Retail pricing of grocery stores in the Tucson metropolitan area

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RETAIL PRICING OF GROCERY STORES IN THE TUCSON METROPOLITAN AREA

by

Katherine Louise Acuna

A Thesis Submitted to the Faculty of the

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STATEMENT BY AUTHOR

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ABSTRACT

This study employs three ordinary least squares regression equations to analyze retail grocery store prices. The grocery stores studied were from the Tucson metropolitan area. The price data collected consisted of a typical market basket purchased in this market. Different price categories were analyzed in order to determine the relevance of interstore comparisons between two different brand categories, national brand and cheapest brand categories. Grocery prices for the two brands were tested to determine if the organization of retail grocery stores (chain and independents), location of the store, store neighborhood average income, and size (in square feet) of the grocery store affected price.

CHAPTER ONE

INTRODUCTION

Retail grocery stores have continually evolved with the lifestyles of consumers over the years. Grocery stores have located closer to consumers and shopping malls, with the supermarket chains concentrating in the middle to high income areas. Supermarket chains have increased in importance and size whereas the number of independently owned grocery stores has decreased over the years. Also, supermarkets have created their own private brand labels to compete with the national brands and to generate more sales. This interstore competition of supermarkets' own private brands with national brands has also extended to competition of private brands between grocery stores, supermarkets and independent stores alike. To compete in the retail food market, along with selling national brands, independent stores also sell private labels which the stores buy from manufacturers who produce private labels and sell to a variety of grocery stores.

Retail food price advertisements of private brands and national brands are reported regularly through the media. These prices are advertised in many forms, as individual items or as a typical grocery market basket. How food prices are advertised could influence the consumer on where to shop.

Retail grocery prices can be affected by statistical changes in the retail food market. Studies have shown that prices differ from one location to another, in different socioeconomic areas, among different

sizes and types of grocery stores, and between brand labels (national brands and private brands) within the stores.

Location has been shown to have an effect on retail grocery prices, subject to the closeness of the competition and the distance of the consumer. The further the consumer is from a grocery store, the greater the chance of another grocery store attracting the consumers away with lower prices. Also, the closer the competition is to another grocery store, the lower the prices.

There have been a lot of inconsistent reportings on the socio-economic influences on retail prices. Some studies have indicated that the price of food is higher in low-income areas, whereas other studies argued that the price of food is lower in low-income areas, depending on the items in the market basket.

Studies have shown that supermarket chains have lower prices than independent stores, a result that holds across various locations of the city under study. But when the size of the stores is considered along with the type of store, then the location of the chain and independent store has a different affect on price in some studies. Anywhere from the smallest to the largest grocery store was reported to be the private store, depending on the location of the grocery store.

Research shows that private label prices have been consistently lower than national brand labels. In some supermarkets, private label items are not of the same weight or volume as national brands, either the private brand would be one or two ounces higher or lower than the national brand. The form of competition between national brands and private brands depends partly on how the supermarket packages their

private brands. If the package volume is identical and/or the packaging strategy is similiar to that used for national brands, then it is more likely that the private brand is in close competition with the national brands. But if the weight of the item was not identical but the packaging was similiar or if both weight and packaging of the product were not similiar at all then the two brands are likely less comparable in the eyes of many consumers.

The objective of this thesis is to determine the effects of selected economic and social characteristics of the Tucson metropolitan market on local food price levels. In order to do this a cross-section of food stores in Tucson were surveyed on a weekly basis for four months. Price comparisons were based on several market baskets of commonly purchased items. By using alternative market baskets it will be possible to evaluate the usefulness of interstore comparisons. Conceivably, defining the comparison instrument according to different criteria can alter the implication of interstore comparisons.

1.1 RETAIL GROCERY STORES

The Consumer of the 80's

The increase of women in the labor force, and changing lifestyles and purchasing patterns during the late 1970's and early 1980's has resulted in less time to shop for food. This time is costly for shoppers. More working women means less time to shop, thus supermarkets must showcase their products to fit into the busy lives of modern consumers. Changes in consumers habits have also caused major changes in the supermarket industry. The trend is toward larger stores that offer a greater variety of products, services, and departments (Price

and Newton, 1986). The expanded products and services offered by larger stores are deli and baked goods counters, gourmet coffee sections, and gourmet meat counter. Consequently, larger supermarkets are replacing specialized and conventional stores, since the specialized stores are unable to compete with the service departments offered by the larger supermarkets (Handy and Kaufman, 1988). The services provided in the supermarket system of the 1980's offer customers flexibility and convenience in order to attract more shoppers and increase store sales (Price and Newton, 1986).

In 1981, nearly half of the consumers said they were buying more generic items, and more than half of them said that generics were important in shopping economically. But the numbers since 1986 are different since generics do not even receive strong support from shoppers who list low prices as a priority during shopping. Shoppers are emphasizing attributes such as food quality and a better shopping experience. It appears that they might be tiring of the low price emphasis. One message consumers seem to be drawing from stores emphasizing "slashed" or "minimum" prices is that regular prices are still high enough to be cut (Walzer, Weinstein and Sansolo, 1987). Shoppers may remain price conscious, but if quality becomes a greater concern more importance would be placed on quality characteristics of fresh items like produce and meat.

Emphasis is being placed on private brands to satisfy the consumers' desire of good quality at low prices. Private labels can be offered at lower prices because costly advertising and promotions are avoided. Also many private label products copy their national brand

competitors in formula and package design, therefore saving on development and market testing costs. To establish a good quality reputation, private labels are offered with money-back guarantees if not completely satisfied.

In early 1984 private label's share of supermarket sales grew to about 27 percent. With the increasing stress on private labels, they are expected to continue to grow and maintain a good part of the market share (Handy, 1985).

Merchandising Strategy

Most retail stores have taken on a new merchandising strategy, one based on the joy of food and shopping, rather than pursuing the lowest shopping bill possible. Retailers are putting more promotional stress on perishables and customer services as well as in-store promotions (Walzer, Weinstein and Sansolo, 1987). The advertising strategies of many supermarkets call attention to abundant services and self-service features, thus creating the image of being a high-quality store (Marks, 1987).

Many retailers are adding institutional and image messages to their traditional announcement of the week's price specials in advertisements. Some image promotions include television advertisements supporting many charitable causes and sponsorship of special local events. In many cases advertisements do not mention items, prices or even food at all. Another advertising approach that is gaining popularity is to devote a larger portion of a commercial to an institutional theme, and then tag on information about a current special feature or coupon offer. A number of retailers have added a new element to their television

advertisements - humor - to emphasize the stores' strengths and also create a strong customer identity (De Santa, 1987).

Expenditures on advertising are aimed at attracting nonshoppers into stores. Once in the store, however, the shopper apparently looks at more than merchandise assortment, services, and prices. Awareness of these other things provides the supermarket management with an additional basis upon which to make its stores something different and better to these potential new shoppers as well as to strengthen its position with regular shoppers (Andersen and Scott, 1970).

Consumer loyalty is an important feature in the retail food industry, with advertising aimed at luring shoppers away from their traditional store. Seventy-two percent of consumers' food dollars are spent in their primary store. The most loyal shoppers are those who rank one-stop shopping, helpful personnel and good service departments as their main reason for choosing a store. Since these shoppers are also those who usually run up the largest bills, food retailers find that there is a great opportunity for sales growth from potential new customers (Walzer, Weinstein and Sansolo, 1987).

1.2 DIFFERENCES AMONG RETAIL GROCERY STORES

Location

Retail grocery stores often disperse themselves in various locations within one market in order to compete for customers in all areas of the market area, and to make it more convenient for consumers to have access to them. Consumers have a greater tendency to buy from the store to whom they are closest (Black, Oslund, and Westbrook, 1985). The location of the store has a major impact on consumer choices, since

location affects consumers' decision on the grocery store they will patronize.

Literature on "spatial microeconomics" appears to be relevant for retail grocery stores because of their dispersion behavior (Benson and Faminow, 1985). Faminow and Benson (1985) utilized spatial microeconomic theory to analyze the effects of retail food price reporting systems (RFPRS) on price levels. Studies had found that consumers did not act on the price information made available to them by a RFPRS. Faminow and Benson reasoned that by making use of the spatial model, small patronage shifts would occur. Only consumers located near market boundaries would be expected to change grocery store patronage as a result of reductions in prices. Consumers located several blocks from a grocer are not likely to travel to a competitor located several miles away due to a small change in price differences. However, consumers located an equal distance from the two stores might be expected to patronize a store on such a difference (Faminow and Benson, 1985).

Consumer Income Level

Low income and elderly consumers have a disadvantage with transportation and economic accessibility which creates fewer choices available to them. Grocery stores also have greater marketing power in these neighborhoods and may exercise this power to the disadvantage of consumers by raising food prices, and limiting the variety of food by type, brand, and size. Prices of national brands tend to be higher and quality factors such as fresh products and store cleanliness tend to be worse. However low price items tend to be competitively priced in low income neighborhoods (Hall, 1983).

Studies have found that the low income consumers generally pay higher prices for food. Devine and Marion (1980) explained this phenomenon was due to lack of information in low income areas. A lower level of consumer search makes it difficult to police competition. Marion (1982) also found that since retail operating expenses were generally higher in poverty areas, the price of food was probably higher as well. Retail operating expenses are generally higher in neighborhoods which consist of mostly low income people (Marion, 1982). One reason for higher retail costs is the cost of security to prevent losses, theft, burglary and bad check expense due to the higher crime rate in low income neighborhoods (Hall, 1983). Another reason for higher retail costs is that the limited buying power of lower income shoppers results in smaller dollar expenditures for food. Therefore, fewer large supermarket chain stores remain in low income neighborhoods than in higher income neighborhoods (Marion, 1982).

Organization

There are two significant groups in the retail food industry, the corporate chains and the affiliated independents (Skinner, 1969). Most independent retailers are affiliated with other retailers or with wholesale distributors to obtain management assistance, private label merchandise, group advertising, and economies in buying and distribution that enable them to compete effectively with chains that operate their own warehouses (Grinnell, 1978). Chains can charge lower and more uniform prices throughout their system. Economies of size enable them to sell at lower prices than independents, and chains have the option of using revenues from more profitable operations to subsidize the higher

cost and often less profitable stores.

Brand Labels

Work done by the National Commission on Food Marketing indicated that on the average private label products sold for 20% less than national brand competitors (Padberg, 1975). Private label products permit a retailer to offer a substitute at a lower price than national brands. This practice contributes to a low price image. A retailer can promote private label products with the assurance that consumers who like the products cannot buy them from another retailer. Since consumers may not view competing retailers' private label products as being perfect substitutes, a firm would not be concerned that a competitor will have lower prices on a specific item (Grinnell, 1978).

Many large chains and smaller independent retailers offer top-line private labels that provide national brand quality at a lower price, as well as second-line products that contain less expensive ingredients and are lower quality. For consumers, private labels mean a choice in the mix of product quality and price. Retailers like the flexibility and full control in pricing and the higher profit margins for many private label items.

National brands are aggressively competing in order to halt the growth in the private label's market share. Manufacturers are fighting the increasing trend of private labels by offering incentives and allowances to make their products more attractive to retailers, protecting their designs and product specification from being copied and introducing unadvertised brands to compete more effectively on the basis of price. But with the strong private label programs in the large

retail chains and the increasingly sophisticated product lines most wholesalers are offering even to the small single-store retailer, private label sales are expected to grow at about the same rate as total store sales thus maintaining their overall market share (Handy, 1985).

1.3 OUTLOOK FOR THE THESIS

The thesis is organized into five chapters. The second chapter discusses literature and studies on retail price behavior, consumer search for retail prices and spatial competition and spatial variation in retail grocery prices. The third chapter explains the procedures involved in collection of the price data, presents and defines the empirical model and the theoretical description of the hypotheses. Chapter four reports the results of the empirical models that are estimated. Chapter five gives a brief summary of the results found, and compares these results with former studies.

CHAPTER TWO

REVIEW OF RELATED RESEARCH

This chapter presents a review of the literature and related research. Chapter 2 consists of three sections. The first section reports studies addressing why retail prices vary and what variables affect prices. The second section discusses the theory of consumer search for price information and the results of empirical research. The third section describes spatial competition theory and how it explains consumer and grocer behavior. This section also includes reviews of studies which consider store location.

2.1 STUDIES ON PRICE BEHAVIOR

Analysis of price information and behavior has taken three principle directions. First, monopolistic competition models have been extended to encompass a multiproduct firm in the retail food merchandising industry. Second, recognition that each firm's demand function is directly influenced by its relationship to other firms has instigated the analysis of the relationship between retail food firms and market price formation. Third, a greater thrust toward research within food firms has led to analyzing price with actual price setting by managers becoming the primary subject of observation. Although pricing practices within the retail food market can be explained, this approach does not provide a basis sufficient to obtain empirical models that closely approximate market conditions (Alderson and Shapiro).

In 1966, Paul Nelson designed a study to produce additional

insights in the general patterns of price merchandising for food retailing firms. His study identified and analyzed pricing of retail food markets and firms differing with respect to the size of the market, numbers and size of the firms and kinds of firms - chains and independents. One question Nelson (pp. 173) asked concerning price behavior in his design was "How do price merchandising activities differ among retailers of different organizational character and size?". His results showed that ownership category was significantly related to price-merchandising practices, defined as the number of times each kind of establishment changed its prices. The data showed variation of price-changing patterns within as well as between ownership types indicating that price increases and decreases do not show uniformity among stores of any one ownership type.

Also reported were the results of comparisons between different store sizes. Size did not show any significant explanation for pricing patterns. This result was expected because of the concentration of independent stores in the smallest size and chains in the largest size category.

In 1967, another price behavior study on retail food markets was conducted in Edmonton, Alberta, Canada. This research, by Hawkins, Warrack and Pattison, involved 72 food items and 23 supermarkets. Prices were collected and analyzed for 11 weeks. Noticeable price differences was observed among different regions of the city, which was hypothesized to be due to a more (less) competitive price level in regions with lower (higher) income levels.

In the middle of the price collection a government study on

consumer problems and inflation prices was released. The effects of the report on prices was impressive. Price levels and price volatility declined, and regional differences diminished. Food prices in the more competitive regions changed marginally, but dropped noticeably in the other areas of the city. As an interpretation of this market reaction, it was hypothesized by Hawkins, Warrack and Pattison that food retailers used consumer ignorance and immobility in formulating price strategy and were highly aware of income, educational, and mobility characteristics among clientele in separate market situations. Since there is a cost for searching for lower prices, consumers are unable to obtain their prefered product, service and price combination in the market. Because of imperfect information, price discrepancies can exist in the market place (Benson and Faminow, 1985).

These results led to a later study in the same city by Devine and Hawkins (1969). In this case a seventy-seven product market basket was priced for approximately six months in both chain and independent operations. Their analysis indicated that the more affluent areas had lower prices than the underprivileged sector of the city. In other words, income was negatively related to food price levels.

