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# Supermarket Prices and Price Differences

## City, Firm, and Store-Level Determinants

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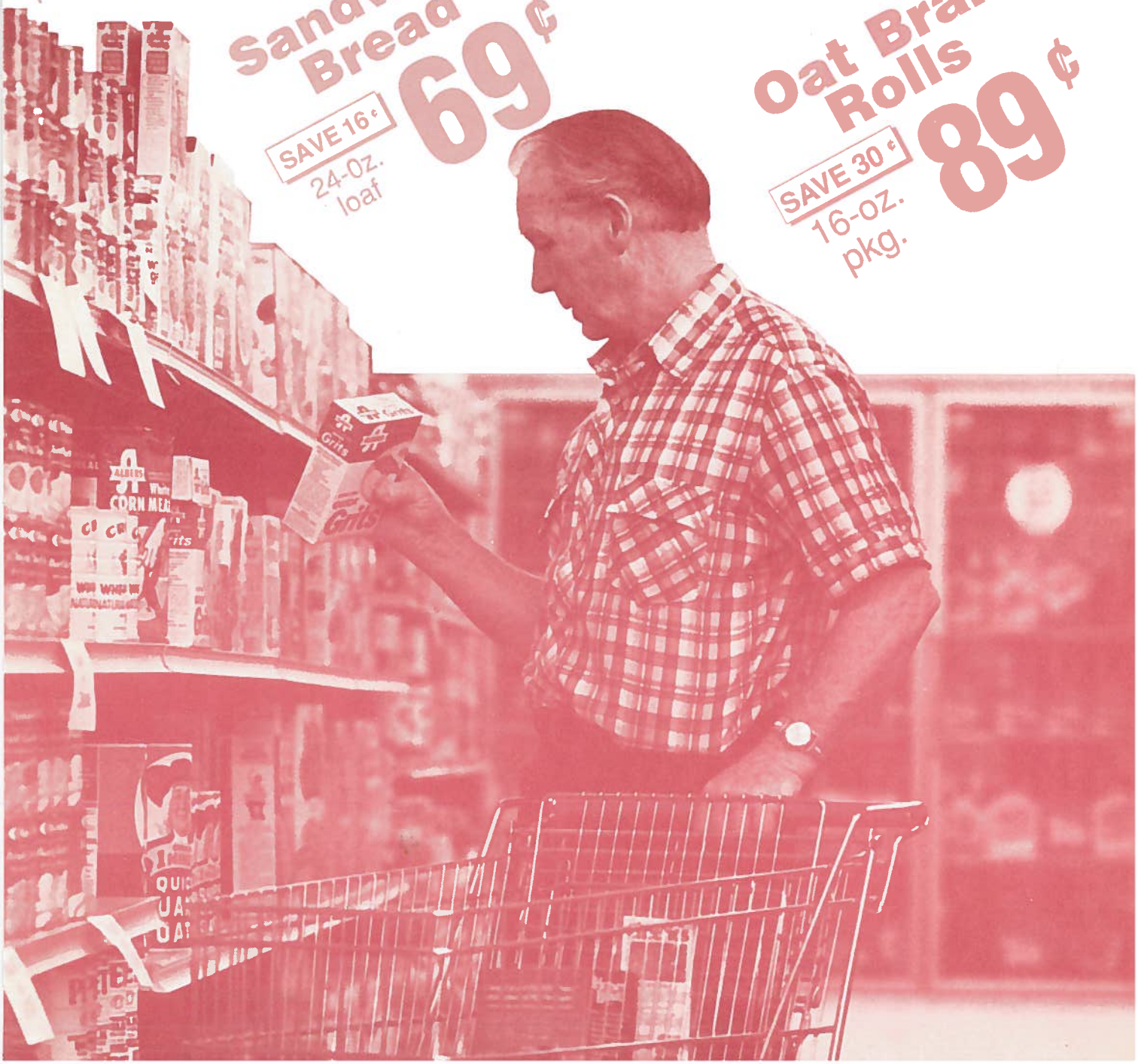

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**Supermarket Prices and Price Differences: City, Firm, and Store-Level Determinants.** By Phillip R. Kaufman and Charles R. Handy. Commodity Economics Division, Economic Research Service, U.S. Department of Agriculture. Technical Bulletin No. 1776.

## Abstract

A nationwide survey of supermarket prices and other store, firm, and city characteristics found considerable diversity between cities and among stores and firms within cities in 1982. Store size, sales volume, store services, occupancy costs, market growth, and market entry contributed to price differences between supermarket firms. Differences in market concentration, firm market share, and firm labor costs were not significant determinants of supermarket prices. Considerable switching occurred in the price rankings of firms in most cities over the three survey periods.

**Keywords:** Food retailing, supermarkets, prices, price determinants, market structure, market performance, retail food price survey, concentration.

## Acknowledgments

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Gerald E. Grinnell, initial project leader, contributed to sample and survey design, methodology, and collection of survey data and provided helpful comments of draft versions of this report; Tom Stafford helped develop item selection and price index aggregation procedures; James M. MacDonald analyzed store-level price dispersion and price determinants; Paul E. Nelson helped with data collection and developed various measures used in the statistical analysis; David M. Smallwood designed the computer programs to calculate price indexes; Charles Hallahan provided technical support for the LIMDEP analysis; Maxine Davis calculated brand-type shares; Judith Jones Putnam, Doris J. Newton, Charlene C. Price, and H. Marcus Blalock collected and audited survey data. Karen Y. Davis typed the manuscript and developed charts.

The report has also benefited from the review and comments of Professor Joseph Uhl, Purdue University, and Professor Jeffrey M. Perloff, University of California-Berkeley.

**Note:** References to commercial firms or brand names in this report are for information only and do not imply endorsement by the U.S. Department of Agriculture.

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## rice Differences Mostly Reflect Cost Differences

**arket power had little effect on supermarket prices.**

variety of city, firm, and store-level characteris-
:s influenced supermarket prices and price differen-
s. Supermarket size and sales volume, occupancy
ısts, store services, and warehouse stores con-
buted to firm price differences within cities. Mar-
:t growth, market rivalry, and market entry ac-
ıunted for firm price differences between cities.
ıere was no evidence that firm market power--the
ıility to unilaterally raise prices--had a signifi-
ınt effect on supermarket prices. The leading
rms in a market, ranked according to sales shares,
ıd diverse pricing patterns, with no apparent rela-
ɔnship to four-firm market concentration, or to
rm market share. The supermarket price survey
as conducted in 28 cities selected at random.
lore than 300,000 item prices were collected from
16 supermarkets representing 321 firms.

ity-level characteristics were analyzed to account
ɔr firm price differences between cities. Highly
ɔncentrated cities did not have firm prices sig-
ificantly different from other less-concentrated citi-
s, controlling for other differences. Firm prices
ere higher in cities with higher growth rates than
ı other cities. Large-scale entry by firms during
ıe 5-year period preceding the price survey was
ssociated with higher supermarket prices, all else
eing equal. Cities where leading supermarket firms
xperienced stronger market rivalry, or greater turn-
ver and changing sales shares, had slightly lower
rices than other cities.

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etermine their influence on prices. Greater market
hare had no discernible effect on firm prices, all
lse being equal. Food retailers operating ware-
ouse stores had lower price levels than did firms
ot operating warehouse stores, controlling for other
ifferences. The extent to which foodstore operators
upport their retailing activities through warehousing,
vholesaling, and purchasing and distribution (degree
ıf integration) was not found to influence firm
ıricing when nonintegrated firms were compared
vith all other firms.

A firm's individual store characteristics had varied effects on prices and price differences. Greater store sales, given store size (a measure of capacity utilization), were associated with lower firm prices, all else being equal. Higher store occupancy costs, such as rental rates and utilities, similarly resulted in higher prices, controlling for other differences. All else being equal, prices were higher among firms with more store services, but greater costs may account for only part of the increase. Differences in labor compensation, or average employee wages and fringe benefits, did not significantly affect firm prices, despite considerable disparities in firm labor costs both within and between cities.

