explaining relative prices at the retail level, so this is only a problem when wholesale prices of included products change relative to excluded products. A pure inflation in wholesale prices will not bias our results. We considered using the lowest retail price in the market as a proxy for wholesale price, but retail prices are not always constant markups of wholesale prices (featured brands may in fact be sold at a loss ((Kemp 1955), (Hess and Gerstner 1987)).

Price matching policies are common in other markets such as appliance and hardware stores, and future research should focus on the impact of these

policies in these markets. Other scholars may already have collected relevant data that can be used to study issues not addressed here. For example, we could not model the dynamics related to the week-by-week responses of the competitors because our data was not gathered continuously. Therefore, it was hard to determine the process by which price coordination was achieved. Did the stores follow a "tit for tat" strategy (Axelrod 1982) or did they use a more complicated strategy? In addition, we also did not study other forms of non-price responses, such advertising and sales promotion.

How did the stores get the information to match unpublished prices of the low price supermarket? In a classroom presentation, a manager of one of the five supermarkets said that they used employees disguised as customers with tape recorders in their pockets to obtain data from the Discount Supermarket. Supermarkets might also use publications like the Price List to coordinate prices.

Finally, there are other strategies of interest that can help retailers limit competition. A grocery chain recently announced that it would honor all store coupons issued by other supermarkets in the area, thereby effectively matching "coupon prices" with its rivals. If other stores follow this strategy of coupon honoring, then no store would find it advantageous to compete using store coupons.

APPENDIX

As mentioned in the text, the typical basket of goods was constructed by obtaining weights for equivalent products from the 1977 Consumer Price Index table of "Relative Importance of Components." We corrected these weights to reflect size units in our samples. For example, since the CPI measures ham prices by the pound whereas our product price is for a four-pound ham, we use our product price and one-fourth of the CPI weight. The weights are adjusted here to sum to one, so price indices are weighted averages of the products' prices.

PRODUCTS AND MARKET BASKET WEIGHTS
BASED ON CONSUMER PRICE INDEX

79 Items Included in the Price List

Brand Name and Product	Weight x 100
Campbell Chicken Noodle Soup	1.14
Campbell Vegetable Beef Soup	1.14
Peter Pan Peanut Butter	.930
Mt. Olive Kosher Dill Pickles	.261
Wishbone Italian Dressing	5.26
Duke's Mayonnaise	.305
Hellman's Mayonnaise	.159
Whitehouse Vinegar	.392
Heinz Ketchup	.159
A-1 Steak Sauce	.494
Heinz 57 Sauce	.494
Morton Iodized Salt	.189
Adolph's Meat Tenderizer	1.39
Ragu Spaghetti Sauce	.581
Chef Boyardee Cheese Pizza	1.20
Del Monte Whole Kernel Corn	.494
Del Monte Cut Green Beans	.494
Campbell Pork & Beans	.523
Hunt's Tomato Sauce	2.12
Hunt's Whole Tomatoes	1.17
V8 Cocktail Juice	.785
Hawaiian Punch Red Fruit Juice	.654
Kool Aid Grape Drink Mix	.479
Gerber Applesauce	2.09
Gerber Oatmeal Cereal	.596
Gerber Strained Carrots	1.06
Spam Luncheonmeat	3.48
Armour Vienna Sausages	6.09