Discount retail food stores had the lowest aggregate price level, followed closely by the largest food chain in the market. However, in the largest food chain the average weighted price index was higher at the end of the each month corresponding to the increased number of advertised specials. Either the advertised specials were offset by increased prices in other items or specials were not price specials but advertisements representing normal or above normal prices. City-wide

advertisements were not rigidly adhered to by supermarkets. The frequency of advertising prices was staggered by retailers. Food bargains available during the interim between end-of-the-month pay checks were generally never advertised, but a relatively large amount of advertised information was distributed at the end of the month when the aggregate price level was highest. In other words, when the number of advertised price changes increased, the aggregate price level increased as well. Due to the negative findings of the Edmonton supermarkets and for fear of the findings being publicized, many of the supermarkets changed their public image to one of being more aware of socioeconomic characteristics and publicly lowered their prices (Devin and Hawkins, 1972).

Several studies were completed in the late 1960's and early 1970's which examined prices paid for food by different socioeconomic groups and provided mixed and somewhat different evidence than the concluding study. Sexton (1971, p. 420; 1973, p.145), in two separate articles based on studies in the Chicago and Washington, D.C. area, asked the questions "Do Blacks Pay More?" and "Do Inner City Stores Charge More?". Similiar studies were done by Marcus (1969) in the Los Angeles area and Goodman (1968, p.18) in the Philadelphia area asking the question "Do the Poor Pay More?". Results of these price comparison studies and others were mixed. But generally they found that prices charged by chain supermarkets were similiar in the inner city and suburbs as well as between the high and low income areas; that chain supermarkets tended to be located in higher income suburban areas; and that prices were high in smaller independent stores which were most common in low-income

neighborhoods. The absence of any strong fluctuations in prices between the high and low income areas suggests that chains did not set different prices for different areas, but in fact centrally set book prices (Sexton, 1973). Chain supermarkets typically utilize uniform pricing within a market area to facilitate advertising of price specials (Carman and Figueroa, 1986).

On the basis of the data collected for general food items in the Marcus article, the poor do not pay more. In fact the cost of food in the low-income area was actually slightly lower than in the high income area, which contradicts Devine and Hawkins research. But if two categories - meat and produce - were excluded from the data, the conclusion is reversed. That is, with meat and produce excluded, the cost of food in the low income area is consistently higher than in the high income area. This suggests that the actual composition of the market basket need for comparison is an important factor in explaining intramarket price variation. The greatest difference in the cost to the consumer can be traced to high prices charged by the "Ma and Pa" independent stores in the poverty area (Marcus, 1969). Independent operators have more flexibility in their pricing and enjoy lower labor costs.

Goodman's findings coincided with Marcus in that the poor do not pay more. The reason for this is that all but a small fraction of residents go outside their immediate vicinity for their principal food shopping. They may go to supermarkets or to competitively priced moderate-sized stores. In addition, price and quality may far outweigh location as a stated patronage factor and most families patronize more

than a single store. The second store chosen is more likely to be another supermarket or competitively priced independent outside the residents' area (Goodman, 1968).

Marion et al, 1979, conducted a study to test if retail grocery prices consisting of national brand and private label items are significantly influenced by the competitive structure of the market. They found that there was a considerable amount of variation in prices across markets - 12% or more for each chain. Prices were lowest in markets where firm rivalry was most intense, indicating that market size has a negative relationship to grocery prices. Their results also showed that store size had a negative relationship to prices, and that private label products in the grocery basket had little effect on statistical findings (Marion et al, 1979).

2.2 CONSUMER SEARCH

As the economic environment becomes more complicated, consumers have the opportunity of more choice and the accompanying burden of more difficult decision making. Information is a basic and essential ingredient of a market economy. The variety of available prices and the quality of products dramatically increases the time and effort necessary to gather information. Thus, the search for information becomes a more important part of the decision process for many consumers (Yeo, 1987).

Information is a valuable economic resource in the functioning of markets (Devine and Marion, 1980). Information equally available to the retailer and to the consumer is necessary for a competitive equilibrium. Disproportional information may give one party an advantage over the other thereby distorting the competitive process. Since the 1960's the

role of imperfect information has received increased attention. The catalyst for this activity was Stigler's work on the economics of information. He argued that faced with a purchase decision a buyer will search for price information among competing sellers until the marginal cost of an additional unit of information equals the marginal returns from the search activity involved (Stigler, 1961; Lesser and Hall, 1983).

One form of search is when consumers share information about the price and quality of goods offered by individual sellers. But as the number of sellers increase so does the dispersion of prices and quality in the market. Consumer search therefore becomes more costly, and the likelihood that a seller will attract new clients by reducing price has diminished. As a result the elasticity of demand faced by sellers falls, which may lead to an increase in price (Hollander, 1986). On the other hand, as the price variance increases there may be greater potential gains for consumers to search for prices so that the final outcome depends on the marginal impacts on search cost and gains from search.

The costs of search consist of actual out-of-pocket expenses and the opportunity cost of shopping time involved, which is generally approximated at the margin by the wage rate or some other fraction of income. The marginal returns - the savings to the consumer which result from the gathering of knowledge through additional units of search - can be approximated by the reduction in price times the quantity purchased of the particular commodity. Thus, the optimum search for the i^{th} commodity by the j^{th} individual requires $MR_{ij}=MC_{ij}$.

Jung Sung Yeo (1987) showed that the higher the level of an individual's or family's income the greater the number of stores visited. A surprising finding is that exchange of information among consumers does not always create savings. Discussions with other consumers decreases the level of final savings so that the consumer could not evaluate or use the information from interpersonal search well enough to benefit. Therefore, the less the purchase is discussed with others, the higher the final savings (Yeo, 1987).

Since consumers may not benefit by exchanging information, alternative forms of disseminating accurate and credible information might be used. Devine and Marion (1980) carried out an experiment in which they published retail food price information through a public agency and examined the effects. The research examined the influence of increased comparative price information on the dispersion of retail food prices and on consumer satisfaction. Benefits of the information program were also assessed. This study indicated that the performance of markets can be affected significantly by the distribution of accurate and credible retail food price information. In response to the publication of the price information, the dispersion of prices across the stores and chains narrowed. In fact, the higher priced stores and chains dropped prices more than relatively low priced stores.

The increase of price information was expected to be especially helpful in low income areas since there is a lower level of consumer search to affect prices and competition. Price data supported this expectation. The lower income areas had significantly higher prices during the pre-information period than the higher income area. During

the information program, prices in the lower income areas dropped. During the post information period there were no significant differences in prices by income area.

The comparative price information program appeared to increase consumer satisfaction with food stores. Although consumers were satisfied with their ability to choose between stores, they were less satisfied with the information available to compare stores. Consumers benefited from the price information program whether they used the information or not. The fact that they could have used the information was enough to create a price decline where all consumers can benefit (Devine and Marion, 1980).

Other researchers have questioned whether publicly reported retail food prices allow consumers to judge relative price levels of competing foodstores. One such experiment was conducted by McCracken, Boynton and Blake (1982). The objective of this research was to investigate the potential of retail food price reporting for improving consumer price information. Improved consumer information was measured by the change in prices in the marketplace. They found that price reporting can lower the level of food prices, both for items individually identified in the price report and items not identified in the report. The survey results showed that consumers used price information for general information, not as an influence to their store choice decision. The price reports changed some consumers' perceptions of high- and low-priced foodstores, but when store patronage patterns were examined, pre and post, these patterns did not change to reinforce the competitive effects of the price reports (McCracken et al, 1982).

Boynton, Blake and Uhl (1983) also analyzed the affects of retail price reporting on the food market. They examined the effects of publicizing food store price differences (identifying the retail food store) on the behavior of the retail food firms and food shoppers. They hypothesized that by increasing consumer price information, price level and price dispersions will fall in the market. The results indicated that by publicizing the price reports, the price of the market basket fell during the publication period. No decline in price dispersion on the reported market basket was found. This result contradicts the previous study by Devine and Marion (1979) which showed a significant decline in price dispersion.

Shoppers used the reports for general information, i.e. to better understand how prices varied from store to store and to observe how food prices changed over time. They did not use the reports to make store, product or brand decisions. The published information did not change consumers' awareness of highest and lowest priced food stores. Very few consumers changed their food store choices because of the published information. As a result of these findings, consumer behavior and store patronage patterns demonstrated that the price reports had no effect on the retail food market (Boynton, Blake and Uhl, 1983).

Lesser and Hall (1983) approached retail food price reporting differently. Instead of reporting names of the retail grocery stores along with the prices the stores offered on items, they only reported the prices of the items, excluding store identification. They felt that by reporting only the prices individual shoppers' perceptions of price dispersions would improve, and in cases where the prices were under-

perceived, lead to a search for lower prices. Those who made use of the reported prices could not be shown to have paid lower prices or to have shopped more efficiently than non-users. Thus, there was no evidence that users were more efficient searchers as a result of the report than non-users, and there were no consistent differences in perception of price dispersions between users and non-users (Lesser and Hall, 1983).

Studies have shown that shopping more than one grocery store saves money on food purchase. But there are secondary costs to shopping around - transportation and time. Crowell and Bowers (1977) undertook a study to determine whether consumers save money on a weekly market basket by shopping more than one supermarket when the secondary costs of transportation and time were considered. For the study four supermarket chains in the Columbus, Ohio area were selected because of their geographical dispersion and their market share in the area. Since the greatest distance between stores in any area was 4.2 miles, a shopper could visit all four stores when shopping. It was assumed that grocery shopping occurred in one trip. The findings of the research found that the difference in market basket price among the stores ranged from $1.68 to $5.19. In order to obtain the lowest price basket a consumer would have had to purchase items at all four stores in an area. By shopping the four supermarkets purchasing items at the lowest price available, a consumer could save between seven and fourteen percent as compared to purchasing the same items in one store.

When only transportation costs were considered, shopping at all four stores in an area gave the lowest market basket price. A combination of three stores shopped usually gave a lower price market

basket than any of the two store combinations.

When time costs were added the pattern changed. Shopping all four supermarkets no longer resulted in the lowest priced market basket. The lowest market basket was obtained by shopping two stores. Time is an important factor in acheiving the lowest priced market basket. Opportunity costs of spending time shopping is different for each individual. For retired consumers with low opportunity costs, time spent shopping three or four supermarkets can lead to buying items at a lower price. For the fully employed shopper, opportunity costs are lowered by shopping at one familiar supermarket which is geographically convenient (Crowell and Bowers, 1977).

2.3 SPATIAL COMPETITION MODEL AND SPATIAL VARIATION IN GROCERY PRICES

Spatial Competition Model

Hotelling (1929) originally formulated the spatial competition model. He stated that there are two distinguishing features of spatial competition as opposed to nonspatial models. The first is transportation cost. If transportation was costless, firms would have no protection from spatially separated rivals and a firm 1,000 miles away would be able to compete as easily as the one next door. As a result, space would not matter. The distance of one firm to another would not be considered as a cost factor when shopping. Thus, perfect competition would occur. Since distance and transportation among firms does play a large role when deciding on stores to shop, transport cost gives the firm some monopoly power over customers located close to it.

The second essential feature is that average cost curves must be downward sloping, which is due to either fixed costs or economies of

scale in production. If average cost curves are not downwardly sloped throughout the entire range, there will be no advantage to concentrate production at specific locations since the advantage of economies of scale in production do not prevail. This would cause spatial competition to disappear because consumers could produce their own food just as cheaply as any concentrated firm (Capozza and Van Order, 1978).

Competition among sellers for consumers in a spatial competition model is typical of an oligopolistic competition. Even when there are a large number of sellers in a marketplace any one seller typically considers his nearest rivals to be major competitors for the consumers in that vicinity. Thus spatial competition is really oligopolistic competition. In nonoligopoly models, price and output decisions are considered by only costs and revenues. But in oligopoly models expectations of rival reactions to a pricing policy are also considered.

In order to illustrate time and transportation costs in consumer choices and oligopolistic competition in a spatial competition model, consider the following: a single retail food store is located in a particular market area where no rivals exist. This store sells to consumers who are evenly and continuously distributed over the market area and sell at prices which consist of the store's prices plus delivery costs to the consumer. Delivery costs represent the costs a consumer incurs in traveling to the store and returning purchases home. There are some potential consumers who choose not to patronize this store because of the high transport costs they will face. The single retail food store commands prices of a spatial monopolist.

Assume a second retail food store enters the market and locates at

the furthest distance the first retail food store had consumers, thus causing the second store to compete for some of the first stores' consumers. Price setting now involves oligopolistic competition. The service area of the first store becomes smaller since some of its service area is going to the second store. Store number two now sells to consumers located over the particular market area in question minus the area that store number one sells to. Thus, maximize profit for the first store now becomes smaller.

Two phenomena came about after the entry of the second store. First, additional consumers were being served. Second, many consumers now pay lower delivery costs due to the shift in patronage. This increase in the number of sellers in a spatial model increases both supply and demand, which causes prices to rise and reduces selling area.

A consequence of entry and reduced market selling area is that the price under competition is higher than the monopolistic price. In a spatial market a reduction in retailer's selling area can lead to higher store prices even though average market prices may fall (Benson and Faminow, 1985).

Spatial Variation in Grocery Prices

Losch (1954), presented two main themes in spatial variation in grocery prices: (1) existence of spatial price variation in the market area and (2) spatial variations on prices significantly affects social welfare.

Losch's first theme was tested by Warntz (1959) who found an apparent influence of spatial variations in the market area. The second theme was examined by Campbell and Chisholm (1970), Parker (1974), and

Poole and O'Farrell (1972) (Hay and Johnston, 1980).

Campbell and Chisholm examined price variations of the cheapest brands in a market basket. In an effort to explain these price variations, their initial hypothesis was that shops located in the central area are more accessible to the total population than those in suburban and village locations and, therefore, have a larger potential clientele. These centrally located shops should enjoy economies of scale, while also operating in a highly competitive environment, and should, therefore, charge lower prices than other shops. The researchers also realized that other factors would also act as determinants of the price level. Thus the variables analyzed were (1) precise location, (2) floor area of the shop, (3) retail organization (independent and chain), (4) type of shop (grocery store, general store, grocery section of a department store, and grocery-cum-delicatessan), (5) size of shopping center (measured by the number of shops of all kinds in the immediate vicinity, and (6) social class of the area in which the shop was located. These six variables were tested in an attempt to isolate those related to price variations. The authors found that only three of the variables showed any relationship to price, thus confirming a more limited hypothesis that the price charged is a function of the shop's location (closeness to the city center), size and retail organization (Campbell and Chisholm, 1970).