The basic competitive environment facing food retailing firms does not change rapidly from year-to-year. The results of this study corroborate results of the National Commission on Food Marketing and the findings of Gorman and Mori in 1966, for example. The growth of price-oriented supermarkets, such as the warehouse and superwarehouse store and the hypermarket, have heightened competitive intensity in many cities and towns since this study collected price data in 1982. These developments strongly suggest that the major findings of this study are as valid in 1989 and beyond, as in 1982.

**City, firm, and store characteristics affect supermarket prices**

- **Within cities:**
  - Store size and sales volume
  - Occupancy costs
  - Store services
  - Warehouse stores
- **Between cities:**
  - Market growth
  - Market rivalry
  - Market entry

## Understanding Food Prices

**Food prices affect practically every consumer, and thus by their practical relevance, stimulate concern about why supermarket prices differ between firms and cities.**

Food products are sold through many types of retail outlets, including supermarkets, convenience stores, superettes (sometimes called "mom and pop" grocery stores), specialized food stores, such as meat markets and produce stands, and nonfood stores. Supermarkets, which represent only 10 percent of all foodstores, account for 70 percent of foodstore sales and, therefore, have the greatest effect on food retailing industry structure and performance.

This report contains the results of a research effort initiated by the Economic Research Service (ERS) in 1980 to learn more about how much supermarket prices vary, both among firms within cities and among firms in different cities, and the reasons for these differences. Separate surveys collected detailed store-level data for grocery item prices, labor compensation, and store characteristics and services. An instore survey collected more than 300,000 food and nonfood item prices from 616 supermarkets operating in 28 cities. The detailed store-level survey data bring a richness of information to the analysis not previously available. The data collection effort and survey design innovations likely account for much of the differences in findings compared with some earlier studies of retail food prices. Specific objectives of the study are to:

- Address the shortcomings and criticisms of earlier food retailing price studies through innovations, including sampling and price measurement procedures.
- Determine whether prices are higher in more concentrated markets.
- Determine whether firms with larger market shares charge higher prices.
- Determine the importance of other factors that have been hypothesized to affect food prices, such as wage rates, occupancy costs, and store services.
- Estimate price differentials between integrated and nonintegrated firms.

The primary focus of the Nation's price collecting and reporting effort has to do with price changes over time. Food price changes are reported by the Bureau of Labor Statistics (BLS) as part of their Consumer Price Index (CPI) series. Because of the survey and calculation methods used, the BLS expressly states that the CPI series is not appropriate for making cross-section (or spatial) comparisons of price indexes, such as those between cities (Rothwell; Geithman and Marion). Only a handful of previous studies have seriously attempted to analyze cross-section retail food prices, partly due to the lack of price data that would allow comparisons across firms and cities.

Early studies in the 1930's compared price differences between chains and independents and found that prices of chains were 6- to 14-percent lower (Hoffman, FTC). Later, Holdren (1960) and Nelson and Preston (1967) again found that chains had lower prices.

The National Commission on Food Marketing (1966) made the first major attempt to specifically address the question of market power using data collected for that purpose in the mid-1960's. Data were collected on 6,000 stores operated by the nine largest food chains. The Commission found that gross margins (markups) were related to a firm's market share but found only a random relationship between market share and prices.

A study of supermarkets in 21 cities and towns by Gorman and Mori (1966) found that average prices in a city were not related to four-firm concentration. A subsample analysis of four chains operating in multiple survey cities found that prices were not related to their respective market shares. The study was criticized for its large proportion of highly concentrated cities, and for omitting other relevant price determinants.

Grinnell and others (1978) were unable to find a positive relationship between market prices and four-firm concentration ratios using CPI indexes. Lamm (1981) subsequently found a positive market concentration-price relationship using alternative measures

of concentration and different BLS data. Both the Grinnell and Lamm studies relied on price data not designed to compare prices between firms and cities.

Marion and others conducted a major study of the price performance of leading multimarket food chains for the U.S. Congress Joint Economic Committee (1979). The weighted average cost of a "market basket" consisting of 94 comparable items, excluding most perishable products and health and beauty aids, was calculated for each of three large supermarket chains. That study reported that higher market share and higher four-firm concentration ratios both contribute to higher food prices.

More recently, Cotterill (1984) found the market basket price to be positively associated with concentration measures in 18 small cities and towns of Vermont. Supermarket four-firm concentration averaged 96.1 percent, with 11 of the 18 market areas dominated by 2 large chains.

An analysis of food cost variation in supermarkets, using 10 of the 28 Standard Metropolitan Statistical Areas (SMSA's) from this study, found significant neighborhood (ZIP-code area) and store-level price differences (Nelson and MacDonald, 1988). The market basket cost differed an average of 7 percent within metropolitan areas. Regression results indicated that a store's market basket cost was higher in high-income areas, increased with a socioeconomic measure of the neighborhood, was inversely related to the number of supermarkets in a neighborhood, and was lower when located near a warehouse supermarket.

These studies have made important contributions to our understanding of factors influencing food retailing prices, and at the same time suggest opportunities to refine sampling and analytical techniques. Sufficient information is required to develop a representative sample of items sold in supermarkets. Stores selected for enumeration should represent all supermarket firms, and sample firms should embody the broadest possible range of market participants. Because food retailing is a local market-based industry, SMSA's--when used to define local markets--should represent homogeneous economic areas. Sample cities should represent a wide range of market structure characteristics. These are the ideal conditions for analyzing retail food prices and price differences.

### Criticisms of earlier price studies

- Items selected not representative of all food and nonfood supermarket products.
- Nonrepresentative sample of cities, firms, and stores.
- Important price determinants omitted from the statistical analyses.
- Store- or firm-level data not available.

## Selecting Cities, Supermarkets, and Items for the Survey

**Random sampling selected cities, firms, and grocery items.**

Our universe of cities consisted of 203 SMSA's with a population of 150,000 or more as determined by the 1970 Census of Population. SMSA's were first stratified into four groups on the basis of four-firm market concentration ratios to assure a broad range of concentration in the sample cities.[1/] The four-firm concentration strata were defined as: (1) less than 40 percent (44 SMSA's); (2) 40 to 49.9 percent (74 SMSA's); (3) 50 to 59.9 percent (47 SMSA's); and (4) 60 percent or higher (38 SMSA's). Seven cities were randomly selected from each of four concentration stratum to obtain a sample of 28 survey SMSA's (table 1).

Larger SMSA's such as New York and Los Angeles may consist of multiple submarkets; therefore, we tried to separate New York into its several boroughs to define more homogeneous markets. However, analysis by borough was determined infeasible, because the available data were inadequate to measure several price determinants.

Because we wanted to examine prices of firms with possible market power, we randomly selected one or more supermarkets from each of the six leading firms in each SMSA. Among larger SMSA's, an additional store was randomly selected from firms not among the six largest firms but having 1 percent or more market share (of total grocery store sales). "Supermarkets" are grocery stores with a range of departments and annual sales of $1 million or more in 1980. In each SMSA, we randomly selected five stores to account for all other supermarket firms operating in the market, largely single and multistore supermarket retailers. In all, 616 supermarkets were selected for instore price collection.

We used scientific selection procedures to develop the sample of grocery items--an important difference from most other multiproduct price-comparison surveys. Detailed share-of-supermarket sales weights ensured that the sample represented all food and nonfood items sold in supermarkets. Most other food price studies have limited item representation because sales weights are applied only to broad product categories. Subjective selection is used to sample items within these categories, which introduces error into the price aggregation and comparison process.