Starkist Tuna	2.96
Jiffy Corn Muffin Mix	.712
Duncan Hines Devil's Food Cake Mix	1.70
Jello Orange Gelatin	2.74
Nestle Semi-Sweet Morsels	.814
Baker Unsweetened Chocolate	.610
Hershey Chocolate Syrup	.305
Hershey Cocoa	.610
Pillsbury All-Purpose Flour	7.27
Red Band Self-Rising Flour	.596
Betty Crocker Bisquick	.145
Crisco Oil	.872
Mazola Oil	.436
Crisco Shortening	.290
Log Cabin Syrup	.203
Kelloggs Corn Flakes	.799
Kelloggs Rice Krispies	.727
General Mills Total Cereal	.523
Brim Electric Perk	2.10
Maxwell House Reg. Ground Perk	2.10
Lipton Tea Bags	1.87
Carnation Coffeemate	1.87
Equal Sugar Substitute	1.68
Clorox Liquid Bleach	.189
Ajax Cleanser	.843
Comet Cleanser	.567
Bold 3 Detergent	.770
Cheer Detergent	.770
Cascade Dishwasher Detergent	.145
Lysol Disinfectant Spray	1.16
Reynold's Aluminum Foil	.988
Cutrite Wax Paper	1.20
White Cloud Bathroom Tissue	1.20
Bounty Jumbo Paper Towels	1.20
Keebler Fudge Stripe Cookies	1.49
Nabisco Oreo Cookies	.857
Nabisco Ritz Crackers	1.57
Kraft American Cheese Slices	3.32
Mrs. Filbert's Margarine	.785
Fleischman's Margarine	1.23
Kraft Parmesian Cheese	5.00
Breyer's Ice Cream	1.20
Sealtest Ice Cream	1.90
Minute Maid Orange Juice Concentrate	5.96
Oreida French Fries	.828
Stouffer's Lean Cuisine/Chicken	2.54
Mrs. Smith's Apple Pie	.319
Sara Lee Streusel	1.03
Bufferin Aspirin	1.89
Ban Roll-On Deodorant	.988
Colgate Winterfresh Gel Toothpaste	.988

35 Items Excluded from the Price List

Brand Name and Product	Weight x 100
Store American Cheese Slices	11.4
Store Cut Green Beans	1.34
Store Hot Dog Buns	1.37
Store Sugar	.573
Store Thin Sliced Bread	.623
Store Whole Kernel Corn	1.27
Store Whole Milk	4.41
Store Bananas	1.24
Store Cucumbers	5.09
Store Head Lettuce	2.29
Oscar Meyer Bologna	5.19
Store USDA Full Chuck	4.19
Store USDA Cube Steak	2.37
Store USDA Choice Sirloin	2.52
Store Market Ground Beef	9.28
Store Pork Loin Chops	2.57
Jesse Jones Country Sausage	1.87
Jesse Jones Franks	1.82
Swift Hostess Ham	1.12
Ball Park Franks	1.37
Bass Farm Sausage	1.64
Oscar Meyer Sliced Bacon	4.19
Coke	1.82
Mellow Yellow	.898
Mountain Dew	.898
Pepsi	1.82
Natural Light Beer	.573
Miller Beer	1.14
Wonder Bread	5.39
Regular Cigarettes	1.34
100 Cigarettes	1.34
Store Large Grade A Eggs	4.34
Store Medium Grade A Eggs	2.79
Thomas English Muffins	.948
Pine State Whole Milk	8.80

TABLE 1

Prices of Selected Items at Five Supermarkets

for Products Included in the Price List

First Week	Discount	Challenger	Dixie	Store 4	Store 5
Hellman's Mayonnaise	1.49	1.49 *	1.99	1.89	1.65
Chef Boyardee Pizza	1.39	1.39 *	1.59	1.39 *	1.49
Hunt's Whole Tomatoes	.60	.60 *	.69	.60 *	.50
Jiffy Corn Muffin Mix	.22	.24	.25	.24	.25
Mazola Oil	1.99	1.99 *	2.15	1.89	2.19
Pillsbury Flour	.79	.79 *	.99	.99	.79 *
Maxwell House Coffee	2.19	2.33	2.29	2.19 *	2.19 *
Comet Cleanser	.69	.69 *	.85	.67	.75
Nabisco Oreo Cookies	1.89	1.85	1.99	1.99	1.89 *
Mrs. Smith's Apple Pie	2.94	2.94 *	3.69	3.49	1.89
Last Week					
Hellman's Mayonnaise	1.69	1.69 *	1.69 *	1.63	1.69 *
Chef Boyardee Pizza	1.44	1.44 *	1.45 *	1.45 *	1.49
Hunt's Whole Tomatoes	.50	.50 *	.50 *	.50 *	.50 *
Jiffy Corn Muffin Mix	.22	.22 *	.22 *	.22 *	.22 *
Mazola Oil	1.73	1.73 *	1.80	1.67	1.70
Pillsbury Flour	.79	.79 *	.79 *	.79 *	.79 *
Maxwell House Coffee	2.89	2.89 *	2.89 *	3.29	2.89 *
Comet Cleanser	.74	.74 *	.74 *	.74 *	.73 *
Nabisco Oreo Cookies	2.46	2.46 *	2.35	2.39	2.46 *
Mrs. Smith's Apple Pie	3.35	3.35 *	3.18	3.39	3.18

* denotes price match with Discount Store to within 1¢.