O'Farrell and Poole analyzed the variations of prices on an intra-regional level - in contrast to the intra-urban project of Campbell and Chisholm. They used "standard" prices for their market basket as opposed to cheapest in Campbell and Chisholm's report. The goods in the

market basket were carefully selected to achieve standardization by weight, volume and brand name in order to guarantee absolute homogeneity of product. The authors tested several hypotheses as follows: (1) there is a negative relationship between store size and price, (2) price is partially a function of the ownership - type of store (independents and chains), (3) the greater number of stores in a center, the more intense will be the degree of competition and the lower the level of prices, (4) there is a difference in price levels between towns in the relatively prosperous area close to the major distribution center and those in the poorer and more remote areas, (4a) accessibility to the major wholesale distribution permits lower prices in the relatively more prosperous area, (4b) lower incomes in the more remote areas discourage entrepreneurs from charging high prices, and (5) price levels in central places that are nearest neighbors are not significantly different from one another because they share market areas.

The first hypothesis (that there is an inverse relationship between store size and price) was not confirmed. Concerning the second hypothesis, highest prices occurred in the independent stores while the lowest mean price was found in the multiple chain stores. Regarding the third hypothesis, there was no statistically significant difference between number of stores in the center and greater competition among these stores. The authors concluded from their findings that the benefits to the consumer in the form of lower prices are less real than popular opinion might support (O'Farrell and Poole, 1972).

Parker's study was an investigation into the variations in retail grocery prices and is very similiar to the previous two studies. The

study is intra-urban like that of Campbell and Chisholm, yet in analysis it is related more to O'Farrell and Poole's study since it is concerned with examining significant differences in retail prices in relation to different variables. The hypotheses of the three studies are also very similiar. The hypotheses in Parker's study are as follows: (1) differences in organizational structure might significantly account for price variables. Three major categories were identified: supermarket chains, retailers affiliated to a retail or wholesale buying group, and independent retailers. (2) Lower prices are associated with larger stores, since these acheive greater economies of scale. Store size was measured by the number of full-time and part-time persons and the square footage of the selling area. (3) The actual location of a store may affect retail prices. To measure this hypothesis each store was classified as belonging to one of three categories: a planned shopping center; adjacent to other shops; or isolated. (4) There is a significant difference in prices between those stores serving predominantly corporation housing areas and those serving private housing areas. Those stores serving predominantly corporation housing areas are hypothesized to be more expensive. (5) The closer a store is to another grocery outlet the lower will be its price level.

The results of the study showed that the supermarket chains were the cheapest grocery stores and the independent retailers were the most expensive. These findings are in agreement with Campbell and Chisholm's study, which also found that supermarket chains had the cheapest basket of goods. The differences in retail prices by organizational structure were tested both between and within different areas of the city.

Independent retailers in the southern suburbs were significantly cheaper than those in the northern suburbs, and supermarkets were the cheapest in both the northern and southern suburbs. The largest group of stores were significantly cheaper throughout the city. A comparison of similiar sized stores for both the smallest and middle sized stores showed that the smallest stores were cheaper on the southside whilst the middle sized stores were cheaper on the north side. The hypothesis that stores in planned centers were cheaper than any other stores, and stores adjacent to other shops were cheaper than isolated grocery stores was confirmed. No difference occurred in retail prices between private and corporation housing areas. For the two nearest neighbor hypothesis the only significant difference in prices was that for the city as a whole, stores where the nearest neighbor of either the same or different organisational type was less than 0.2 of a mile away were cheaper than stores where the nearest neighbor was between 0.2 and 0.6 of a mile away (Parker, 1974).

The previous three reports analyzed hypotheses of what variables significantly influence the variation of grocery prices by location. One of the hypotheses stated that relatively isolated stores should be able to charge higher prices for groceries. Johnston and Hay argue against this hypothesis, stating that the free-standing establishments should be cheaper than those in the shopping centers, not more expensive. The authors theorize that if a grocery store is located in or adjacent to a shopping center, when customers visit the store they can also visit the adjacent establishments at no additional travel costs. Whereas extra travel costs would have to be incurred by visiting

a free standing grocery store. Benefits can be incurred in the store located near or in a shopping center because it has a more favorable site than its competitors, therefore it can capitalize on the economies by raising its prices (Hay and Johnston, 1980).

Given that distance of retail food stores and travel costs are important to consumers, retailers generally adjust pricing strategies to meet their closest (spatial) competition. Thus the distance cost affect marketing decisions. In spatial competition each seller recognizes that nearby rivals are his major competitors, so he expects that they will notice his price changes and respond. From the consumer's perspective, distance costs are accrued in terms of actual out-of-pocket expenses and the opportunity cost of time. Consumers located several blocks from a store may not travel to another store located several miles away to obtain a small reduction in prices. However, consumers located right in between two stores might be expected to base store selection on such a difference since individual demand is more elastic for consumers located an equal distance to two or more stores (Faminow and Benson, 1985).

CHAPTER THREE

DATA SELECTION AND THE EMPIRICAL MODEL

This chapter defines the data selection procedures and the empirical model. Selection of the market basket, market area and stores, and the problems which arose while collecting retail grocery prices are explained in the section on data selection. The empirical model developed analyzes the effect that the variables STORE (store specific dummy variable), INCOME (neighborhood income), and SIZE (size of the store) have on retail grocery prices for both national and cheapest brand labels. This section shows how each of the regression equations for national brands and cheapest brands were estimated, describing the statistical tests used.

3.1 Data Selection

A forty-four item judgement market basket for a "typical" family of four was constructed for this study (Table 3.1). Most of the items in the market basket are used by a common U.S. family of four. To make the market basket generally resemble an average Tucson family's diet, products which were indigenous to the Tucson area were also chosen. These products were flour tortillas, Farmer John bacon (Farmer John is a regional brand), refried beans and picante sauce.

The market basket was broken down into six categories: 1) cereal/bakery, 2) meats/poultry, 3) dairy/eggs, 4) canned/packaged, 5) fresh produce and 6) nonfood. These six categories were taken from a foodstore pricing study by Uhl, Boynton and Blake (1981). The item

choice in their market basket was judgemental and selected based on the Bureau of Labor Statistics monthly pricing list of food and non-food items, the consumer price index, those items frequently purchased, and a desire for a broad representation of food and non-food items (Uhl, Boynton and Blake, loc cit).

To obtain a market basket of a typical grocery purchase, the market basket from the Uhl, Boynton and Blake study, weekly newspaper advertised specials, and the USDA nutritional requirements for a family of four obtained from a USDA publication "Making Food Dollars Count, Nutritious Meals at Low Cost" were analyzed. The market basket construed is strictly a judgment basket. Items from Boynton, Blake and Uhl's market basket were randomly chosen, keeping the USDA nutritional factors in mind. Forty-four items were chosen for this study. All the stores considered for the study were visited to make sure that they carried all the same national brands and the same sizes in the market basket. A few items were changed and matched to other stores until the market basket was constructed.

Table 3.1: The Market Basket

A. CEREAL/BAKERY	SIZE	NATIONAL	CHEAPEST
1. Kelloggs corn flakes	18 oz.		X
2. Quaker instant oatmeal	12 oz.	X	X
3. Rainbow white bread-thin	16 oz.	X	X
4. Keebler soft batch cookies	16 oz.		X
5. Premium saltine crackers	16 oz.	X	X
6. La Suprema flour tortillas	1 doz.		X
B. MEATS/POULTRY			
1. ground beef-premium	16 oz.	X	X
2. Oscar Meyer bologna	16 oz.		X
3. pork chops	16 oz.	X	X
4. round steak-top	16 oz.		
5. fryer-cut	16 oz.		
6. fryer-whole	16 oz.	X	X
7. Farmer John bacon	16 oz.	X	X
C. DAIRY/EGGS			
1. grade AA medium eggs	1 doz.		
2. 2% low fat milk	.5 gal		X
3. skim milk	.5 gal		X
4. whole milk	.5 gal		X
5. Kraft American single	12 oz.	X	X
6. Blue Bonnet margarine qtr.	16 oz.	X	X
7. Breyers ice cream-vanilla	.5 gal		X
D. CANNED/PACKAGED			
1. Picsweet mixed vegetables	16 oz.		
2. Green Giant corn	17 oz.		X
3. Folgers coffee-regular ground	16 oz.	X	X
4. Minute Maid orange juice	64 oz.		X
5. Ragu spaghetti sauce	32 oz.	X	X
6. Carnation instant cocoa	12 oz.		X
7. Old El Paso taco shells	1 doz.		X
8. Pace Picante sauce	16 oz.		X
9. Coke-canned	6 pack	X	X
10. Jiff peanut butter	18 oz.	X	X
11. Smuckers grape jelly	18 oz.		X
12. Rosarita refried beans	30 oz.	X	X
13. Starkist tuna-oil	6.5 oz.	X	X
14. Budweiser beer	72 oz.		
15. Miller beer	72 oz.		
E. FRESH PRODUCE			
1. lettuce	each	X	X
2. carrots	1 lb.	X	X
3. tomatoes - large	1 lb	X	X
4. potatoes	5 lb	X	X
5. yellow corn	1 lb	X	X
F. NON-FOOD			
1. Crest toothpaste	6.4 oz.	X	X
2. Tide laundry detergent	42 oz.	X	X
3. Ivory shampoo	16 oz.		X
4. Pampers-ultra	48 ct.		

Brand Labels

The size, weight and volume of the items priced were uniform throughout all stores for both national and cheapest brands. When checking the stores for national brands, the volume, weight and size was an important consideration in order to guarantee homogeneity of the products among all the stores when collecting prices.

Of the items chosen for the market basket, national brands and cheapest brand labels were priced. Data for these two product classes were collected so as to compare and contrast the differences in prices and to determine whether different brands compete with each other within the store.

The cheapest brands include any brand which had the lowest price at the time prices were collected. The cheapest could be a national brand or a private brand. No generic brands were included in the study.

House brands were also priced as a specific brand category but were later excluded from specific analysis because of the lack of house brands in all the stores surveyed. House brand price data were collected for the national and regional chain stores in the sample since they all carried their own house brand labels. But the independent grocery stores did not carry house brands, so house brand price data were not collected for these stores. The reasoning for these six stores not carrying house brands comes from Handy and Padberg's (1971) paper on the competitive behavior of food industries. The chain stores, or as Handy and Padberg refer to them, core distributors, have a competetive advantage over the independent stores (fringe distributors) due to size. Core distributors have their own warehouse and manufacturing plants

where they can produce their own private labels, i.e. house brands. Whereas fringe distributors aren't large enough to have manufacturing plants produce their own house brands (Handy and Padberg, 1971).

Collection Days

Prices of the forty item market basket were collected every week on Thursdays and Fridays over a seventeen week period from the week of February 8 to the week of June 1, 1987. All the stores surveyed were called and asked when they changed their weekly prices. The general answer was either Tuesday or Wednesday. The week's grocery price advertisement in the Wednesday paper (effective date usually being Wednesday to Tuesday) was also taken into consideration as a stable price period. It was necessary that the stores surveyed be visited on the same day to obtain an accurate indication of prices. But the constraint of the price data collectors' schedules did not make one-day collection possible. A two-day collection period was determined appropriate for the data collection process. Given all of this information, Thursdays and Fridays were chosen for the collection days, since prices generally were not changed on Thursday or Friday.

Past studies on retail price comparison (Boynton, Blake and Uhl; Devine and Marion; Devine and Hawkins; O'Farrell and Poole; Campbell and Chisholm; Mccracken, Boynton and Blake; and Alcaly) collected price data for a period of anywhere from one day to twenty-five weeks. In order to evaluate price relationships over time, it was desirable to track price observations over the most extended time period attainable. But due to time constraints, the longest collection period possible was over one semester. Thus, a seventeen week collection period was decided upon for

analysis.

Market Area Selection

Each retail food store was estimated as having a potential service area of 2.6 square miles, which overlaps its competitors' service area. In order to establish the 2.6 square mile service area, the following procedure was applied. First, all the stores were plotted on a Tucson map. The map was then broken down into legislative districts and socioeconomic areas within Tucson. The population density was also plotted. The number of retail grocery stores in the Tucson metropolitan area during the time under study, 135 retail stores were then divided by the total square mileage of the Tucson metropolitan area, 351 square miles. The number obtained was 2.6 square miles. Using the scaled mile legion from the map, 2.6 square miles was measured throughout the map, controlling for population and number of stores.

The market area in the study was deliberately scattered over the entire metropolitan area. Ten locations were established on the north, south and east side of Tucson based on the 2.6 square mile service area, close competition, and socioeconomic information obtained from "The Tucson Trends 1986". There were not any stores on the west side of Tucson, so no store location was established in this area.

All ten locations were visited to check the size, organization of the store and number of stores in each location in order to have locations on all three sides of town comparable with each other. Each location consisted of one to four retail grocery store(s) depending on the number of stores within the 2.6 square mile area.

These ten locations were then classified into four "mean household

income groups" which were $20,000 or less, $20,000 to $24,999, $25,000 to $29,999, and $30,000 or more. The income information was obtained form the "Tucson Trends, 1986" publication.

Store Selection

A subjective sample consisting of 23 retail grocery stores - excluding convenience stores - in the Tucson metropolitan area was chosen. There were 135 grocery stores in this area during the period under study which encompassed 351 square miles. The store selection was subjective due to the manner in which they were chosen. If there were stores on one side of town with a certain number of supermarket chains and/or independent stores, then the same number of type or organization of stores was chosen on other sides of town (if possible) in order to have comparable service areas.

The retail grocery stores were classified into two categories: 1) organization and 2) size. The organization of the store was categorized as either chain or independent. The retail grocery stores were separated into these two groups because of the difference in retailing the two types of organizations practice. The chain grocery stores were larger stores with the advantages of cost and efficiency as well as manufacturing of their own brand labels. The chain stores had an economic appeal and/or advertising campaign. The independent grocery stores were small and medium size stores with the advantage of greater merchandising flexibility which they use to adapt to the needs of the communities they serve. For the independence to be competitive with the chains, the independent grocers emphasize quality products and innovative store design (Handy and Padberg, 1971). In this study there

were sixteen chain stores, six independent stores and one bulk discount store.

The selling area inside the store was physically measured. All twenty-three stores were personally entered and the store's selling area estimated. The size of the stores was grouped as either large-6000 ft^2 or greater, medium/large-5999 ft^2 to 5000 ft^2, medium-4999 ft^2 to 3001 ft^2,and small-less than 3000 ft^2.

The selling area, which is defined as the size of the store had to be physically measured because of the discrepancy of size information available. The Shopping Center Directory, 1987-27th Edition for the West was used to obtain size information for the grocery stores. Not all of the grocery stores in the study were listed in this directory, and those stores which were, used the "gross leasable area (GLA)" in square feet as a measurement. GLA is defined as the total floor area including basements, mezzanines, and upper floors measured from the center line of joining partitions and from the outside wall faces. These measurements ranged from 24,000 ft^2 to 50,000 ft^2. Since not all size information was available for the grocery stores, and it was not feasible to measure those stores by the GLA measurement, all of the stores in the study were independently measured by a graduate student involved in the price collection.

Price Collection Problems

The price collection was conducted by two Agricultural Economic graduate students. Stores were divided between the two students, and prices were collected on a weekly basis for seventeen weeks. All prices were entered on the computer using Lotus 123.