We randomly selected the sample of food and grocery items from about 95 percent of supermarket products, including produce and fresh meat. To obtain a representative list of item prices, we established the following objectives for the sample design:

- Products selected should represent the entire supermarket, to the extent possible.
- Items should be selected in proportion to their share of total supermarket sales.
- Price comparisons should be limited to like items; we did not directly compare prices between different container sizes, product types, flavors, or brand types.
- The data should permit a comparison of prices between brand types.
- Random selection should be used.

To achieve these objectives, we obtained share-of-sales data for individual supermarket products classified into detailed product subcategories containing only one container size, product type, and flavor.[2/] We made a list of these items, then randomly selected individual subcategories until the desired sample size was achieved. Appendix A contains examples of actual product subcategories.

1/ Four-firm grocery store concentration ratios were estimated from the 1980 issue of *Market Scope*, published by Progressive Grocer, after converting the denominator from food store sales to grocery store sales based on the 1977 Census of Retail Trade.

2/ This procedure required share-of-sales data for detailed product categories, such as canned peas #303 size (15-17 ounces) or whole milk (excluding flavored milk) in half-gallon containers. Share-of-sales data were obtained from *Chain Store Age: Supermarkets*, A.C. Nielsen Co., and U.S. Department of Agriculture data series.

In the supermarket, enumerators were instructed to price-check every item that met the selected sub-category descriptions in each sample store. All price comparisons for the supermarkets were made on a unit-price basis. The enumerators recorded physical product quantities and made appropriate conversions. Most prices were converted to a per-unit-weight basis (pounds or ounces), although many were converted to a common volume (fluid ounce, quart, or gallon), and a few were converted to a count basis (price per trash bag). Per unit conversions were made even when products were packed in a standard-sized can. For example, a #303 can may contain 15-17 ounces of product by weight.

Three repeated independent samples were drawn, one for each wave, or study period, of price collection. Price indexes for the three waves were averaged together to reduce the influence of any potential temporary market aberration. By using three different item samples, each wave represents a complete replication of price measurement and, when averaged together, results in a more accurate estimate of price levels for the sample firms.

## Features of the ERS supermarket price study

- 28 cities (SMSA's) randomly selected
- Prices collected from 616 supermarkets in 321 firms
- All supermarket departments represented, including fresh meat and produce
- Item prices recorded instore by trained enumerators
- More than 300,000 food and nonfood prices collected
- 3 price collection surveys (waves)
- Separate surveys of store characteristics and labor compensation

**Table 1--Survey SMSA's by population size**

| SMSA and population size | 1980 population | Grocery store sales, 1982 | Four-firm concentration, 1982 | Price survey supermarkets, 1982 |
|---|---|---|---|---|
| | Thousands | 1,000 dollars | Percent | Number |
| 1,000,000 or more: | | | | |
| 1. New York, NY | 9,253 | 6,830,595 | 34.8 | 29 |
| 2. Los Angeles-Long Beach, CA | 7,245 | 7,844,816 | 35.1 | 31 |
| 3. Philadelphia, PA | 4,772 | 4,158,326 | 43.9 | 28 |
| 4. Detroit, MI | 4,357 | 3,674,861 | 50.4 | 22 |
| 5. Boston, MA | 3,255 | 2,460,018 | 34.6 | 18 |
| 6. Houston, TX | 2,758 | 4,233,146 | 53.0 | 24 |
| 7. St. Louis, MO | 2,393 | 2,283,176 | 59.5 | 24 |
| 8. Pittsburgh, PA | 2,276 | 2,210,759 | 37.9 | 17 |
| 9. Atlanta, GA | 1,904 | 2,162,350 | 65.9 | 21 |
| 10. San Diego, CA | 1,801 | 1,846,082 | 67.1 | 22 |
| 11. Denver, CO | 1,564 | 2,103,149 | 83.7 | 24 |
| 12. Miami, FL | 1,517 | 1,658,107 | 60.3 | 20 |
| 500,000 to 999,999: | | | | |
| 1. Fort Lauderdale, FL | 966 | 1,224,818 | 74.4 | 23 |
| 2. Akron, OH | 656 | 679,602 | 50.1 | 17 |
| 3. Tulsa, OK | 647 | 892,799 | 46.9 | 14 |
| 4. Jersey City, NJ | 566 | 493,905 | 43.8 | 13 |
| 5. Youngstown, OH | 547 | 499,140 | 53.0 | 19 |
| Less than 500,000: | | | | |
| 1. Baton Rouge, LA | 460 | 641,138 | 45.1 | 17 |
| 2. Paterson-Clifton-Passaic, NJ | 460 | 327,678 | 45.7 | 13 |
| 3. Albuquerque, NM | 443 | 480,140 | 69.7 | 16 |
| 4. Las Vegas, NV | 395 | 650,076 | 62.1 | 20 |
| 5. Madison, WI | 311 | 300,975 | 50.9 | 12 |
| 6. Evansville, IN | 304 | 335,469 | 48.2 | 14 |
| 7. Jackson, MS | 303 | 332,972 | 68.4 | 15 |
| 8. Huntington-Ashland, WV | 301 | 299,626 | 29.8 | 12 |
| 9. Portland, ME | 207 | 301,716 | 55.3 | 12 |
| 10. Springfield, MO | 204 | 220,767 | 77.4 | 14 |
| 11. Santa Cruz, CA | 183 | 230,271 | 40.4 | 17 |

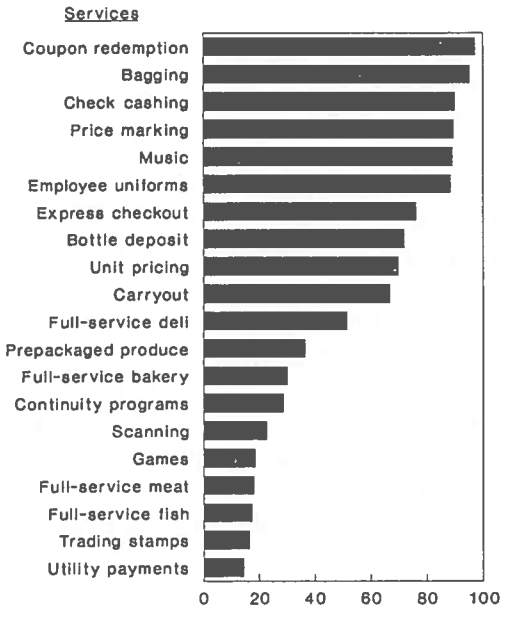
## Data Collection Procedures

**Store-level surveys collected data on item prices, store characteristics, and labor costs.**

Developing accurate, representative price data is the most difficult and expensive aspect of conducting concentration-price analyses. The present study has incorporated procedures that recognize within-SMSA differences. Earlier investigations often relied on firm-supplied price lists, limited sample sizes, and marketwide measures of operating costs and other data to conduct price analysis. These differences may largely explain the divergence in findings and conclusions from some of the earlier studies, where they exist.

Price data were collected by instore enumerators in 1982 on February 11-13 (wave 1); April 1-3 (wave 2); and May 6-8 (wave 3). The Thursday through Saturday collection period was set to coincide with end-of-week price promotions, a common industry practice. A separate survey form containing the list of all items, grouped by supermarket department, was developed for each of the three collection waves (Appendix A). For each item, enumerators recorded the brand name and container size (if not prelisted), the item price, and the number of containers sold at the price, if sold in multiples. Enumerators also measured and recorded the diameter of certain produce items, such as Red Delicious apples from Washington State and Temple oranges. Produce items priced by the head or per unit were weighed to compute a price per ounce. In the fresh meat department, the grade (Prime, Choice, or non-USDA grade) for most beef cuts was recorded. Enumerators recorded an average of 170 item prices per supermarket, totaling more than 100,000 price observations per collection wave.