TABLE 2

Prices of Selected Items at Five Supermarkets

for Products Excluded from the Price List

First Week	Discount	Challenger	Dixie	Store 4	Store 5
Cut Green Beans	$ .35	.35 *	.33	.49	.33
Thin Sliced Bread	.59	.55	.48	.33	.50
Head Lettuce	.89	.69	.69	.99	.79
Pork Loin Chops	3.69	2.49	2.79	2.79	2.79
Ground Beef	1.69	1.69 *	.99	1.79	1.55
Swift Hostess Ham	8.99	8.99 *	9.98	9.99	9.99
Coke	.99	1.29	1.49	.89	1.39
Pepsi	1.47	1.19	1.29	1.69	.99
Large Grade A Eggs	1.33	1.37	1.37	1.29	1.47
Miller Beer	2.71	2.71 *	2.71 *	2.63	2.65
Last Week					
Cut Green Beans	.33	.33 *	.33 *	.40	.33 *
Thin Sliced Bread	.55	.69	.50	.50	.55 *
Head Lettuce	.89	.99	.99	.99	.49
Pork Loin Chops	3.49	2.99	2.99	3.29	3.39
Ground Beef	1.49	1.69	1.49 *	1.49 *	1.49 *
Swift Hostess Ham	9.99	9.99 *	7.99	10.99	10.99
Coke	1.09	.89	1.39	.99	1.49
Pepsi	1.29	1.39	.99	1.39	1.09
Large Grade A Eggs	.78	.49	.68	.79 *	.89
Miller Beer	2.84	2.84 *	2.84 *	2.85 *	2.85 *

* denotes price match with Discount Store to within 1¢.

TABLE 3

Percentage of Products with Price Identical to Discount Supermarket's

Part A: Products Included in the Price List

Year	Challenger	Dixie	Store 4	Store 5
1984	87.8	3.5	19.1	13.0
1985	85.6	69.5	24.1	29.5
1986	80.1	71.5	57.9	40.1

Part B: Products Excluded From the Price List

Year	Challenger	Dixie	Store 4	Store 5
1984	52.6	24.8	23.3	18.6
1985	51.9	41.0	36.9	33.6
1986	47.3	34.3	35.6	26.7

These are the average weekly percentage matches. Twelve weeks were sampled in 1984, twelve in 1985 and nine in 1986.

TABLE 4

Regression Equation for Relative Price of Included Products to Excluded Products for the Five-Store Average

Independent Variable	Coefficient	(t-ratio)
POLICY Variable	0.01634	(+3.335)**
Intercept	0.71390	(182.7)**

$N = 33$, $R^2 = 0.2640$

** denotes significance at 1%

POLICY variable equals 0 before Dixie introduces its price-matching policy and 1 afterwards.

TABLE 5

Regression Equation for Relative Price of Included Products to Excluded Products for the Five-Store Average

Independent Variable	Coefficient	(t-ratio)
Relative Match: Dixie with Discount Store	0.00836	(+3.164)**
Relative Match: Challenger with Discount Store	-0.01596	(-1.992)*
Intercept	0.74103	(+52.62)**

$N = 33$, $R^2 = 0.3070$

* denotes significance at 5% and ** denotes significance at 1%

Relative match is defined in equation (1).

TABLE 6

Price Indices of Discount Supermarket

Year	Included	Excluded	Relative
1984	$1.266	$1.799	0.704
1985	$1.330	$1.837	0.725
1986	$1.324	$1.787	0.741

TABLE 7

Regression Equation for Relative Price of Included Products to Excluded Products at the Discount Supermarket

Independent Variable	Coefficient	(t-ratio)
POLICY Variable	0.02728	(+4.912)**
Intercept	0.70432	(159.0)**

$N = 33$, $R^2 = 0.4377$

** denotes significance at 1%

POLICY variable equals 0 before Dixie introduces its price-matching policy and 1 afterward.