Problems arose early in the price collection procedure. A discount store was not cooperative in allowing the pricing to proceed. The student who was collecting prices in that store had to verbally explain to the store manager and in a follow-up letter the exact nature of the study, ensuring store confidentiality. Another problem which arose occured in general independent grocery stores. The owners would follow the price collector around the store, incessantly asking where the student was from and what she was doing. But after numerous visits to the store with the same incident constantly happening and the price collector repeating the same answer, the owners finally stopped asking.

3.2 Empirical Model

The general model used to analyze the retail grocery prices for national and cheapest brands from the price data collected in the Tucson metropolitan area discussed in the previous section is defined as,

(3.2a) PRICE=F(STORE, INCOME, SIZE)

where: PRICE - retail grocery prices;
STORE - grocery store identity;
INCOME - neighborhood income; and
SIZE - physical size of the grocery store.

Three specific equations were developed from this general model. In addition, alternative variable definitions for prices were used. The market baskets analyzed included the price of the aggregate market basket, the aggregate prices of each category (cereal/bakery, meats/poultry, dairy/eggs, canned/packaged, and non-food items), and the prices of individual items. The Fresh Produce price category was not

estimated because the cheapest and national brand prices were the same since there were no differences in brands for the items in the Fresh Produce category.

This model was constructed in order to estimate and compare the national and cheapest brand prices for the market basket, the prices for the categories and the prices for individual products. The significant effect on the price levels were analyzed when these three prices were compared within a store and among other stores.

The Variables

The dependent variables for the three regression models were: (1) the amount of the entire market basket (MKTBSKT), (2) the amount of each category (CATEGORY); and (3) the price of individual goods in the market basket (ITEM). Each of these dependent variables was developed for both national brands and cheapest brands. Three independent variables; 1) store identity (STORE), 2) income of the stores' neighborhood (INCOME), and 3) size of the store (SIZE) were tested in the models. In addition, in the model which used ITEM as a dependent variable an item - specific dummy variable was included to account for price differences between items in the market basket.

The variables income and size were subclassified into four discrete variables. The income subvariables were less than $20,000 (INCOME1), $20,000 to $24,999 (INCOME2), $30,000 or more (INCOME3), and $25,000 to $29,999 (INCOME4). The size subvariables were large (SIZE1), medium/large (SIZE2), medium (SIZE3), and small (SIZE4). INCOME4 and SIZE2 were used as the base variables and therefore excluded from the regression model for all equations.

Variables considered to influence grocery pricing for the two brand types (national and cheapest) were the identity and size of the store, and socio-economic characteristics of the market area. These variables were chosen because they could be easily observed and measured by the consumer. Variables easily obtainable could aide in the consumer's understanding of which grocery stores have a greater fluctuation in prices within the national and cheapest brand categories.

The store variable was the key variable in the model since the analysis concentrated on interstore comparisons between the two brand categories, and the impact on the three different price levels (individual items, market basket, and categories). Supermarket chains, independent retail groceries, and a discount store were chosen in order to analyze the pricing strategy of the different stores within a particular store and between the stores.

There are twelve store identity variables in the model which encompasses the twenty-three retail grocery stores. The chain supermarkets were grouped as one variable for each chain name and the independent stores were each grouped as one variable for each independent name. The store variables were classified as follows: STORE1 is a chain variable which includes six of the same supermarkets (located in different areas of the city); STORE2 is a chain variable with three same supermarkets; STORE3 is a chain variable, comprising two identical supermarkets; STORE4 is a chain supermarket which contains all of the same four supermarkets; STORE5, and STORE6 are each one individual independent grocery; STORE7 is one chain supermarket; STORE8 and STORE9 are each an independent store; STORE10 is a discount grocery

store; STORE11 and STORE12 are each independent store.

The estimation was over seventeen weeks using the two price categories: 1) national brand and 2) cheapest brand prices. Price data for individual products, categories, and market baskets was compared for the two brands to analyze the variation of prices and compare the pricing strategy of the different stores.

Seven regressions for national brands and seven regressions for cheapest brands were analyzed. The seven equations each had a different dependent variable, which were (1) the price of individual items, (2) the price of the market basket, (3) the price of the Cereal/Bakery category, (4) the price of the Meats/Poultry category, (5) the price of the Dairy/Eggs category, (6) the price of Canned/Packaged category, and (7) the price of the Non-Food category. The independent variables were the same for each equation. The regression models for the national and cheapest brand labels are exactly the same, except for the amount of data used. Due to missing price data, the market basket for the national brands consisted of twenty-two items, whereas the market basket for the cheapest brands consisted of thirty-seven items. The reason for the inconsistent amount of price data for the two categories was that over the seventeen week survey period, only twenty-two out of forty-four national brand items had all the price data available. Whereas thirty-seven cheapest brand products out of the forty-four item survey had all seventeen weeks prices.

National and cheapest brand labels could not be accurately compared for two main reasons: (1) there were fifteen more items in the private brand market basket, and (2) in analyzing national brands,

homogenous products were being compared throughout all stores because the same brand label was being priced. But in analyzing cheapest brands, heterogeneous products - products of different qualities - were compared throughout all stores since only the cheapest i.e. different brand labels were being priced.

Estimating the Model

Pooled cross-section and time-series techniques were employed in examining the data. All of the independent variables were invariant over the study period, so the model was essentially a cross sectional analysis where the dependent variables changed through time but the values of the explanatory variables did not. In the analysis of the data, the effect the independent variables had on the dependent variables were examined. To estimate the significance of the independent variables over time a model using only dummy variables was employed. Since all of the independent variables were qualitative explanatory variables, a model with dummy variables was used to test the hypotheses.

Ordinary least-squares method was utilized in the regressions using the SPSS/PC+ computer program to analyze the price data. Each regression was individually tested using the t-test to measure the significance of the independent variables to the dependent variables.

SPSS/PC+ had a default to detect if multicollinearity was present among the independent variables, which was the Tolerance default. All variables must pass the tolerance, which had a minimum value of 0.01, in order to be able to enter into the equation. The tolerance default was set at this minimum value to avoid computaional problems in the

regression results, since the smaller the tolerance the larger the standard error of the coefficient. If a variable had a tolerance level below 0.01, then that variable was not entered into the equation (Noriusis, 1986).

There were some cases where store specific dummy variables did not pass the tolerance minimum value. Results for these stores were not reported. Thus, the potential existence of multicollinearity is avoided since these stores had price movements the same or very similiar to one or more other stores.

The variables which were normalized on were those which were considered the most "typical" or "average" of the variables. The store eliminated in the model was a chain supermarket which appeared, by observing the price data, to be neither consistently high priced nor low priced, but had average prices over the seventeen week price data. The income variable eliminated, since it was regarded as being the mean income level of the study market area, was the income level $25,000 to $29,999 which was classified as INCOME4. The size variable excluded from the model was the store with the selling area of 5000 ft^2 to 5999ft^2 which is categorized as medium/large and SIZE2. The good variable for the individual goods model (3.2b) taken out of the equation was that good with the mean price of all goods in the forty-four item market basket.

The individual items, market basket and categories for national brands and cheapest brands discussed in the equations 3.2b, 3.2c, and 3.2d are indicated in Table 3.1.

The three equations estimated were specified as follows:

(3.2b) $ITEM_t = B_0 + B_1 STORE_t + B_2 INCOME_t + B_3 SIZE_t + B_4 GOOD_t + E_t$

where: $ITEM_t$ - price of individual goods for national and cheapest brands;

$STORE_t$ - store dependent dummy variable;

$INCOME_t$ - dummy variable for neighborhood income where the store is located;

$SIZE_t$ - dummy variable for store size; and

$GOOD_t$ - dummy variable to identify the good.

This equation measured the impact the organization of the store, the income of the stores' neighborhood and the selling size had on the price of the individual items for the national and cheapest labels. Two equations were estimated. One equation had prices of national brands for individual items as the dependent variable with store, size, income and good as the independent variables. The other equation had prices of cheapest brands for individual items as the dependent variable with the same independent variables as the national brand equation. The GOOD variable was included in the equation to act as a control variable. The two equations were estimated to observe the significant effect the independent variables had on the national and cheapest brand prices for individual items and to compare this effect within the stores for the two brands and between the stores.

(3.2c) $CATEGORY_t = B_0 + B_1 STORE_t + B_2 INCOME_t + B_3 SIZE_t + E_t$

where: $CATEGORY_t$ - price of the categories for national and cheapest brands

This equation tested the effect that the type of store, the income of the stores' neighborhood, and the size (in square feet) had on the

price of the five categories, which were Cereal/Bakery, Meats/Poultry, Dairy/Eggs, Canned/Packaged, and Non-Food, for national and cheapest brands. Five equations were estimated with national brand prices of each one of the five categories as the dependent variable, and another five equations were estimated with cheapest brand prices for each of the five categories as the dependent variable. The same independent variables, store, size and income, were used for the ten regressions. The ten equations measured whether the categories were priced differently between stores and if store rankings differed by category.

(3.2d) $$MKTBSKT_t = B_0 + B_1 STORE_t + B_2 INCOME_t + B_3 SIZE_t + E_t$$

where: $MKTBSKT_t$ - price of the market basket for national and cheapest brands

This equation examined the significant effect the type of the store, income of the stores' neighborhood and size of the store had on the national and cheapest brand prices of the aggregated market basket. Two equations for the market basket were estimated. One equation had national brand prices of the market basket as the dependent variable. The second equation had the cheapest brand market basket prices as the dependent variable. Both equations had store, size and income as the independent variables.

3.3 Hypotheses

As formal hypotheses, the models evaluated whether there were differences in the national and cheapest brand category prices of the market baskets, categories, and individual goods with the type of grocery store, location of the store, income of the store's neighborhood and size of the store. However, a much more useful direction of the

research is to evaluate the impact of alternative definitions of prices used in interstore comparisons. This is done using comparisons based upon the econometric results.

Stores

The first hypothesis established was that prices are affected by store identity.

Store Size

The second hypothesis tested was that larger size stores had lower prices than the smaller size stores.

Neighborhood Income

The last hypothesis tested was that there were price differences between national and cheapest brand categories among the different socioeconomic neighborhoods.

CHAPTER FOUR

EMPIRICAL RESULTS

This chapter describes the results and hypotheses tests from each of the three estimated models. Each independent variable is discussed and analyzed on how it affects the dependent variable. The three equations are compared to examine how different or similiar their results are relative to each other. The rankings of the stores, cheapest to highest priced store, and the level of significance of each store relative to a base store are reported and compared for the national and cheapest brands.

4.1 Individual Items

The results of Tables 4.1a and 4.1b, which utilize individual items for national and cheapest brands on the dependent variables are discussed below.

The following equation estimates the significance of store identity, the neighborhood income level, and the size of the store (selling area in square feet) on the price of individual items. The GOOD variable acts in the equation as a control variable by identifying each specific item.

$$ITEM_t = B_{0t} + B_1 STORE_t + B_2 INCOME_t + B_3 SIZE_t + B_4 GOOD_t$$

There are twelve store variables, five are chain supermarkets, six are independents and one is a discount store. The four income level variables are $20,000 or less, $20,000 to $24,999, $25,000 to $29,999 and $30,000 or more. There are also four size variables which are 6000

ft^2 or greater, 5999 ft^2 to 5000 ft^2, 4999 ft^2 to 3001 ft^2 and 3000 ft^2 or less.

Summary Statistics

The adjusted R-square for the national brand equation (4.1a) is 0.94 which indicates a good degree of fit between the dependent variable and the independent variables. The F-statistic for the national brands equation is 3395.11, which is significant at the 95% level. Such a large number indicates that there is a relationship between prices of individual items and the store type, neighborhood income level and the size of the store.

The adjusted R-square for the cheapest brands equation (4.1b) is 0.73, which means that the estimated relationship can explain 73 percent of the variation in the dependent variable. The F-statistic for the cheapest brands is significant at the 95% level with a value of 732.68. This verifies that the regression model fits the individual items' price data well.

The R-square and F-statistic are lower in the cheapest brand equation than the national brand equation. This could be because the individual items' price data for the national brands consisted of twenty-two items, whereas the individual items' price data for the cheapest brands consisted of thirty-seven items. Since there are more items, thus more prices in the cheapest brand equation, there is also more to explain.

STORE

The store which was normalized or used as the base store was STORE3 since the price data of this store appeared to have average prices for

most of the individual items. This store was normalized for both the national brand equation (4.1a) and the cheapest brand equation (4.1b).

Eight of the stores in Table 4.1a had a significant effect on price for the national brands. Of these eight stores, the cheapest store (STORE10) was the discount store and the second cheapest store (STORE6) was an independent store. The highest priced store for national brands was in a chain supermarket (STORE7).

For the cheapest brand category (Table 4.1b), only two stores, one independent (STORE5) and the other a discount store (STORE10), have prices significantly different from the base store. The lowest price store is the discount store (STORE10), similiar to the national brands results. But unlike the national brands, the highest priced store for cheapest brands is in an independent store (STORE5).

The hypothesis that there is a significant degree of variation in the national and cheapest brand prices for the individual items price data in the different stores can be supported for the national brands. There appears to be substantial interstore variation in national brand prices, much more than for the cheapest brands.

Comparing the national to cheapest brands within the same store shows that all of the national brands for individual items have higher prices than the cheapest brands. National brands are most likely competing against cheapest brands for individual items on the basis of quality rather than low prices. National brands are marketed as brands with excellent quality, giving the perception that price reflects quality.

INCOME

The income level which is excluded is INCOME4, $25,000 to $29,999, for both the national brand equation and the cheapest brand equation.

Looking at the significance of income on the price of individual items for national brands in Table 4.1a, none of the income levels has a significant effect on price.

In Table 4.1b, the high income area shows an impact on prices for individual items in the cheapest brand category. The other two income areas do not show an effect on prices. The high income area also appears to have the highest individual item prices for cheapest brand prices. These high prices and the significant effect of prices in the high income neighborhoods for cheapest brands could be a consequence of pricing strategy for cheapest brands, since the demand of this brand category is possibly more inelastic in the high income area. If the stores lowered the prices for the cheapest brands not much more will be bought due to the inelastic demand. So the stores keep the prices high.

The hypothesis that price differences exist between national and cheapest brand categories in different socioeconomic neighborhoods cannot be supported since the individual items prices are not significantly different in the three income levels for national brands and the high and medium income levels for cheapest brands. This hypothesis can only hold for the low income level for cheapest brands since there appeared to be a significant effect on prices.

SIZE

SIZE2, which is 5000 ft^2 to 5999 ft^2, is the base size for the national and cheapest brand regressions.

National brand prices for individual items were significantly higher in small stores (Table 4.1a). The large and medium size stores did not have an impact on national brand prices for individual items. Prices appeared to be lower in the large and medium stores relative to the small stores. The low prices for national brands in the large stores could be due to economy of size as well as to a competitive effect. Since large chain stores usually carry two or more national brands these brands compete among themselves within the same store. So, in order to sell national brands, prices must be competitive i.e. low.