Figure 1
**Percentage of supermarkets offering services**




Supervisory field personnel completed a store characteristics form for each sample supermarket sometime during the three waves of price collection. Store characteristics (which the enumerators were instructed to observe without asking questions of store personnel) relate to type of store location (city, suburban, stand-alone, or shopping center), size of selling area, type of store (traditional supermarket, superstore, combination store, no-frills store, or other), hours of operation, and 20 different customer services (fig. 1). The questionnaire and accompanying instructions are reproduced in Appendix B.

Labor costs account for more than half of supermarket operating costs, excluding cost of merchandise. A separate labor cost questionnaire collected information on total payroll, hours, and fringe benefits data for all hourly (nonsalaried) employees in each survey supermarket (Appendix C). The labor cost survey was conducted after the final price collection wave. Retailers had the option of completing the forms at their headquarters or having enumerators contact their store managers.

- **Survey data sources**
  - Item prices
  - Store characteristics survey
  - Labor costs
- **Published data sources**
  - Supermarket census
  - Annual supermarket sales
  - Share-of-sales data

## Calculating Price-relative Indexes

**Price-relative indexes reduce bias resulting from missing items and aggregation procedures.**

A fundamental empirical question concerns procedures used to compare foodstore prices across stores, firms, and cities. Most price comparison studies have used the "market basket" approach. For a given store, prices of all sampled items are summed to represent the total dollar amount a consumer would pay for that "market basket" of items. The number of items selected from each product category (such as dairy, produce, and fresh meat) is usually in proportion to those categories' share of total store sales. A comparable list of market basket items are price-checked in each store.

This market basket approach raises two conceptual questions: (1) what to do when a store does not have all items in the market basket (missing items), and (2) what quantity of each product to price-check. The "missing item" question arises when one or more items in the market basket are either out of stock or not handled by a survey store. The solution most often used is to insert the average price charged by other survey stores for the missing item(s). This procedure inadvertently reduces a store's market basket price variation compared with the other stores. A store that does not handle many items will appear to have prices more similar to those of the other stores, even though the prices on the products it handles may differ sharply.

In comparison, a price-relative index measures a store's price for a particular product compared with the average price charged by all survey stores for that product. For example, Campbell's cream-of-mushroom soup in a 10.75-ounce can costs 32 cents each (3 cents per ounce) in supermarket A. If the average price of national brand cream-of-mushroom soup in 10- to 15-ounce cans was 3.3 cents per ounce for all stores in the survey, then the price-relative index for Campbell's cream-of-mushroom soup in supermarket A on a per-ounce basis equals 3 divided by 3.3 multiplied by 100, or 90.9. Price-relative indexes were similarly computed for all item prices recorded. Item price-relative indexes were then aggregated into averages by brand type (national, private/store label, and generic), department, store, firm, and SMSA.

The market basket approach specifically biases the summary price estimate when there are missing items, whereas the price-relative approach does not. The price-relative index procedure implicitly treats missing items as if their price relatives were higher or lower in the same proportion as that of the store's all-item price relative index. When a significant number of sample items are missing in a particular store, the sample may not adequately represent its price level regardless of which approach is used.

A second conceptual question about the market basket approach concerns the selection of product quantities or package sizes that do not accurately reflect consumer expenditures or share-of-supermarket sales for those products. Analysts usually sample products with probability of selection based on consumer expenditure data for broad product categories and then arbitrarily select the quantity or package size from each category to price check, such as one quart of milk, or one pound of hamburger. Subjective selection of one quart, one pound, or any other specific product quantity introduces error in the market basket aggregation process. Implicit item weights are applied that most likely do not reflect actual share of sales for that item.

The price-relative approach eliminates the need for an item size or quantity weight in the aggregation process, unlike the market basket method. Because items are selected with probability according to detailed share-of-supermarket sales, individual price-relative indexes can be averaged together directly without further weighting. It does not matter whether enumerators price check a 3/4-, 1-, or 1-1/4-pound package of hamburger because quantity weights are not used in the aggregation of price-relatives. The implicit weights are the detailed share-of-supermarket sales weights used to develop the item sample. Package sizes or quantities as applied in the market basket method most often do not correspond to the correct sales or expenditure share weight.

The aggregation procedure to calculate store and firm price indexes was repeated three times, once

for each price collection wave, to reduce pricing aberrations due to price wars or seasonal shortages. We then averaged the store price indexes of the three waves to form the basis for empirical analysis of firm-level price indexes.

The list of supermarket items to be enumerated and the accuracy of the data collected were crucial to the success of the study. Once detailed product subcategories were selected, field checks ensured that items found in the subcategory did not contain more than one type of product, flavor, or package size.

### Aggregating the price indexes

Three separate product lists were used in the three price collection waves (some product overlap occurred due strictly to chance). Separate price indexes were constructed for each wave and were then averaged together. The same procedure calculated price indexes in each wave and entailed two major steps.

- For all sample stores, the average unit price of each brand type in each product subcategory was determined.
- The unit price of each item in each store was divided by the appropriate all-store average unit price.

This converted the price to index units, which were aggregated into averages for each brand type, department, store, firm, and SMSA. Although the basic procedures were fairly straightforward and simple, several complex sets of weights were needed, making the actual computations quite tedious. For a list of the actual steps involved in aggregating the indexes, refer to Appendix D.

## Quality Control Procedures

**Considerable effort at every phase of the supermarket price study ensured the integrity and quality of the data.**

Training sessions were held for data collection field supervisors in each region. The sessions were conducted by a team of at least one USDA project member and one instructor from the data collection contractor. Field supervisors returned to their local areas to train enumerators and to conduct instore trials of the price survey form. The supervisors sent completed forms to USDA for review to rectify any problems before beginning data collection.

A communication center maintained at USDA monitored progress and handled special problems during the three price collection waves. USDA project members also went to various survey cities during the three waves to observe and verify the enumerators' work. Field supervisors reviewed all completed survey forms for accuracy, and either deleted or corrected errors or omissions before forwarding the forms to USDA.

USDA project members exhaustively reviewed all recorded price data for accuracy. National, regional, and private-label brand names were verified from a comprehensive listing of published brand name lists supplemented by telephone calls to wholesalers and retailers. Because standardized names are not used for fresh meat, broad categories were randomly selected (boneless beef roast, for example), and all items meeting that description in the supermarket were price-checked. Enumerators recorded meat item names exactly as they appeared on the packages. A meat nomenclature expert reviewed the survey forms and assigned each item an appropriate subcategory code to ensure that price comparisons were made only among like items, such as boneless beef bottom round roasts.

We checked entries for accuracy and legibility prior to data entry. Computer editing programs identified enumerator or data entry errors. All errors were verified and deleted, unless the error source was obvious, such as a misplaced decimal point. Field supervisors conducted the store characteristics and labor cost surveys, and USDA project members reviewed the surveys. Questionnaires received from companies' headquarters were reviewed for any questionable or incomplete information, and were rechecked through letters or telephone calls to store managers. These efforts produced a labor cost survey response rate of 83 percent among all supermarkets in our sample, and a 100-percent response rate for store characteristics.

There were two opportunities to partially verify collected price data. Rourke and Wetterau (1982) surveyed fluid milk prices in several SMSA's. Their prices closely matched prices of similar items collected for our study. Another verification source was a survey of supermarket prices in Los Angeles by an independent third party (CALPRIG). The time period and leading eight firms included in that survey were the same as for our study. We compared rankings of average prices for each firm from both studies and found them to be identical.

The proposed methodology and procedures were the subject of considerable critique and review. Seminars helped to draw on the expertise of researchers in the Economic Research Service, the Federal Trade Commission, other Federal agencies, university academicians, food industry trade association representatives, food industry participants, and public interest groups.