TABLE 8

Regression Equation for Relative Price of Included Products to Excluded Products at the Discount Supermarket

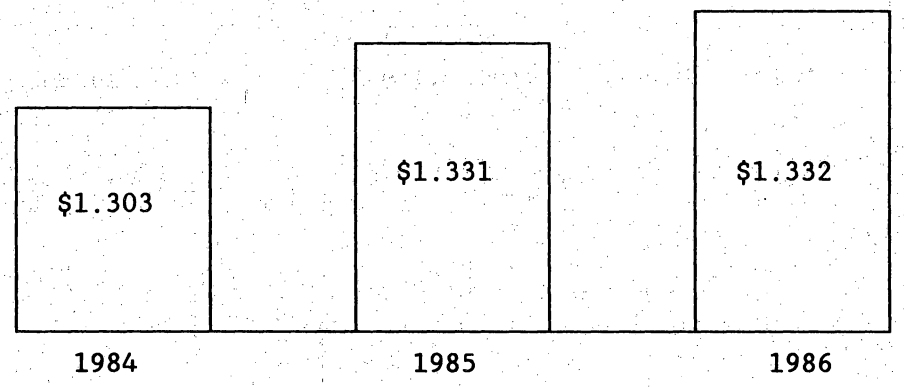
Independent Variable	Coefficient	(t-ratio)
Relative Match: Dixie with Discount Store	0.01478	(+4.791)**
Relative Match: Challenger with Discount Store	-0.00933	(-0.997)
Intercept	0.71901	(+43.747)**

$N = 33$, $R^2 = 0.4389$, ** denotes significance at 1%

Relative match variable is defined in equation (1).

FIGURE 1

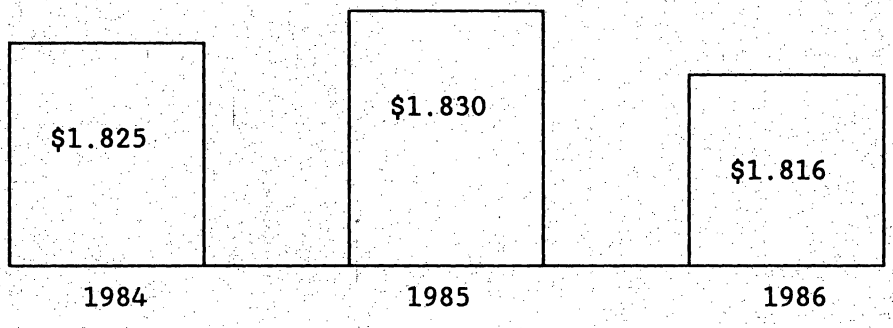
Average Market Prices for a Basket of Included Products



The prices are the average weekly price index for 79 products included in the Price List for the five stores weighted by market share. Twelve weeks were sampled in 1984, twelve in 1985 and nine in 1986.

FIGURE 2

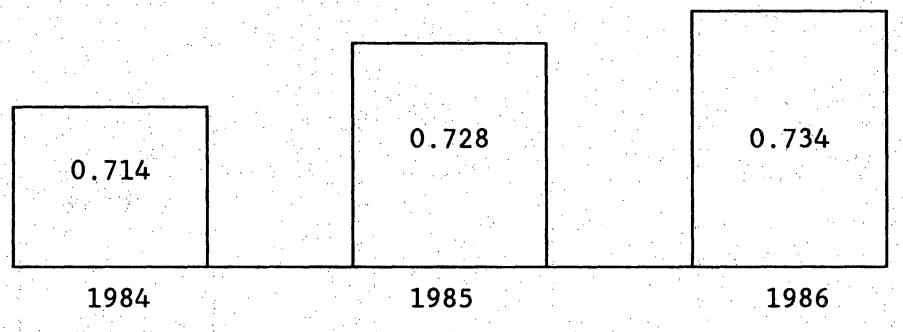
Average Market Prices for a Basket of Excluded Products



The prices are the average weekly price index for 35 products excluded in the Price List for the five stores weighted by market share. Twelve weeks were sampled in 1984, twelve in 1985 and nine in 1986.

FIGURE 3

Relative Price (Included/Excluded Products)



The relative prices are the average weekly ratio of the price index for products included in the Price List to the price index for excluded products.

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