Like the national brands of individual items, prices for cheapest brands in Table 4.1b are also highest in small stores, and the small stores also have a significant effect on prices. These results indicate that high prices in small stores can be due to diseconomies of size. The small stores cannot carry a large volume of products; only a limited quantity and type of products can be displayed at once. Only a certain number of customers can be served at one time in small stores as compared to large stores because of size. Since the small stores sell a smaller quantity, their prices tend to be higher for both national and cheapest brands. The prices for the cheapest brands do not differ in the large and medium size stores.

The prices increase as the stores decrease in size (i.e. price has a negative relationship with size of the store.) Thus the hypothesis that larger size stores have lower prices than the smaller size stores is accepted since the smaller stores have higher prices for both national and cheapest brands.

Table 4.1a: National Brands for Individual Items

$ITEM_t = B_{0t} + B_1 STORE_t + B_2 INCOME_t + B_3 SIZE_t + B_4 GOOD_t$

Variables	Coefficients	t-stat
Intercept	1.87	83.496
STORE1 (chain)	-0.07	-4.834
STORE2 (chain)	0.029	1.853
STORE4 (chain)	-0.01	-1.419
STORE5 (indep)	0.02	1.223
STORE6 (indep)	-0.08	-4.38
STORE7 (chain)	0.033	2.626
STORE8 (indep)	-0.03	-2.066
STORE10 (discount)	-0.13	-7.341
STORE11 (indep)	-0.05	-2.859
STORE12 (indep)	-0.06	-3.7
INCOME1	-0.004	-0.298
INCOME2	0.005	0.339
INCOME3	0.002	0.135
SIZE1	0.004	0.225
SIZE3	0.01	1.429
SIZE4	0.12	6.709

adjusted R Square = 0.94 F = 3395.11

Note (1):
INCOME1: $20,000 or less SIZE1: 6000 ft^2 or greater
INCOME2: $20,000 to $24,999 SIZE3: 4999 ft^2 to 3001 ft^2
INCOME3: $30,000 or more SIZE4: less than 3000 ft^2

Note (2):
SPSS/PC+ did not enter STORE9 into the equation since the minimum tolerance default level was not reached. This is a default test that implies the potential existence of multicollinearity.

Note (3):
All of the t-statistics are measured by two-tailed significance tests at the 90% confidence level.

Table 4.1b: Cheapest Brands for Individual Items

$ITEM_t = B_{0t} + B_1 STORE_t + B_2 INCOME_t + B_3 SIZE_t + B_4 GOOD_t$

Variables	Coefficients	t-stat
Intercept	1.35	48.782
STORE1 (chain)	-0.001	-0.066
STORE2 (chain)	0.02	1.014
STORE4 (chain)	0.01	0.360
STORE5 (indep)	0.13	5.193
STORE6 (indep)	-0.013	-0.523
STORE7 (chain)	0.022	1.285
STORE8 (indep)	-0.012	-0.582
STORE9 (indep)	0.014	0.702
STORE10 (discount)	-0.08	-3.066
STORE11 (indep)	-0.03	-1.293
INCOME1	0.01	0.707
INCOME2	0.004	0.208
INCOME3	0.04	2.1
SIZE1	0.02	0.855
SIZE3	0.02	1.36
SIZE4	0.10	3.910

adjusted R Square = 0.73 F = 732.68

Note (1):
INCOME1: $20,000 or less SIZE1: 6000 ft^2 or greater
INCOME2: $20,000 to $24,999 SIZE3: 4999 ft^2 to 3001 ft^2
INCOME3: $30,000 or more SIZE4: less than 3000 ft^2

Note (2):
SPSS/PC+ did not enter STORE12 into the equation to the minimum tolerance default level was not reached. This is a default test that implies the potential existence of multicollinearity.

Note (3):
All of the t-statistics are measured by two-tailed significance tests at the 90% confidence level.

Store Ranks and Level of Significance

Table 4.1c ranks the stores from the lowest priced store to the highest priced store for the national and cheapest brand labels. The Rank Table is set up to compare how the national brands and cheapest brands are priced within the same store.

Comparing the two brand categories to each other does not show a large difference in store rank for the national brands versus the cheapest brands for individual items. The ten stores generally fall in the same rank for pricing, with several differences. The three highest priced stores are the same for both brands with some ranked as having higher (lower) priced national brands than cheapest brands. STORE10 is the only store which has the same rank for national and cheapest brands, that being the lowest priced store. STORE11 is the only store that has a greater rank difference since its national brands ranks fifth, in the medium price range, and its cheapest brands ranks second, in the cheapest price range.

The stores are categorized into three different significant effects of price levels in Table 4.1d. These levels are the price levels: (1) significantly higher than the base store; (2) not significantly different from the base store; and (3) significantly lower than the base store. The significant tests are two-tailed tests measured at the 90% level. The store may be ranked as highly priced or cheaply priced in the Rank Table, but Table 4.1d shows whether prices vary greatly from the "average" store. If the store is ranked as the highest (lowest) priced store, yet it does not appear to have a significant effect on price, then being the highest (lowest) priced store proves to be inconsequential. Thus, in Table 4.1d is more informative than the store rank table (Table 4.1c).

Examining Table 4.1d, the price level significance for individual items, shows a greater degree of difference between the two categories. The cheapest brand category only has one store which is significantly

higher than the base store and one store which is significantly lower than the base store, and the price level for the other eight stores do not appear to be significantly different. The national brands have two stores which are significantly higher (neither one being the same as the cheapest brands), six stores significantly lower, and only two stores not significantly different from the base store. This could mean, with the assumption that the base store is the "average" priced store, that national brands are priced lower than average in most stores, and that cheapest brands are priced in the average range in most stores for individual items.

Comparing Table 4.1c to 4.1d for cheapest brands shows that stores may be ranked as being priced high or low in Table 4.1c, but that most of the stores do not price differently for individual items according to Table 4.1d, only the cheapest and highest priced stores appear to. Comparing the two tables for national brands verifies that the six cheapest stores price lower than average, and that the two highest priced stores price higher than average. The three stores (STORE3 being the base store) which fall in the middle to high end of the rank (rank 7, 8 and 9) in Table 4.1c are shown to be the average priced stores from Table 4.1d.

Table 4.1c: Ranking of Stores for Individual Items

Rank	National	Cheapest
Cheapest Store	STORE10	STORE10
2	STORE6	STORE11
3	STORE1	STORE6
4	STORE12	STORE8
5	STORE11	STORE1
6	STORE8	STORE3
7	STORE4	STORE9
8	STORE3	STORE4
9	STORE5	STORE2
10	STORE2	STORE7
Highest Priced	STORE7	STORE5

4.1d: Store Price Level Significance for Individual Items

Price Category	National	Cheapest
I	STORE7	STORE5
	STORE2	
II	STORE5	STORE7
	STORE4	STORE2
		STORE9
		STORE4
		STORE1
		STORE6
		STORE8
		STORE11
III	STORE8	STORE10
	STORE11	
	STORE12	
	STORE6	
	STORE1	
	STORE10	

Note (1):

I: Price level is significantly higher than the base store.

II: Price level is not significantly different from the base store.

III: Price level is significantly lower than the base store.

Note (2):

All significance tests are two-tailed tests at the 90% confidence level.

4.2 Market Basket

The following examines the outcome of Tables 4.2a and 4.2b. These tables examine a twenty-two item market basket for national brands and a thirty-seven item market basket for cheapest brands. The equation used to analyze these two market baskets is

$MKTBSKT_t = B_{0t} + B_1 STORE_t + B_2 INCOME_t + B_3 SIZE_t$.

The variables which were normalized are STORE3, INCOME4 and SIZE2 for both national and cheapest brands.

Summary Statistics

The adjusted R-square for the national brands for the Market Basket equation is 0.77. This value means that the estimated relationship can explain 77 percent of the variation in the dependent variable. The F-statistic is 80.39, which indicates that the equation has an effect on the market basket price data since the F-value is significant at the 95% level.

The R-square and the F-statistic for the cheapest brands are also large and verify the accuracy of the Market Basket equation and its results. The values are 0.69 for the R-square and 56.36 for the F-statistic.

STORE

In (Table 4.2a), all of the store specific dummy variables are significant in the pricing of the market basket for national brands. The results show that an independent store (STORE5) has the highest price, and a discount store (STORE10) is the lowest priced store.

Similiar to the market basket for national brands, the lowest priced store for the cheapest brands' market basket is the discount

store (Table 4.2b). Also, the highest priced store for cheapest brands is the same independent store (STORE5) as for the national brands. The market basket price level was significantly different for six out of ten stores for the cheapest labels. Comparing the significance levels between the two brand categories shows that there are more stores with a greater variation in the market basket prices for national brands than for cheapest brands. Thus, the hypothesis that prices vary significantly for both brands in the stores can be supported for national brands, and only for those stores which show their cheapest brands to have a significant effect on price.

INCOME

Considering the t-tests of the INCOME variables in Table 4.2a, none of the income levels show a significant effect on the market basket price level (similiar to the results for individual items).

Similiar to indivdual items, the results from Table 4.2b for the cheapest brands' market basket reveal that the high income area appears to have higher prices. This means that stores in high income neighborhoods price significantly higher than the base income neighborhood, which is the $25,000 to $29,999 income group. The highest prices for the cheapest brand category is also in the high income group.

Similiar to the individual items' findings, results from the market basket model for both brand categories do not support the hypothesis that price differences between the national and cheapest brands exist among the different socioeconomic neighborhoods since the national brand prices were not significantly different, and the high and medium income groups brands also do not have a significant effect on cheapest brand

prices. The only exception is that the low income group had a significant effect on cheapest brand prices.

SIZE

In Table 4.2a, the small stores have a significant effect on the market basket price in the national brands; and prices for national brands appear to be high in the small stores, like the indivdual item results.

Similiar to national brands, prices for the cheapest brands market basket, according to Table 4.1b, are highest in the small size stores. The high price for national and cheapest brands in small stores can be due to these stores having to keep a small inventory and not being able to buy a large quantity because of a slow turn-over rate.

Prices in small and medium size stores are significantly higher in the market basket for cheapest brands. Prices are significantly higher in these two size stores than in the base store (5000 ft^2 to 5999 ft^2).

The results reveal that the prices for the national and cheapest brand labels have higher prices in small stores than in large stores. Thus the hypothesis that small size stores have higher prices than the large size stores is accepted.

Similiar to the case of individual items, the STORE and INCOME variables appear to affect national and cheapest brands for the market basket differently. Yet the SIZE variable has the same effect on the market basket prices for both brand categories.

Table 4.2a: National Brands for the Market Basket

$MKTBSKT_t = B_{0t} + B_1 STORE_t + B_2 INCOME_t + B_3 SIZE_t$

Variables	Coefficients	t-stat
Intercept	33.03	87.914
STORE1 (chain)	-1.52	-5.593
STORE2 (chain)	0.66	2.267
STORE4 (chain)	-0.33	-1.668
STORE5 (indep)	1.26	3.76
STORE6 (indep)	-0.90	-2.696
STORE7 (chain)	0.74	3.088
STORE9 (indep)	0.68	2.429
STORE10 (discount)	-2.94	-8.632
STORE11 (indep)	-0.30	-9.07
STORE12 (indep)	-0.53	-1.922
INCOME1	-0.08	-.351
INCOME2	0.10	.399
INCOME3	-0.11	-.388
SIZE1	0.08	.265
SIZE3	0.29	1.546
SIZE4	2.01	5.906

adjusted R square = 0.77 F = 80.39

Note (1):
INCOME1: $20,000 or less SIZE1: 6000 ft^2 or greater
INCOME2: $20,000 to $24,999 SIZE3: 4999 ft^2 to 3001 ft^2
INCOME3: $30,000 or more SIZE4: less than 3000 ft^2

Note (2):
SPSS/PC+ did not enter STORE8 into the equation due to the minimum tolerance default level was not reached. This is a default test that implies the potential existence of multicollinearity.

Note (3):
All of the t-statistics are measured by two-tailed significance tests at the 90% confidence level.

Table 4.2b: Cheapest Brands for the Market Basket

$MKTBSKT_t = B_{0t} + B_1 STORE_t + B_2 INCOME_t + B_3 SIZE_t$

Variables	Coefficients	t-stat
Intercept	43.28	63.737
STORE1 (chain)	0.62	1.264
STORE2 (chain)	1.63	3.092
STORE4 (chain)	1.11	3.121
STORE5 (indep)	4.37	7.210
STORE6 (indep)	-0.09	-0.150
STORE7 (chain)	1.83	4.213
STORE9 (indep)	0.55	1.095
STORE10 (discount)	-2.02	-3.286
STORE11 (indep)	-1.32	-2.168
STORE12 (indep)	0.22	0.454
INCOME1	0.58	1.453
INCOME2	0.30	0.663
INCOME3	1.71	3.475
SIZE1	0.68	1.287
SIZE3	0.87	2.557
SIZE4	4.26	6.923
adjusted R square = 0.69		F = 56.36

Note (1):
INCOME1: $20,000 or less
INCOME2: $20,000 to $24,999
INCOME3: $30,000 or more
SIZE1: 6000 ft^2 or greater
SIZE3: 4999 ft^2 to 3001 ft^2
SIZE4: less than 3000 ft^2

Note (2):
SPSS/PC+ did not enter STORE8 into the due to to the minimum tolerance default level was not reached. This is a default test that implies the potential existence of multicollinearity.

Note (3):
All of the t-statistics are measured by two-tailed significance tests at the 90% confidence level.

Store Ranks and Level of Significance

Table 4.2c shows a small variation in cheapest and national brands for the market basket. The same store, STORE10, is the lowest priced store, and the same store, STORE5, is the highest priced store. Most of the other stores, except for STORE11, show a small difference in rank

for the two brands. STORE11 appears to have higher priced national brands since it is ranked sixth in national brands, and appears to have lower priced cheapest brands since it is ranked as second in this brand category.

Table 4.2d indicates that more stores are priced significantly lower than the base store in the national brands than in the cheapest brands. All of the stores are priced significantly higher or lower than the base store for national brands, whereas for cheapest brands, four stores are priced the same. Four stores in national brands and four stores in the cheapest brands' categories are priced significantly higher than the base store. Three of these stores are the same for both brand categories. One store which shows a greater degree of difference is STORE4. This store is shown to have a price level significantly lower for national brands and a price level to be significantly higher for cheapest brands. This can mean that STORE4 prices its national brands significantly lower since competition for these brands is probably more severe. Whereas, the cheapest brands probably dominate the market in this store so STORE4 can price cheapest brands significantly higher since the store can be sure to sell this brand.