## Price Differences Within Firms

**A variety of factors, including submarket or store trading area characteristics, may cause price differences within firms.**

The theoretical framework for analyzing determinants of price and price differences posits the firm as the basic unit of observation. One limitation of firm-level price analysis is the ability to determine price variation within market areas. Differing demographic, competitive, and marginal cost conditions likely produce some price variation among multistore firms in an SMSA. Firm-level analytical models should, wherever practical, take submarket or store trading area characteristics into account to the extent such differences exist. The presence of unexplained, systematic store-level variation would otherwise weaken analysis of firm price determinants.

Price differences between stores within a firm are thought to be limited due to uniform pricing practices. Uniform pricing aids marketwide advertising of weekly specials, promotes brand image and firm identity when used with services and product mix, and affords greater firm control at the store level.

Examining our data can determine the extent of store price variation within a firm. Our sample consists of firms represented by their individual stores in each SMSA. Firms range in size from single-store, single-market retailers to those with multistore operations in multiple markets. Of the 321 firms included in the sample, 120 firms had more than one sample store in an SMSA. Store prices of these multistore firms were within 2 percentage points of each other in only 68 of 120 instances. There were 22 multistore firms with store prices more than 4 percentage points apart (table 2). These differences among multistore firms compare with a standard deviation of 6.5 percentage points for stores of all firms in the sample. A subset of the sample (integrated firms) had a standard deviation of 5 percentage points about the store price mean.

Nelson and MacDonald (1987) identified some of the factors causing price dispersion within multistore firms in a 10-city subset analysis of the present survey. The degree of within-firm differences revealed here underscores the importance of selecting multiple stores when analyzing firm price behavior in a particular market. The potential for considerable firm price measurement error exists otherwise.

**Table 2--Multistore firm price variation for wave 3 store price indexes**

| Price index variation | Firms having multiple sample stores | |
|---|---|---|
| Percentage points | Number | Percent |
| 0-2 | 68 | 57 |
| 2.1-4 | 30 | 25 |
| 4.1 or more | 22 | 18 |
| Total | 120 | 100 |

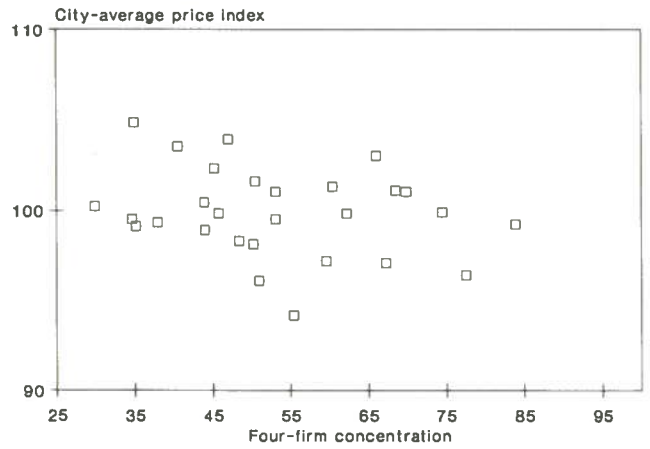
## Price Differences Between Cities and Firms

**Relying on marketwide determinants, such as concentration, market share, and average wages, masks individual store and firm characteristics that may be equally important.**

Studies that compare average supermarket prices have often reported large differences between cities (ACCRA, 1987; Rice, 1980), prompting questions about the role of market concentration and other reasons for these differences. The city average price is often based on a limited, nonrepresentative sample of supermarkets. Price differences between stores of a supermarket firm are assumed to be small. A study that analyzes factors affecting city-average price differences may rely exclusively on marketwide measures such as market concentration, market growth, and average wage rates. To the extent that within-city price differences exist, relying on marketwide determinants masks equally important differences between individual stores and firms.

We analyzed the relationship between city price averages and four-firm market concentration for each of the 28 survey cities in our study. Figure 2, a simple two-variable analysis, plots the city-average index against each city's respective four-firm concentration ratio. A separate multiple regression analysis controls for other factors that may affect firm prices. For this random sample of cities, there clearly is no systematic relationship between a city's average price index and its four-firm concentration, even at concentration levels above 60 percent.

Figure 2
**City average price index by four-firm concentration**




1/ Weighted by firm market share.
2/ 100 = all-firm, all-city average.

Figure 2 also illustrates the importance of selecting a representative random sample. Within the full 28-city sample, one can easily select subgroups of cities with strong positive or negative relationships between concentration and price. Generalizing from these small subgroups is clearly inappropriate and misleading.

Investigating the data collected for this study can determine the extent of across-city and within-city price variation. Important within-market characteristics might be ignored when analyzing price differences between cities. Within-city dispersion of the market average price and other market-based measures may be important compared with total dispersion (both within- and between-city variation).

Measures of firm price variation found among firms and cities are given in tables 3 and 4. We applied an analysis of variance (ANOVA) test to determine the relative importance of between-city differences and within-city differences to total price variation. Comparing sources of firm-price variation in the full sample, we found that between-city price differences account for 22 percent of total variation ($R^2$=0.22), leaving 78 percent of variation due to within-city firm price differences (table 4). Limiting the sample to integrated firms, the proportion of total variation due to between-city differences rose to 39 percent. Even among this more homogeneous group, the within-city firm variation still accounts for the largest share, 61 percent, of firm price variation, underscoring the importance of within-city price determinants. Factors specific to stores, firms, and cities all likely influence supermarket prices.

Labor compensation is an important element of firm costs, representing more than 50 percent of average supermarket operating expenses. Large within-city variation of wages and labor requirements may place those firms paying higher wages and providing a greater degree of service at a disadvantage compared

**Table 3--Supermarket price variation**

| SMSA | All-firm average price index 1/ | Firm price index range | |
|---|---|---|---|
| | | Minimum | Maximum |
| Akron, OH | 98.1 | 95.9 | 100.7 |
| Albuquerque, NM | 101.0 | 93.1 | 113.1 |
| Atlanta, GA | 103.0 | 93.1 | 113.6 |
| Baton Rouge, LA | 102.3 | 94.3 | 107.9 |
| Boston, MA | 99.5 | 87.2 | 121.5 |
| Denver, CO | 99.2 | 97.7 | 107.1 |
| Detroit, MI | 101.6 | 97.0 | 107.2 |
| Evansville, IN | 98.3 | 89.6 | 104.6 |
| Fort Lauderdale, FL | 99.9 | 95.1 | 112.2 |
| Houston, TX | 101.0 | 96.5 | 106.0 |
| Huntington-Ashland, WV | 100.2 | 97.1 | 103.0 |
| Jackson, MS | 101.1 | 99.4 | 105.7 |
| Jersey City, NJ | 100.4 | 97.0 | 104.4 |
| Las Vegas, NV | 99.8 | 93.7 | 121.2 |
| Los Angeles-Long Beach, CA | 99.1 | 90.3 | 118.8 |
| Madison, WI | 96.1 | 88.3 | 102.3 |
| Miami, FL | 101.3 | 95.3 | 116.4 |
| New York, NY | 104.8 | 96.6 | 108.2 |
| Paterson-Clifton-Passaic, NJ | 99.8 | 95.4 | 103.6 |
| Philadelphia, PA | 98.9 | 76.0 | 102.7 |
| Pittsburg, PA | 99.3 | 89.1 | 103.4 |
| Portland, ME | 94.2 | 84.6 | 101.9 |
| St. Louis, MO | 97.2 | 73.0 | 108.0 |
| San Diego, CA | 97.1 | 91.0 | 110.9 |
| Santa Cruz, CA | 103.5 | 94.7 | 107.8 |
| Springfield, MO | 96.4 | 86.0 | 100.7 |
| Tulsa, OK | 103.9 | 99.0 | 112.8 |
| Youngstown, OH | 99.5 | 95.7 | 101.9 |

1/ Weighted by firm market share.