Table 4.2c: Ranking of Stores for the Market Basket

Rank	National	Cheapest
Cheapest Store	STORE10	STORE10
2	STORE1	STORE11
3	STORE6	STORE6
4	STORE12	STORE3
5	STORE4	STORE12
6	STORE11	STORE9
7	STORE3	STORE1
8	STORE2	STORE4
9	STORE9	STORE7
10	STORE7	STORE2
Highest Priced	STORE5	STORE5

4.2d: Store Price Level Significance for the Market Basket

Price Category	National	Cheapest
I	STORE2	STORE2
	STORE5	STORE4
	STORE7	STORE5
	STORE9	STORE7
II		STORE1
		STORE6
		STORE9
		STORE12
III	STORE1	STORE10
	STORE4	STORE11
	STORE6	
	STORE10	
	STORE11	
	STORE12	

Note (1):

I: Price level is significantly higher than the base store.

II: Price level is not significantly different from the base store.

III: Price level is significantly lower than the base store.

Note (2):

All significance tests are two-tailed tests at the 90% confidence level.

4.3 Categories

The five categories (cereal/bakery, meats/poultry, dairy/eggs, canned/packaged, and nonfood) are analyzed for national and cheapest brands in Tables 4.3a, b, c and d thru 4.7a, b, c and d. The equation used to analyze each category is as follows;

$PRICE_t = B_{0t} + B_1 STORE_t + B_2 INCOME_t + B_3 SIZE_t$

The dependent variable is defined differently for each equation according to the category being estimated. There are twelve different store variables, four different income variables and four separate size variables. The same store, income and size variable are normalized for all five category equations. These variables are STORE3, INCOME4 and SIZE2.

Low R-squares are reported for some of the category equations, suggesting lower levels of fit for the estimated equations. Yet the model does fit some categories quite well as measured by high R-squares for these category equations. The R-squares vary from 0.28 to 0.80 for the five category equations for national and cheapest brands. The F statistic for the national and cheapest brands for all the categories prove to be significant at the 95% level. Thus, the F-statistic indicates that the model fits the category prices for the two brands, even in cases where there is a low R-square.

The following summarizes the results from tables 4.3a and b to 4.7a and b for the income and size variables.

INCOME: Summary for Categories

For all the categories, except for Meats/Poultry and Dairy/Eggs, of the national brands there is no significant effect on prices. Only the

high income group (INCOME3) demonstrates an impact on the Meats/Poultry and Dairy/Eggs price level in the national brands. The findings indicate that the lowest priced national brands in the Meats/Poultry category are in the high income area of the city. The low prices for this category in the high income bracket could be speculated to be because the demand for meat in this income group is relatively elastic since it is likely that there are a greater variety of meat cuts to choose from. In other words if the price of a certain type and cut of meat increases, more substitutes are available.

In the cheapest brands, the high (INCOME3) and low (INCOME1) income groups have an impact on the price level for Cereal/Bakery, Canned/Packaged, and Non-Food categories. For these categories, the highest priced items are in the high income areas, with lower prices in the low income areas. The income levels in the Meats/Poultry and Dairy/Eggs category for cheapest brands do not have an effect on these categories' prices.

The national and cheapest brands' results illustrate that low income consumers could save on their grocery bill if they bought the cheapest brands in the Cereal/Bakery, Canned/Packaged, and Non-Food categories because these categories demonstrated lower prices in the cheapest brand category.

The pricing pattern between national and cheapest brands for each category in the three income groups does not appear to be similiar. The high income levels which have a significant effect on certain category prices for national brands do not have the same effect for cheapest brands. The high and low income levels which have a significant effect

on cheapest brand prices for particular categories do not have the same significant effect for national brands. Thus, the hypothesis that price differences exist between the two brand categories can only be accepted for the high and low income groups.

SIZE: Summary for Categories

Studying the five category tables (Tables 4.3a and b to 4.7a and b) it is clear that the national brands and cheapest brands react the same in the small size stores The small stores for all the categories except for Non-Food appear to have a significant positive effect on price. The Cereal/Bakery, Dairy/Eggs and Canned/Packaged show that their highest priced items are in the small stores, but the Meats/Poultry category shows the lowest priced items to be in the small stores for both brand categories.

An explanation why none of the size variables for the Non-Food category appear to have an impact on the national or cheapest brand prices is because there are only two items in the national brand Non-Food category and only three items in the cheapest brand category. Such a small representative sample for both brand categories could cause the price to appear insignificant.

The hypothesis that small stores have higher prices than larger stores can only be accepted for the Cereal/Bakery, Dairy/Eggs and Canned/Packaged categories for both national and cheapest brands.

Table 4.3a: National Brands for Cereal/Bakery Category

$CBPRICE_t = B_{0t} + B_1 STORE_t + B_2 INCOME_t + B_3 SIZE_t$

Variables	Coefficients	t-stat
Intercept	4.27	50.748
STORE1 (chain)	-0.13	-2.070
STORE2 (chain)	0.04	0.593
STORE4 (chain)	-0.05	-1.162
STORE5 (indep)	0.005	0.060
STORE6 (indep)	-0.16	-2.178
STORE7 (chain)	0.006	0.109
STORE9 (indep)	0.06	0.992
STORE10 (discount)	-0.17	-2.190
STORE11 (indep)	-0.15	-2.053
STORE12 (indep)	0.02	0.368
INCOME1	-0.008	-0.154
INCOME2	-0.002	-0.028
INCOME3	0.005	0.084
SIZE1	-0.86	-0.131
SIZE3	0.04	0.961
SIZE4	0.21	2.745

adjusted R Square = 0.28 F = 10.73

Note (1):
INCOME1: $20,000 or less SIZE1: 6000 ft^2 or greater
INCOME2: $20,000 to $24,999 SIZE3: 4999 ft^2 to 3001 ft^2
INCOME3: $30,000 or more SIZE4: less than 3000 ft^2

Note (2):
SPSS/PC+ did not enter STORE8 into the equation due to the minimum tolerance default level was not reached. This is a default test that implies the potential existence of multicollinearity.

Note (3):
All of the t-statistics are measured by two-tailed significance tests at the 90% confidence level.

Table 4.3b: Cheapest Brands of Cereal/Bakery Category

$CBPRICE_t = B_{0t} + B_1 STORE_t + B_2 INCOME_t + B_3 SIZE_t$

Variables	Coefficients	t-stat
Intercept	6.52	38.409
STORE1 (chain)	-0.46	-3.725
STORE2 (chain)	0.47	3.586
STORE4 (chain)	-0.009	-0.099
STORE5 (indep)	0.30	2.004
STORE6 (indep)	-0.42	-2.767
STORE7 (chain)	0.16	1.513
STORE9 (indep)	-0.15	-1.217
STORE10 (discount)	-0.53	-3.420
STORE11 (indep)	-0.70	-4.590
STORE12 (indep)	0.26	2.106
INCOME1	0.19	1.855
INCOME2	0.008	0.070
INCOME3	0.54	4.389
SIZE1	0.27	2.049
SIZE3	0.13	1.572
SIZE4	0.98	6.363

adjusted R Square = 0 .70 F = 58.22

Note (1):
INCOME1: $20,000 or less SIZE1: 6000 ft^2 or greater
INCOME2: $20,000 to $24,999 SIZE3: 4999 ft^2 to 3001 ft^2
INCOME3: $30,000 or more SIZE4: less than 3000 ft^2

Note (2):
SPSS/PC+ did not enter STORE8 into the equation due to the minimum tolerance default level was not reached. This is a default test that implies the potential existence of multicollinearity.

Note (3):
All of the t-statistics are measured by two-tailed significance tests at the 90% confidence level.

Table 4.4a: National Brands for Meats/Poultry Category

$MPPRICE_t = B_{0t} + B_1 STORE_t + B_2 INCOME_t + B_3 SIZE_t$

Variables	Coefficients	t-stat
Intercept	7.48	32.372
STORE1 (chain)	0.16	0.928
STORE2 (chain)	-0.004	-0.007
STORE4 (chain)	0.10	0.826
STORE5 (indep)	1.27	6.129
STORE6 (indep)	0.28	1.356
STORE7 (chain)	0.93	6.244
STORE9 (indep)	0.24	1.385
STORE10 (discount)	-0.93	-4.434
STORE11 (indep)	1.22	5.902
STORE12 (indep)	-0.40	-2.334
INCOME1	-0.18	-1.282
INCOME2	-0.05	-0.299
INCOME3	-0.43	-2.559
SIZE1	-0.07	-0.365
SIZE3	0.15	1.313
SIZE4	-0.44	-2.082

adjusted R Square = 0.36 F = 14.75

Note (1):
INCOME1: $20,000 or less SIZE1: 6000 ft^2 or greater
INCOME2: $20,000 to $24,999 SIZE3: 4999 ft^2 to 3001 ft^2
INCOME3: $30,000 or more SIZE4: less than 3000 ft^2

Note (2):
SPSS/PC+ did not enter STORE8 into the equation due to the minimum tolerance default level was not reached. This is a default test that implies the potential existence of multicollinearity.

Note (3):
All of the t-statistics are measured by two-tailed significance tests at the 90% confidence level.

Table 4.4b: Cheapest Brands of Meats/Poultry Category

$MPPRICE_t = B_{0t} + B_1 STORE_t + B_2 INCOME_t + B_3 SIZE_t$

Variables	Coefficients	t-stat
Intercept	8.41	30.997
STORE1 (chain)	0.42	2.150
STORE2 (chain)	-0.13	-0.624
STORE4 (chain)	-0.203	-1.428
STORE5 (indep)	2.16	8.911
STORE6 (indep)	1.14	4.714
STORE7 (chain)	0.57	3.29
STORE9 (indep)	0.35	1.756
STORE10 (discount)	-1.38	-5.605
STORE11 (indep)	1.65	6.825
STORE12 (indep)	-0.05	-0.234
INCOME1	-0.09	-0.529
INCOME2	-0.04	-0.239
INCOME3	-0.17	-0.889
SIZE1	-0.005	-0.025
SIZE3	0.20	1.443
SIZE4	-1.23	-5.007

adjusted R Square = 0.52 F = 27.67

Note (1):
INCOME1: $20,000 or less SIZE1: 6000 ft^2 or greater
INCOME2: $20,000 to $24,999 SIZE3: 4999 ft^2 to 3001 ft^2
INCOME3: $30,000 or more SIZE4: less than 3000 ft^2

Note (2):
SPSS/PC+ did not enter STORE8 into the equation due to the minimum tolerance default level was not reached. This is a default test that implies the potential existence of multicollinearity.

Note (3):
All of the t-statistics are measured by two-tailed significance tests at the 90% confidence level.

Table 4.5a: National Brands for Dairy/Eggs Category

$DEPRICE_t = B_{0t} + B_1 STORE_t + B_2 INCOME_t + B_3 SIZE_t$

Variables	Coefficients	t-stat
Intercept	2.49	27.031
STORE1 (chain)	-0.11	-1.622
STORE2 (chain)	0.25	3.505
STORE4 (chain)	-0.06	-1.267
STORE5 (indep)	0.12	1.514
STORE6 (indep)	0.03	0.342
STORE7 (chain)	0.04	0.736
STORE9 (indep)	0.31	4.515
STORE10 (discount)	0.12	1.492
STORE11 (indep)	0.02	0.271
STORE12 (indep)	-0.01	-0.155
INCOME1	0.05	0.972
INCOME2	0.10	1.689
INCOME3	0.17	2.591
SIZE1	0.13	1.848
SIZE3	0.06	1.250
SIZE4	0.30	3.574

adjusted R Square = 0.51 F = 26.46

Note (1):
INCOME1: $20,000 or less SIZE1: 6000 ft^2 or greater
INCOME2: $20,000 to $24,999 SIZE3: 4999 ft^2 to 3001 ft^2
INCOME3: $30,000 or more SIZE4: less than 3000 ft^2

Note (2):
SPSS/PC+ did not enter STORE8 into the equation due to the minimum tolerance default level was not reached. This is a default test that implies the potential existence of multicollinearity.

Note (3):
All of the t-statistics are measured by two-tailed significance tests at the 90% confidence level.

Table 4.5b: Cheapest Brands of Dairy/Eggs Category

$DEPRICE_t = B_{0t} + B_1 STORE_t + B_2 INCOME_t + B_3 SIZE_t$

Variables	Coefficients	t-stat
Intercept	6.44	28.522
STORE1 (chain)	0.32	1.984
STORE2 (chain)	-0.20	-1.153
STORE4 (chain)	0.28	2.412
STORE5 (indep)	0.27	1.330
STORE6 (indep)	-0.58	-2.867
STORE7 (chain)	-0.18	-1.218
STORE9 (indep)	-0.06	-0.387
STORE10 (discount)	-0.69	-3.374
STORE11 (indep)	-0.27	-1.322
STORE12 (indep)	-0.12	-0.739
INCOME1	-0.07	-0.514
INCOME2	0.02	0.128
INCOME3	-0.11	-0.660
SIZE1	-0.07	-0.383
SIZE3	0.08	0.711
SIZE4	0.70	3.403

adjusted R Square = 0.33 F = 13.05

Note (1):
INCOME1: $20,000 or less SIZE1: 6000 ft^2 or greater
INCOME2: $20,000 to $24,999 SIZE3: 4999 ft^2 to 3001 ft^2
INCOME3: $30,000 or more SIZE4: less than 3000 ft^2

Note (2):
SPSS/PC+ did not enter STORE8 into the equation due to the minimum tolerance default level was not reached. This is a default test that implies the potential existence of multicollinearity.

Note (3):
All of the t-statistics are measured by two-tailed significance tests at the 90% confidence level.

Table 4.6a: National Brands for Canned/Packaged Category

$CPPRICE_t = B_{0t} + B_1 STORE_t + B_2 INCOME_t + B_3 SIZE_t$

Variables	Coefficients	t-stat
Intercept	11.23	63.582
STORE1 (chain)	-0.67	-5.213
STORE2 (chain)	0.31	2.270
STORE4 (chain)	-0.01	-0.127
STORE5 (indep)	0.05	0.321
STORE6 (indep)	-0.21	-1.335
STORE7 (chain)	-0.20	-1.761
STORE9 (indep)	0.54	4.144
STORE10 (discount)	-0.81	-5.077
STORE11 (indep)	-0.62	-3.960
STORE12 (indep)	-0.58	-4.467
INCOME1	-0.08	0.779
INCOME2	0.05	0.417
INCOME3	0.07	0.516
SIZE1	-0.06	-0.472
SIZE3	-0.06	-0.719
SIZE4	1.37	8.544

adjusted R Square = 0.80 F = 100.86

Note (1):
INCOME1: $20,000 or less SIZE1: 6000 ft^2 or greater
INCOME2: $20,000 to $24,999 SIZE3: 4999 ft^2 to 3001 ft^2
INCOME3: $30,000 or more SIZE4: less than 3000 ft^2

Note (2):
SPSS/PC+ did not enter STORE8 into the equation due to the minimum tolerance default level was not reached. This is a default test that implies the potential existence of multicollinearity.

Note (3):
All of the t-statistics are measured by two-tailed significance tests at the 90% confidence level.

Table 4.6b: Cheapest Brands of Canned/Packaged Category

$CPPRICE_t = B_{0t} + B_1 STORE_t + B_2 INCOME_t + B_3 SIZE_t$

Variables	Coefficients	t-stat
Intercept	16.15	56.587
STORE1 (chain)	-0.82	-3.946
STORE2 (chain)	-0.0003	-0.002
STORE4 (chain)	0.144	0.964
STORE5 (indep)	1.07	4.194
STORE6 (indep)	0.01	0.043
STORE7 (chain)	0.26	1.430
STORE9 (indep)	-0.13	-0.612
STORE10 (discount)	-0.06	-0.239
STORE11 (indep)	-1.48	-5.815
STORE12 (indep)	-0.44	-2.059
INCOME1	0.35	2.033
INCOME2	0.21	1.095
INCOME3	0.93	4.521
SIZE1	0.28	1.270
SIZE3	0.22	1.560
SIZE4	1.76	6.805

adjusted R Square = 0.73 F = 66.81

Note (1):
INCOME1: $20,000 or less SIZE1: 6000 ft^2 or greater
INCOME2: $20,000 to $24,999 SIZE3: 4999 ft^2 to 3001 ft^2
INCOME3: $30,000 or more SIZE4: less than 3000 ft^2

Note (2):
SPSS/PC+ did not enter STORE8 into the equation due to the minimum tolerance default level was not reached. This is a default test that implies the potential existence of multicollinearity.

Note (3):
All of the t-statistics are measured by two-tailed significance tests at the 90% confidence level.

Table 4.7a: National Brands for Non-Food Category

$NFPRICE_t = B_{0t} + B_1 STORE_t + B_2 INCOME_t + B_3 SIZE_t$

Variables	Coefficients	t-stat
Intercept	4.26	31.782
STORE1 (chain)	-0.25	-2.275
STORE2 (chain)	0.05	0.893
STORE4 (chain)	-0.063	-1.018
STORE5 (indep)	0.27	2.635
STORE6 (indep)	0.36	3.451
STORE7 (chain)	0.04	0.493
STORE8 (indep)	0.71	8.058
STORE9 (indep)	0.40	4.379
STORE10 (discount)	-0.43	-4.849
STORE11 (indep)	0.20	2.194
STORE12 (indep)	0.76	9.025
INCOME1	-0.006	-0.098
INCOME2	0.04	0.438
INCOME3	0.08	0.812
SIZE1	0.10	0.886
SIZE3	0.07	0.904
SIZE4	0.09	1.062

adjusted R Square = 0.65 F = 44.21

Note (1):
INCOME1: $20,000 or less SIZE1: 6000 ft^2 or greater
INCOME2: $20,000 to $24,999 SIZE3: 4999 ft^2 to 3001 ft^2
INCOME3: $30,000 or more SIZE4: less than 3000 ft^2

Note (2):
All of the t-statistics are measured by two-tailed significance tests at the 90% confidence level.

Table 4.7b: Cheapest Brands for Non-Food Category

$NFPRICE_t = B_{0t} + B_1 STORE_t + B_2 INCOME_t + B_3 SIZE_t$

Variables	Coefficients	t-stat
Intercept	3.87	15.524
STORE1 (chain)	0.39	3.626
STORE2 (chain)	0.22	2.227
STORE4 (chain)	-0.18	-1.667
STORE5 (indep)	1.34	6.976
STORE6 (indep)	1.17	6.118
STORE7 (chain)	-0.09	-0.640
STORE8 (indep)	0.83	5.065
STORE9 (indep)	1.52	8.916
STORE10 (discount)	0.05	0.324
STORE11 (indep)	0.59	3.537
STORE12 (indep)	0.98	6.285
INCOME1	0.24	1.982
INCOME2	0.19	1.091
INCOME3	0.51	2.844
SIZE1	0.17	0.760
SIZE3	0.11	0.694
SIZE4	-0.005	-0.030

adjusted R Square = 0.58 F = 32.49

Note (1):
INCOME1: $20,000 or less SIZE1: 6000 ft^2 or greater
INCOME2: $20,000 to $24,999 SIZE3: 4999 ft^2 to 3001 ft^2
INCOME3: $30,000 or more SIZE4: less than 3000 ft^2

Note (2):
All of the t-statistics are measured by two-tailed significance tests at the 90% confidence level.

Store Rank and Level of Price Significance: Cereal/Bakery

There are only three items in the Cereal/Bakery category for national brands and six items in this category for the cheapest brands.

According to Table 4.3c, STORE9 shows a greatest difference in prices between the two brand categories. This store is categorized as the highest priced store for national brands, yet for cheapest brands it is listed as the fifth cheapest store. Most stores are similiarly ranked across categories.

The store price significance level for Cereal/Bakery category in Table 4.3d indicates that more stores price levels are not significantly different from the base store in the national brands as compared to cheapest brands. No stores are significantly higher for national brands, whereas, three stores are significantly higher than the base store for cheapest brands. The four stores with their price level significantly lower than the base store are identical for national and cheapest brands.

Table 4.3c: Ranking of Stores for Cereal/Bakery Category

Rank	National	Cheapest
Cheapest Store	STORE10	STORE11
2	STORE6	STORE10
3	STORE11	STORE1
4	STORE1	STORE6
5	STORE4	STORE9
6	STORE3	STORE4
7	STORE5	STORE3
8	STORE7	STORE7
9	STORE12	STORE12
10	STORE2	STORE5
Highest Priced	STORE9	STORE2

4.3d: Store Price Level Significance for Cereal/Bakery Category

Price Category	National	Cheapest
I		STORE2
		STORE5
		STORE12
II	STORE2	STORE4
	STORE4	STORE7
	STORE5	STORE9
	STORE7	
	STORE9	
	STORE12	
III	STORE1	STORE1
	STORE6	STORE6
	STORE10	STORE10
	STORE11	STORE11

Note (1):

I: Price level is significantly higher than the base store.

II: Price level is not significantly different from the base store.

III: Price level is significantly lower than the base store.

Note (2):

All significance tests are two-tailed tests at the 90% confidence level.

Store Rank and Price Level Significance: Meats/Poultry

There are four items in the national brands and five items in the cheapest brands for the Meats/Poultry category.

There are no outstanding differences in the ranking of stores between the national and cheapest brands for the Meats/Poultry category in Table 4.4c. The same stores are the lowest priced and highest priced stores for the two brands.

There is a larger difference among stores which are significantly lower or higher for the two brands from the results in Table 4.4d. Six

stores are significantly lower for the cheapest brands, whereas five stores are not significantly different for the cheapest brands. The national brand category has more stores that are significantly higher priced than is the case for cheapest brands.

Table 4.4c: Ranking of Stores for Meats/Poultry Category

Rank	National	Cheapest
Cheapest Store	STORE10	STORE10
2	STORE12	STORE2
3	STORE2	STORE12
4	STORE3	STORE4
5	STORE4	STORE3
6	STORE1	STORE9
7	STORE9	STORE1
8	STORE6	STORE7
9	STORE7	STORE6
10	STORE11	STORE11
Highest Priced	STORE5	STORE5

4.4d: Store Price Level Significance for Meats/Poultry Category

Price Category	National	Cheapest
I	STORE5	STORE1
	STORE7	STORE5
	STORE11	STORE6
		STORE7
		STORE9
		STORE11
II	STORE1	STORE2
	STORE2	STORE4
	STORE4	STORE12
	STORE6	
	STORE9	
III	STORE10	STORE10
	STORE12	

Note (1):
I: Price level is significantly higher than the base store.
II: Price level is not significantly different from the base store.
III: Price level is significantly lower than the base store.

Note (2):
All significance tests are two-tailed tests at the 90% confidence level.

Store Rank and Store Price Level Significance: Dairy/Eggs

There are two items in the national brands and six items in the cheapest brands for Dairy/Eggs category.

From the findings in Table 4.5c, a greater variation in store rank is noticeable between the national and cheapest brands for the Dairy/Eggs category. STORE1 and STORE4 are ranked as the lowest and second lowest priced stores in the national brands, yet they are the highest and second highest stores in the cheapest brands. STORE10 is ranked as the lowest priced store in the cheapest brands, but ranked as

the fourth highest priced store in the national brands.

Looking at the price level significance in Table 4.5d, these price variations do not seem to have a big impact since eight of the ten stores do not have a significantly different price level from the base store. Only the two highest priced stores appear to have a price level which is significantly higher than the base store. This is similiar with the cheapest brands. Most of the stores' price level for cheapest brands are not significantly different than the base store. Also the two highest priced stores and the two lowest priced stores have a price level significantly higher and lower, respectively, than the base store.

Table 4.5c: Ranking of Stores for Dairy/Eggs Category

Rank	National	Cheapest
Cheapest Store	STORE1	STORE10
2	STORE4	STORE6
3	STORE12	STORE11
4	STORE3	STORE2
5	STORE11	STORE7
6	STORE6	STORE12
7	STORE7	STORE9
8	STORE5 & STORE10	STORE3
9	STORE2	STORE5
10	STORE9	STORE4
Highest Priced		STORE1

4.5d: Store Price Level Significance for Dairy/Eggs Category

Price Category	National	Cheapest
I	STORE2	STORE1
	STORE9	STORE4
II	STORE1	STORE2
	STORE4	STORE5
	STORE5	STORE7
	STORE6	STORE9
	STORE7	STORE11
	STORE10	STORE12
	STORE11	
	STORE12	
III		STORE6
		STORE10

Note (1):

I: Price level is significantly higher than the base store.

II: Price level is not significantly different from the base store.

III: Price level is significantly lower than the base store.

Note (2):

All significance tests are two-tailed tests at the 90% confidence level.

Store Rank and Price Level Significance Canned/Packaged

There are six national brands' items and twelve cheapest brand items in the Canned/Packaged category.

For the Canned/Packaged category store ranks in Table 4.6c, the stores show some rank variation with the largest degree of difference being four ranks off for STORE10 and STORE7. The highest and lowest priced stores for the two brands are not the same.

The price level significance in Table 4.6d shows the impact of the price variation. More stores have a price level significantly lower for

the national brands, whereas more stores' price level are not significantly different for the base store.

Table 4.6c: Ranking of Stores for Canned/Packaged Category

Rank	National	Cheapest
Cheapest Store	STORE10	STORE11
2	STORE1	STORE1
3	STORE11	STORE12
4	STORE12	STORE9
5	STORE6	STORE10
6	STORE7	STORE2
7	STORE4	STORE3
8	STORE3	STORE6
9	STORE5	STORE4
10	STORE2	STORE7
Highest Priced	STORE9	STORE5

4.6d: Store Price Level Significance for Canned/Packaged Category

Price Category	National	Cheapest
I	STORE2	STORE5
	STORE9	
II	STORE4	STORE2
	STORE5	STORE4
	STORE6	STORE6
		STORE7
		STORE9
		STORE10
III	STORE1	STORE1
	STORE7	STORE11
	STORE10	STORE12
	STORE11	
	STORE12	

Note (1):

I: Price level is significantly higher than the base store.

II: Price level is not significantly different from the base store.

III: Price level is significantly lower than the base store.

Note (2): All significance tests are two-tailed tests at the 90% confidence level.

Store Rank and Price Level Significance: Non-Food

There are two national brands' items and three cheapest brand items in the Non-Food category.

A price rank variation is seen in Table 4.7c in the Non-Food category. The highest and lowest stores for the national and cheapest brands are not priced the same. Both brands within the same store are ranked differently, up to four ranks off.

Table 4.7d shows that most of the stores for both brands have a price level which is significantly lower than the base store. In the case of national brands, two stores are priced significantly higher than the base store. No stores are significantly higher for cheapest brands.

Table 4.7c: Ranking of Stores for Non-Food Category

Rank	National	Cheapest
Cheapest Store	STORE10	STORE4
2	STORE1	STORE7
3	STORE4	STORE3
4	STORE3	STORE10
5	STORE7	STORE2
6	STORE2	STORE1
7	STORE11	STORE11
8	STORE5	STORE8
9	STORE6	STORE12
10	STORE9	STORE6
11	STORE8	STORE5
Highest Priced	STORE12	STORE9

4.7d: Store Price Level Significance for Non-Food Category

Price Category	National	Cheapest
I	STORE5	STORE1
	STORE6	STORE2
	STORE8	STORE5
	STORE9	STORE6
	STORE11	STORE8
	STORE12	STORE9
		STORE11
		STORE12
II	STORE2	STORE4
	STORE4	STORE7
	STORE7	STORE10
III	STORE1	
	STORE10	

Note (1):

I: Price level is significantly higher than the base store.

II: Price level is not significantly different from the base store.

III: Price level is significantly lower than the base store.

Note (2):

All significance tests are two-tailed tests at the 90% confidence level.

4.4 Summary

By observing the store rank tables for the different prices (individual items, market basket and the five categories) a larger interstore price variation between national and cheapest brand categories is seen among the different categories than in the individual items or market basket. Comparing these results with the Summary Table (Table 4.8), the interstore variation between the two brand categories appears to be similiar for the different prices. Table 4.8 illustrates and compares the significantly different effects of the

alternative prices (individual items, market basket and the five categories) for the national and cheapest brand categories in each store.

This table demonstrates that the significant effect of the prices for the national brand individual items and the national brand market basket are the same for most of the stores. But when comparing the national brand category to the cheapest category for individual items, the results are different for most of the stores. This is because most of the national brands indicate a price level either significantly higher or lower than the base store. Whereas the cheapest brands tend to not be significantly different. The market basket for the national and cheapest brands are similiar for half of the stores.

When comparing the significant effect of all national brands prices or all cheapest brands prices for the five categories to each other in the same store, there is a larger variation than when comparing national to cheapest brands for each category within the store.

To obtain a different view of the variation of prices Table 4.9 was constructed. This table demonstrates how many times each store had a price level significantly higher (I), not significantly different (II), or significantly lower (III) than the base store for the seven alternative prices (individual items, market basket, and the five categories). Of the eleven stores, four showed a difference between national and cheapest brands. STORE1 and STORE12 were similiar in that they displayed most variation across different market baskets significantly lower in national brands. But these two stores had the seven market baskets almost evenly distributed in the three significant

classes (I, II and III). For the national brands, STORE5 showed a fairly even distribution of the seven price categories between the significantly higher class (I) and the not significantly different class (II). STORE5 never charged less than the average price for national or cheapest brands But six of the seven price groups were significantly higher for cheapest brands. STORE9 had most of the different prices significantly higher for national brands, but most were not significantly different for cheapest brands.

The impact of the price level is greatly influenced according to how the prices are defined, whether as an individual item, an aggregated market basket, or as separate grocery categories. These findings indicate that there is definitely a distinction in the form prices are reported and compared. It has been observed chat some stores may have been priced lower in certain categories or individual items, but these same stores also appear to be priced higher in other categories.

More variation was seen with national brands for the individual item prices and the market basket prices than with the five category prices, since a significant effect was seen, whether higher or lower, in the individual items' and market baskets' model.