**Table 4--Firm-level ANOVA test: City-specific differences in supermarket price variation**

| Item | Sum of squares | | F | $R^2$ |
|---|---|---|---|---|
| | Total | Model | | |
| All firms | 9,614.26 | 2,073.46 | 2.98 | 0.22 |
| Integrated firms | 1,140.82 | 1,600.63 | 3.75 | .39 |

with their competitors, unless higher costs can be offset by higher prices or greater labor productivity.

We examined average hourly compensation data collected for each survey store. Table 5 presents summary data by survey SMSA, including firm-level averages and the range of average compensation within each SMSA. An ANOVA test was performed for both firms and stores to determine the extent to which labor costs differ within and between cities (table 6). The $R^2$ for the firm-level test is 0.43, indicating that less than half of total variation in labor compensation is due to between-city differences. The remainder of total variation, 0.57 (or 1-0.43), is due to within-city differences. To determine the extent to which non-integrated firms may be influencing the ANOVA results, we restricted the sample of firms to integrated firms and repeated the test. Although between-city variation is more important among integrated firms ($R^2$=0.58), within-city differences still account for 42 percent of total labor cost variation.

**Table 5--Average hourly labor cost, 1982**

| SMSA | All-firm 1/, 2/ average hourly compensation | Firm average hourly compensation | | Union | Nonunion |
|---|---|---|---|---|---|
| | | Minimum | Maximum | | |
| | | Dollars | | | |
| Akron, OH | 10.71 | 7.27 | 13.64 | 10.84 | 7.91 |
| Albuquerque, NM | 7.99 | 4.49 | 10.91 | 11.09 | 6.80 |
| Atlanta, GA | 7.72 | 3.73 | 11.44 | 10.46 | 7.17 |
| Baton Rouge, LA | 7.50 | 3.34 | 12.69 | 12.05 | 6.62 |
| Boston, MA | 7.44 | 4.19 | 9.42 | 8.82 | 7.06 |
| Denver, CO | 9.44 | 6.24 | 13.49 | 12.83 | 7.34 |
| Detroit, MI | 9.62 | 3.47 | 15.13 | 14.01 | 4.65 |
| Evansville, IN | 5.77 | 3.92 | 7.79 | 7.92 | 5.16 |
| Fort Lauderdale, FL | 7.22 | 5.60 | 9.45 | 8.58 | 7.33 |
| Houston, TX | 8.66 | 5.34 | 12.54 | 10.37 | 6.55 |
| Huntington-Ashland, WV | 6.29 | 4.53 | 12.53 | 12.41 | 5.66 |
| Jackson, MS | 6.66 | 4.14 | 10.09 | 9.54 | 6.22 |
| Jersey City, NJ | 8.39 | 5.79 | 11.59 | 8.78 | 6.91 |
| Las Vegas, NV | 10.17 | 5.53 | 13.631 | 11.24 | 5.76 |
| Los Angeles-Long Beach, CA | 13.32 | 6.55 | 15.07 | 13.32 | 10.55 |
| Madison, WI | 8.98 | 5.02 | 12.89 | 10.92 | 6.15 |
| Miami, FL | 6.21 | 4.16 | 8.65 | 8.55 | 6.55 |
| New York, NY | 8.81 | 5.92 | 14.11 | 9.23 | 6.02 |
| Paterson-Clifton-Passaic, NJ | 9.59 | 4.80 | 14.21 | 10.94 | 6.17 |
| Philadelphia, PA | 10.54 | 7.43 | 13.08 | 11.17 | 9.77 |
| Pittsburg, PA | 8.15 | 5.94 | 10.91 | 8.40 | 9.13 |
| Portland, ME | 6.40 | 4.56 | 8.98 | NA | 7.17 |
| St. Louis, MO | 9.53 | 4.21 | 14.05 | 10.80 | 6.95 |
| San Diego, CA | 11.61 | 4.30 | 14.78 | 13.33 | 6.61 |
| Santa Cruz, CA | 14.01 | 9.20 | 17.60 | 16.15 | 9.30 |
| Springfield, MO | 7.47 | 4.53 | 12.14 | 9.32 | 6.82 |
| Tulsa, OK | 8.66 | 4.32 | 12.48 | 12.57 | 7.77 |
| Youngstown, OH | 8.22 | 6.21 | 11.89 | 8.62 | 6.31 |

NA = Not applicable.
1/ Includes average wages plus fringe benefits per employee valued as a cost to the employer.
2/ Weighted by firm market share.

**Table 6--Firm-level ANOVA test: City-specific differences in average hourly labor costs**

| Item | Sum of squares | | F | $R^2$ |
|---|---|---|---|---|
| | Total | Model | | |
| All firms | 3,138.67 | 1,336.48 | 8.16 | 0.43 |
| Integrated firms | 1,405.81 | 822.39 | 8.04 | .58 |

## Price Patterns Within Cities

**The degree of price variation and switching among leading firms in a city may also have implications for concentration-price and market share-price linkages.**

Supermarket firms operating in multiple cities may follow consistent pricing strategies across cities, despite differing market share or four-firm concentration levels. The performance of leading firms may have a potentially large effect on firm price determinants.

Pricing patterns of the top four firms, ranked by market share, in each of the 28 cities in our sample exhibit considerable within-city variation. Figures 1-28 in Appendix E show how relative prices varied among the leading firms in each city during the three price collection waves. The cities are grouped by three levels of four-firm concentration: (1) low (below 50 percent); (2) medium (50-59 percent); and (3) high (60 percent and above). In each city, the four leading firms are ranked from A to D, with A having the largest market share. Thus, the identity of firm A in one city is not necessarily the same as for firm A in another city. The reader can thus compare the relative market share and price levels of the leading firms without knowing the identity of the individual firms. We also arbitrarily numbered the cities from 1 through 28 to avoid disclosure.

We used only price data in this descriptive analysis, making no attempt to control for differences in market structure, product-service mix, or costs of doing business. Regression analysis results that control for these and other variables are reported in the next section.

This analysis helps to answer such questions as:

- Is there less price variation among firms in more highly concentrated cities?
- Do firms with leading or dominant market share typically charge higher prices than do firms with smaller market share?
- Are firms' relative price rankings stable over time?

What summary observations do the descriptive analysis in Apendix E illustrate? First, pricing patterns from city to city and among firms within cities vary considerably. In some cities, the average price indexes of the leading firms were tightly clustered (Appendix E, figure 14). In other cities, price levels varied widely among the top four firms (Appendix E, figure 13). The degree that average price levels among leading firms varied did not appear to be related to the level of concentration in each city. Many smaller firms had price levels exceeding the highest priced leading firm, but many other small firms had average prices equal to or lower than the top four firms.

Second, the market share leader did not necessarily have average prices consistently higher than the remaining leading firms in a particular city. In 7 of the 28 sample cities, the firm with the leading market share had the lowest average prices among the top 4 firms. In contrast, the market share leader had the highest average prices among the four leading firms in only two cities. Most of the time, the leading firm's prices fell in the middle. Among the leading 4 firms, the top-ranked firm had the second highest prices in 10 cities, and the third highest prices in 9 cities.

In 11 of the 28 cities, the leading firm had a dominant market share. There is no precise definition of a dominant market share, but we classified a firm as dominant if it had at least a 20-percent market share, and its market share was at least 6 percentage points higher than the second-place firm. In 8 of these 11 cities, the dominant firm had the lowest or second-lowest average price among the top 4 firms. In the three remaining cities, the dominant firm had the second-highest average price. Dominant firms did not have the highest average price among the top 4 firms in any of our 28 sample cities. These results support a competitive pricing theory.

Third, the relative price rankings of the leading four firms were unstable in many cities, switching from one survey period to another. In table 7, SMSA's are categorized by their four-firm concentration and by the degree of switching occurring between survey periods. Higher levels of market concentration can theoretically lead to greater interfirm coordination, and thus to greater stability in price rankings. The

incidence of switching from one survey period to another does not seem related to four-firm concentration for this sample of 28 SMSA's. Considerable switching occurred in 4 of 9 highly concentrated cities and in 5 of 12 fairly unconcentrated cities. Only one city had no switching among the leading four firms. Including the fifth and sixth leading firms in appendix figures 1-28 would markedly increase the incidence and frequency of switching. Considerable switching between survey periods of relative firm price levels was also reported by several other researchers (NCFM; Uhl, Boynton, and Blake; and Jermolowicz, Reed, Skees, and Robbins). This switching indicates the importance of including more than one survey period when comparing firms' relative price rankings.

Fourth, even though a firm's relative price ranking may switch between survey periods, most leading multimarket firms seem to follow a fairly consistent strategic pricing pattern. A firm's prices may vary from store to store and from city to city, but the variation typically occurs within a rather narrow band or range. Thus, many firms can be classified as following a high, medium, or low pricing strategy based on their product-service mix. For example, one multimarket firm operating in six of our sample cities had consistently low average price levels regardless of its own market share or of the city's four-firm concentration ratio. This firm's average price index for each of the six cities ranged from 91.4 to 96.5 (100 = all 28-city average). The average price index for this firm across all six cities was 93.7 with standard deviation of 1.67 (table 8). This firm's highest average price level was in a city where it had a low market share and a concentration ratio well below the all-city average.

Another multimarket firm operated in eight of our sample cities and followed a relatively high-priced strategy. This firm's average price level was consistently above the national average in each city. The average price indexes for this firm in the eight cities went from 100.5 to 106.2. This firm's average price index across the eight cities was 103.3 with a standard deviation of 1.72.

Several multimarket firms appeared to follow a medium-priced strategy. One such firm operated in nine cities in our sample. The average price index for this firm in each of the nine cities went from 96.8 to 101.7. The average price index for this firm across the nine cities was 98.6 with standard deviation of 1.90. This firm's highest average prices occurred in a medium-sized city with relatively low concentration.

**Table 7--Price patterns analysis**

| Degree of switching | Four-firm concentration | | |
|---|---|---|---|
| | Low <50 | Medium 50-59 | High >60 |
| | Number of SMSA's | | |
| None | 0 | 0 | 1 |
| Some | 7 | 5 | 4 |
| Considerable | 5 | 2 | 4 |

**Table 8--Multimarket firm price strategies**

| Item | Price strategy | | |
|---|---|---|---|
| | Low-price firm | Medium-price firm | High-price firm |
| Price index: | | | |
| Firm's multicity average | 93.7 | 98.6 | 103.3 |
| Standard deviation | 1.7 | 1.7 | 1.9 |
| Minimum | 91.4 | 96.8 | 100.5 |
| Maximum | 96.5 | 101.7 | 106.2 |
| Number of survey cities in which each firm operated | 6 | 9 | 8 |

## Framework for Choosing and Testing Price Determinants

**A theory of imperfectly competitive markets was used to construct a multiple regression model.**

Economic theory provides a framework for hypothesizing factors that affect prices and for testing the hypothesized relationships empirically. In a perfectly competitive market, a firm's prices are determined by market forces that it cannot control. Cost factors determine the long-term market price. Change in market demand only affects price in the short-term, because market supply responses are limited. A firm's demand curve in a purely competitive market is infinitely elastic. No sales occur if the firm price is greater than the market price.

Cournot (1838), Chamberlin (1935), and Stigler (1964) have made important contributions to the theory of imperfectly competitive markets, wherein one or more firms can make sales when their price is higher than that of other sellers. An individual firm's ability to raise its price independent of other firms in an imperfectly competitive market depends on several factors:

- The difference between the firm's demand elasticity and market demand.
- The ability of other firms to enter and grow in the market.
- The ability of and actual extent to which existing sellers act in accord.
- The degree of product or service differentiation.

Market demand conditions encourage supermarket firms to alter their individual demand elasticities. Retail food demand is quite stable over time. Real income in markets also changes slowly and income elasticity of demand is low, at about 0.25. Price elasticity of retail food demand is also low, at about -0.45. Therefore, growth in market demand (an outward shift of the demand curve) is largely dependent on market size or population. These market demand conditions provide incentives for firms to distinguish themselves from their competitors, thereby reducing their individual demand elasticities.

The potential also exists for supermarket firms to at least recognize the consequences of, and so avoid, aggressive price rivalry. The grocery store four-firm market concentration ratio for 318 SMSA's averaged 58 percent in 1982. Higher average prices may result over time, when interfirm coordination is possible. In the short run, market rivalry of firms aggressively vying for market position would cause prices to be lower than otherwise, given the market share and the level of market concentration. Market turbulance--temporary market aberrations, such as price wars or supply shortages--may also mitigate the anticompetitive effects of concentration in the short run.

Opportunities abound for food retailers to differentiate their product and service offerings, which may be a relevant determinant of firm price. By distinguishing their offerings from those of competitors, a firm may gain market power, or the ability to raise price while increasing total revenue (price x quantity).[3/]

The supermarket firm elasticity of supply in the long run depends on the presence or absence of economies of scale and the ability of new firms to enter the market. Firms may gain scale economies by capturing a large market share in a small market or a small market share in a large market. Differences in store sales per unit of floor space can measure relative economies of scale. Scale economies, such as advertising, may require a large market share regardless of the market size. Differences in technology or product-service offerings, rather than scale economies, might cause firms to generally shift from small to large stores.

A sustained effort to limit entry into retail food markets is difficult and expensive. There are two principal ways, other than differentiation, to limit entry:

3/ Services presumably would not be offered unless they affect the demand for a firm's product. The services' contribution to revenues similarly must exceed their contribution to costs, allowing the cost of services to act as a minimum estimate of their demand-altering effects.

- Secure desirable store locations before there is enough population to profitably support supermarkets in an area;

- Induce heated price and nonprice rivalry whenever significant market entry occurs to drive entrants out or to raise the costs of entering the market.

Multimarket firms may use cross-subsidization tactics in which above-normal profits from one market area are used to deter entry in another market area. Within a market, multistore firms may employ zone or individual store pricing near a price-competitive entrant, while leaving prices at its other stores unchanged. Cross-subsidization and zone pricing have been generally unsuccessful deterrants to large-scale entry.

Lacking high entry barriers, incumbent firms cannot raise prices in the long run without inducing a compensating increase in market supply. Elasticity of market supply depends on these factors plus the effect on input prices in response to a change in market demand.[4/] Thus, an individual firm's supply response to a change in market demand depends on scale economies, input prices, and firms' ability to limit entry of other sellers into the market. Given a change in firm supply, the elasticity of firm demand ultimately determines its price and output quantity.

4/ Several factors suggest that the market supply function is highly elastic, including: (1) this is probably a constant-cost industry, since most inputs are relatively unspecialized; (2) there are economies of large-scale operation within a market; (3) small-scale market entry is relatively easy; and (4) firms have strong motivation to increase their market shares.

The relevant factors that can affect an individual supermarket firm's prices in the long run are market share, degree and nature of interfirm coordination, degree of product and service differentiation, economies of scale, input prices, and conditions of entry. Growth, market rivalry, and market turbulence are additional determinants in the short run.

**Determinants of firm price**

- **Short run:**
  - Market growth
  - Market rivalry
  - Market turbulence

- **Long run:**
  - Market share
  - Interfirm coordination
  - Firm differentiation
  - Economies of scale
  - Input prices
  - Market entry conditions

## Regression Model and Description of Variables

**The following variables place the hypothesized relationships in quantifiable terms to define those factors likely to influence firm prices and price differences.**

Although economic theory identifies those factors likely to influence supermarket firm prices and price differences, theory alone cannot provide us with definitive answers. To put the question to empirical test, we define the hypothesized relationships in quantifiable terms, expressed with the following variables:

PRICE--The average of one or more store price indexes represents the firm price index. Store-level indexes were calculated from prices collected in each survey supermarket (Appendix D).