Table 4.8: Summary Table I

	STORES										
	1	2	4	5	6	7	8	9	10	11	12
Individ. item											
National	III	I	II	II	III	I	III		III	III	III
Cheapest	II	II	II	I	II	II	II	II	III	II	
Mkt Basket											
National	III	I	III	I	III	I		I	III	III	III
Cheapest	II	I	I	I	II	I		II	III	III	II
Cereal/Bakery											
National	III	II	II	II	III	II		II	III	III	II
Cheapest	III	I	II	I	III	II		II	III	III	I
Meats/Poultry											
National	II	II	II	I	II	I		II	III	I	III
Cheapest	I	II	II	I	I	I		I	III	I	II
Dairy/Eggs											
National	II	I	II	II	II	II		I	II	II	II
Cheapest	I	II	I	II	III	II		II	III	II	II
Canned/Pckged											
National	III	I	II	II	II	III		I	III	III	III
Cheapest	III	II	II	I	II	II		II	II	III	III
Non-Food											
National	III	II	II	I	I	II	I	I	III	I	I
Cheapest	I	I	II	I	I	II	I	I	II	I	I

Note:

I: Price level is significantly higher than the base store.

II: Price level is not significantly different from the base store.

III: Price level is significantly lower than the base store.

Table 4.9: Summary Table II

	NATIONAL			CHEAPEST		
	I	II	III	I	II	III
STORE1	0	2	5	3	2	2
STORE2	4	3	0	3	4	0
STORE4	0	6	1	2	5	0
STORE5	3	4	0	6	1	0
STORE6	1	3	3	2	3	2
STORE7	3	3	1	2	5	0
STORE8	1	0	1	1	1	0
STORE9	4	2	0	2	5	0
STORE10:	0	1	6	0	2	5
STORE11:	2	1	4	2	2	3
STORE12:	1	2	4	2	3	1

Note:

I: Price level is significantly higher than the base store.

II: Price level is not significantly different from the base store.

III: Price level is significantly lower than the base store.

CHAPTER FIVE

CONCLUSION

This chapter summarizes the thesis, discussing the objectives and how these objectives were acheived. The results of the empirical model are briefly reviewed, comparing and contrasting these results with past literature. The weakness of the study and recommendations for further research and study is discussed.

5.1 Summary of the Thesis

The objective of this thesis is to determine the consequence certain socioeconomic and store characteristics have on retail food prices. To achieve this objective, food and non-food price data were collected from grocery stores in the Tucson metropolitan market over a seventeen week period. The price data collected consisted of a typical market basket purchased in this market. Different price categories were analyzed in order to determine the relevance of interstore price comparisons between different brand categories. An ordinary least squares model was applied to test the impact the store, neighborhood income and store size had on national and cheapest brand prices for seven alternative price measures (individual goods, the whole market basket, and five food categories). Comparisons were made between the two brand categories for these price levels, resectively, within each store.

The results indicated, given the market basket in the study, that grocery store's image of being a low or high priced store may change

according to whether national or cheapest brands for particular food categories are considered. Generally, retail grocery stores advertise prices for a specific brand, not specifying the prices of other brands of the good(s) advertised. The study found that there are differences in prices of the same item but in different brands. Some stores appear to price national brands low while pricing other brands high, or vice versa.

One supermarket chain store in particular which stands out in its marketing strategy is STORE1. This store has advertised itself as being the "Low Price Leader" and has used advertised prices to signal this price image. The results indicate that this store tends to price national brands lower than the other stores, but it is less clearly the lowest price chain when less expensive brands are included. In other words, a price conscious shopper without strong brand preferences can do well by shopping at other stores.

Another store with noticeable pricing strategy between brands is STORE5, an independent store. From the findings of the study, this store prices national brands at levels similiar to other stores, with some items priced higher than the norm. This store appears to have relatively high prices when considering brands other than the national brands. These two stores are not the exception to the rule, but more the norm. Thus, with this in mind, consumers should be aware of the type of brands and items a store advertises when it is marketing a low price image. Any public price reporting system should include the cheapest alternative of a particular item if it is to be useful to shoppers searching for an economical alternative.

When considering the socioeconomic impacts of food prices for national brands for all the seven price levels, except for two food categories (Meats/Poultry and Dairy/Eggs), in general none of the income areas in the city appear to have a significant effect prices.

In the cheapest brand category, the high income areas had a significant effect for five of the price levels, with the exception of the same two food categories previously mentioned; and the low income areas had an impact on the prices of three (Cereal/Bakery, Canned/Packaged, Non-Food) of the five food categories. These results also confirm that there are interstore differences among brands.

Prices are affected by the size of the store. The small stores had a significant positive effect on all of the price levels (individual goods, the whole market basket, and five food categories) except for the Non-Food category. The highest prices were also observed in small stores for all of the price levels (individual goods, the whole market basket, and five food categories) except for Meats/ Poultry category which appeared to have low prices in small stores.

5.2 Comparison of Results with Previous Work

4.3.1 Brands

Prices were compared by type of label for ten products in the Handy and Padberg (1971) article. Private label items were found to be less expensive than comparable advertised brand items. In conjunction to Handy and Padbergs' result, O'Farrell and Poole (1971) also found that national brands were priced higher than private brands when they conducted a study on retail grocery price price variation in Northern Ireland. These results coincided with the one found in the thesis which

was that the national labels were found to be generally more expensive or priced higher than the private brand items.

4.3.3 Income

Devine and Hawkins (1970) did an empirical study concerning market conduct in food retailing. One of their findings was that the underprivileged sector of the population had higher priced stores in their neighborhoods. In another Devine and Hawkins (1972) study they again found that the under-privileged sector paid more for food and that the more affluent areas had lower food prices. The results of this thesis contradict Devine and Hawkins' findings. The results showed that grocery stores in high income areas of the city generally had higher prices for the private brands. The low income areas only showed an impact on price for three food categories (Cereal/Bakery, Canned/Packaged and Non-food); and this impact was one of low prices. Therefore, the findings from the thesis differ with the previous studies mentioned, since it was shown that high prices prevail in high income areas and that low income consumers have access to low priced food items.

Other views from the past literature which coincided with the thesis came from Hall (1983) and Cotterill (1986). Hall found that low income consumers are better off with respect to prices that are offered for low price items but worse off with respect to the prices of brand name items. That is, prices offered for the private brand labels tend to be lower in low income neighborhoods. In conjunction with this finding, Cotterill found that prices are higher in high income markets. He reasoned this to be because markets with high per capita income will

tend to have more inelastic demand curves for food because food represents a smaller portion of a high income person's expenditures.

4.3.4 Size

In Nelson's (1966) study of price competition among retail food stores, he found that size contributed little explanation of differences in pricing patterns, that size alone was not a primary determinant of price change practices. O'Farrell and Poole (1971) also demonstrated that store size doesn't significantly influence the level of retail prices. Cotterill (1986) found that size does not affect the retail grocery price. These findings were similiar to those found in the thesis since large and medium size stores did not significantly influence food prices, whether observing them individually, in categories or in a market basket. But in contrast, the small stores, for all price categories proved to influence retail food prices.

Campbell and Chisholm (1969) estimated from their study that the size of the store is related to the price level. Parker (1974) broke the sizes down into categories and found that the largest stores were significantly cheaper than the smallest and middle sized stores. Marion et al (1979) also reported a significant effect of size on price. They determined that average store size had a negative relationship to price i.e. the larger (smaller) the store the lower (higher) the price of items. Hall (1983) agreed with Parker's and Marion's reports since he also found that the larger stores offered relatively better prices. These results for the store sizes could not be compared to the thesis. In contrast, only the small stores had an impact on prices, and were shown to have high prices as well.

5.3 Weaknesses of the Study

The weaknesses of the study are as follows: (1) Since the market basket was subjectively chosen and contained items which were typically purchased, many items which could have affected the results were not included, such as goods which are not regularly purchased. Studies have found that the consumer is not readily aware of prices of items which are not bought on a regular basis, so this gives a pricing advantage to the grocery stores. Prices for such items could be marked up without the consumer noticing. (2) The store size measurements were also subjective. (3) When mapping the stores in their respective income areas, stores which were close to another income area was not taken into account. (4) Errors in the price data could have occurred during price data collection without knowledge to the student involved in the collection. (5) The amount of price data analyzed could have effected the results of the empirical model significantly if more price data was analyzed.

5.4 Recommendations of Further Research

Further research could be done in the area of comparing the price data collected to advertised price checks published in the Tucson city's newspaper and reported on cable television to find out if the advertised items coincide with the price data. Prices advertised by chain stores usually do not specify which store location the advertised prices are sold. The consumer is led to believe that the advertised price is available at all of the stores owned by the chain. From the price data collected, it was observed that there were differences in the prices for the market basket, certain food items and food categories within the

same chain but at different locations. Due to this observation, it could be hypothesized that there could be a significant difference between the advertised prices and the store prices in various locations.

Research concentrating on the the effects prices of national brands have on prices of other brands and vice versa for each store can be further studied to find out if different brands affect the prices of each other. It was clear in the study undertaken that there is a variation in prices between the national and cheapest brand categories within each store. But the effect these brands have on each other was not analyzed. The prices of one brand could be analyzed over time to estimate the impact they have on other brand prices.

This study could also be expanded to study supermarket chains in the towns surrounding the Tucson metropolitan area as well as in the Phoenix metropolitan area and surrounding suburbs to analyze the variation in prices of different brands in each chain depending on its location. Differences in prices of the same brand category, in the same chain but in different locations were noticed in the price data from this study. Further research could be undertaken due to this reaction.

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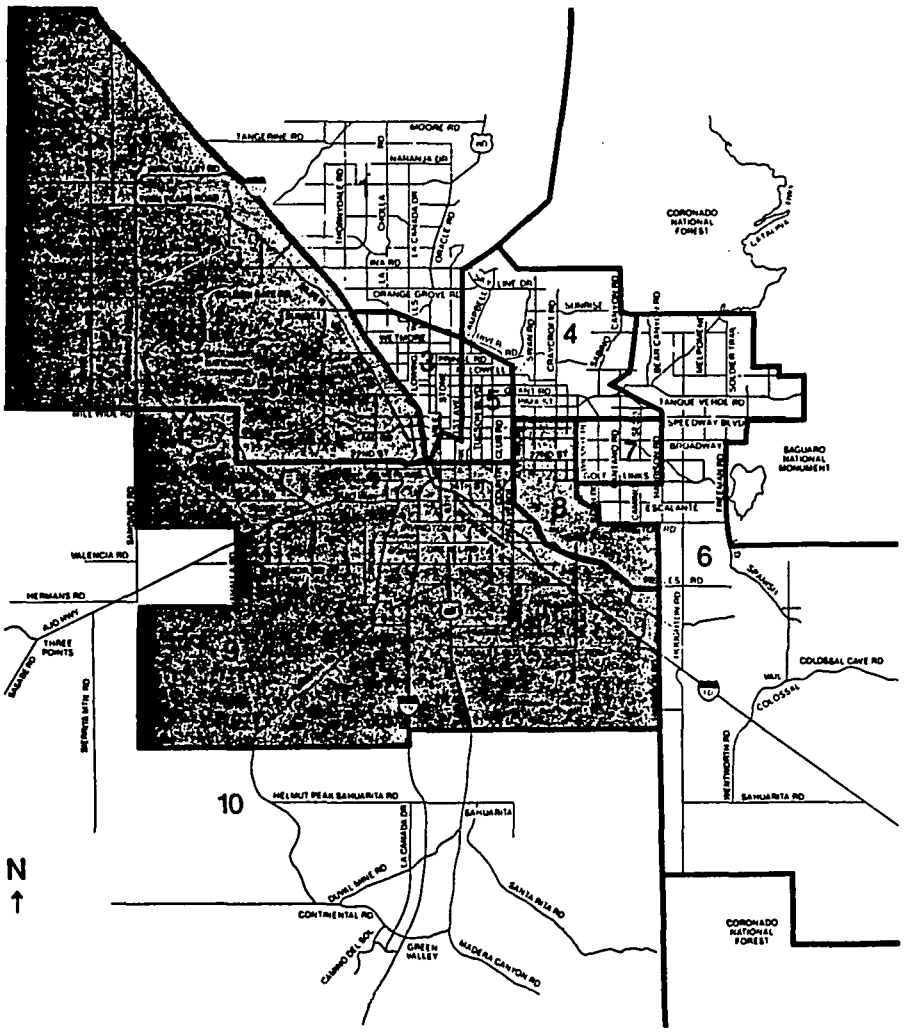
APPENDIX A

The stores which were studied in the Tucson metropolitan areas are as follows;

1. Lucky Food Centers
   3900 W. Ina
2. A.J. Bayless
   3688 W. Orange Grove
3. Fry's Food Stores
   3770 W. Ina
4. Safeway Stores Inc.
   3749 W. Ina
5. Coronado Grocery & Market
   3125 N. Stone
6. Safeway Stores Inc.
   855 E. Grant
7. Lucky Food Stores
   719 E. Ft. Lowell
8. Grantstone
   8 W. Grant
9. Alpha Beta
   4625 E. Speedway
10. Safeway Stores Inc.
    5548 E. Grant
11. Lucky Food Center
    5667 E. Speedway
12. A.J. Bayless
    7025 E. Tanque Verde
13. Fry's Food Center
    7850 E. Speedway
14. Lucky Food Centers
    8975 E. Tanque Verde
15. United market
    2400 S. 6th
16. El Grande
    805 E. 36th
17. Warehouse Foods
    3455 S. Campbell
18. Rays Market
    3030 E. 22nd
19. A.J. Bayless
    1775 W. Ajo Way
20. Lucky Food Centers
    1740 W. Ajo Way
21. Safeway Stores
    2940 W. Valencia
22. Fairmont
    2700 W. Valencia
23. Lucky Food Stores
    2520 S. Harrison

APPENDIX B

MEDIAN HOUSEHOLD INCOME



Source: Tucson Trends 1986

HOUSEHOLD INCOME BY ZONE

Zone	Under $10,000	$10,000-$14,999	$15,000-$19,999	$20,000-$24,999	$25,000-$29,999	$30,000-$39,999	$40,000-$49,999	$50,000 or More	1986 Median Income
1	7%	7%	9%	13%	17%	22%	8%	17%	$29,125
2	13	18	16	11	12	12	7	11	21,111
3	20	17	18	11	13	16	3	2	18,583
4	7	10	10	15	12	18	7	21	28,182
5	20	16	16	15	10	9	6	8	19,250
6	2	8	5	18	21	17	15	14	29,028
7	3	11	11	13	13	23	14	12	29,643
8	12	10	26	19	9	14	6	4	20,658
9	15	18	15	20	13	11	5	3	20,529
10	13	9	11	14	14	22	8	9	26,136
1986 Estimated Households	31,900	34,400	34,400	36,900	31,900	36,900	17,200	22,100	
1986 Total Area	13%	14%	14%	15%	13%	15%	7%	9%	$23,213
1984 Total Area	19%	16%	14%	13%	11%	13%	6%	8%	$20,346
1982 Total Area	26%	14%	13%	14%	9%	11%	6%	7%	$18,979

Source: Tucson Trends 1986