MARKET SHARE--The share of total grocery store sales by a firm in a particular market. Markets are defined by the Standard Metropolitan Statistical Area (SMSA) as of 1980. Market shares were calculated from individual store sales data obtained from the Food and Nutrition Service, U.S. Department of Agriculture. MARKET SHARE--a structure variable--is included to determine its influence on firm price in a market. A firm with a larger market share than competing firms may confer some degree of price-enhancing power (Marion, 1979), producing a positive market share-price relationship.

MARKET SHARE may also determine cost efficiencies associated with economies of scale. Given competitive pressures in the marketplace, firms may charge lower prices, creating a negative market share-price association. Salop and Stiglitz (1977) show that in markets with search costs and imperfect information, larger firms with lower costs are likely to charge lower prices than smaller, higher cost firms. In light of the conflicting theories and evidence, we leave the role of market share to empirical test.

MARKET CONCENTRATION--Market concentration measures the share of sales held by leading firms compared with total market sales. The four-firm partial Herfindahl ($H_4$) and, alternatively, the four-firm concentration ratio ($CR_4$) are applied.[5/] MARKET CONCENTRATION determines the relationship between firm price and the degree of mutual interdependence and interfirm coordination. According to oligopoly theory, firm prices are expected to be higher in markets where higher firm concentration occurs, controlling for other factors. Salop and Stiglitz (1977) reach an opposite conclusion when markets contain search costs, and when price information is not freely available to all buyers. Declining numbers of firms in a market would reduce buyer search costs and would simultaneously facilitate access to information. These circumstances would produce less price variation across firms and would lower firm prices. Conflicting theories and the lack of consistent evidence to support either side require us to leave to empirical test the effect of concentration on firm price.

SALES*SIZE--The product of firm average store sales and firm average store selling area in square feet. The SALES*SIZE variable measures store-level size economies, such as capacity utilization and other dimensions of technical efficiency. Average store sales and selling area (floor space) are calculated for each firm. Store selling-area data were obtained from the Store Characteristics survey (Appendix B). Sample supermarkets vary widely in size, from 3,000 to 68,400 square feet of selling area. The SALES*SIZE variable measures variations in sales given store size. The National Commission on Food Marketing (NCFM) study found a strong inverse association between sales per square foot of store selling area and store expenses as a percentage of sales (NCFM, 1966). In other words, given store capacity (selling area), shortrun incremental costs seemed to fall as output was

5/ The traditional measure of market concentration is the $CR_4$--the sum of the leading four firms' market shares. The four-firm partial Herfindahl ($H_4$)--an alternative measure--is calculated as the sum of the squared market shares of the four leading firms. The partial Herfindahl measure is preferred to four-firm concentration ($CR_4$) because it takes into account both the sum and the distribution of the top four market shares. The $CR_4$ measure was used in addition to the partial Herfindahl to allow comparison of results with earlier concentration-price studies.

increased. If true, then SALES*SIZE should be inversely related to incremental costs and price.[6/]

FIRM INTEGRATION (binary)--Intended to capture the potential economies of multistore operation within a market area. Integration distinguishes between those supermarket firms that operate support functions, such as warehousing and transporting, and those firms that do not. Integrated firms, because of their sales volume, may also enjoy lower merchandise costs than their nonintegrated counterparts. The degree of integration for each firm was obtained from Progressive Grocer's *Market Scope* and a special store census listing for 1982. Supermarket firms vary in their degree of vertical integration in wholesaling functions. In the analysis, we could find no consistent separate effects of varying degrees of vertical integration, so we distinguished between nonintegrated firms and all other firms in the sample. Integrated firms may have lower marginal costs, and therefore lower prices, than do nonintegrated firms.

OCCUPANCY COST--As a proxy for the price of land and capital, the occupancy cost variable is an index of rental rates and utility costs, compared with the 28-SMSA sample average. Rental rates were estimated from rates for prime warehouse space reported in *SIR Industrial Real Estate Market Survey*. Electric utility costs were obtained from *Typical Electric Bills, January, 1982*, U.S. Department of Energy. The OCCUPANCY COST variable captures differences both between and within SMSA's, and we expect it to have a positive effect on prices.

STORE SERVICES--To control for the effect of store services on costs and prices, an index of services was constructed for each firm. The Store Characteristics survey provided store services information for each supermarket. To calculate the index, we summed the number of services (from 20 common ones) that a store offers, with a double weight assigned to the four most costly services (bakery, meat, deli, and seafood counters) (Appendix B). While all consumers may not desire all services, these services are a means of firm differentiation and likely contribute to higher prices.

LABOR COMPENSATION--Calculated as average hourly wage rate per employee plus employee fringe benefits valued as a cost to the employer. Total employee hours, total payroll, and benefits data were collected from each survey supermarket (Appendix C). Supermarket firms may have divergent average labor compensation rates despite similar hourly wage schedules and fringe benefits. Labor force characteristics, such as the mix of senior versus nonsenior employees, part-time versus full-time employees, and the number of service personnel, contribute to compensation differences. Labor compensation rates varied widely between both cities and firms within cities (tables 5 and 6). Unless increases in productivity accompany differences in average hourly compensation, firms with higher wage rates face higher labor costs per unit of output. To the extent a firm possesses market power, higher labor costs may be partially transferred to consumers as higher prices. Alternatively, competitive pressures within the market area would otherwise force firms to absorb higher labor costs, negating the expected positive relationship between labor costs and price. Because of these conflicting outcomes, the expected relationship of labor costs to firm price is left to empirical test.

WAREHOUSE STORE(S) (binary)--Warehouse stores offer lower prices than most other supermarkets at the expense of fewer services and limited product assortment. A binary variable denotes firms that had one or more warehouse stores in the price survey. The price index of survey firms having both warehouse and nonwarehouse supermarkets was weighted according to the sales share of each type of supermarket compared with total firm sales.

MARKET RIVALRY--The sum of the absolute value of market share changes among the leading six firms in a market during the 3 consecutive years prior to price collection. Market share changes among leading firms are attributed to temporary strategies to gain market position (Marion, 1979). Firms could compete aggressively without any market share changes, although this may be unlikely over a 2- to 3-year period. Greater market

6/ Other studies (Cotterill; NCFM) have used store sales divided by selling area to measure the effect of scale economies. An inherent weakness with the SALES/SQFT variable is its inability to control for differences across a wide range of store sizes, as found in the present sample. Kaufman and MacDonald (1987) found that sales volume increases less than proportionately with store size. The SALES/SQFT measure would therefore decline with increases in store size. We selected SALES*SIZE as a superior measure of store economies of scale. For comparison of results, we substituted sales per square foot in the regression model (Appendix F).

rivalry preceding the price collection waves should be negatively related to firm price, all other factors being equal. Firm market shares were obtained from annual issues of Progressive Grocer's *Market Scope*.

MARKET TURBULENCE (binary)--A test for the presence of within-market turbulence during price collection is necessary to account for competitive factors likely to have short-term price effects. To determine this, market behavior was observed for evidence of increased "discount" or "warehouse pricing," price-comparison advertising among leading firms, use of double coupon redemptions, or trade publication reports of price wars. The presence of abnormal market turbulence is expected to produce lower prices than would exist otherwise, other factors held constant. A subjective measure on a scale from 0-2 indicated the extent of turbulence in a market area. After the survey was completed, review of the ratings led to further aggregation of the turbulence score in the form of a 0 or 1 value.

MARKET GROWTH--Measured by average annual real growth of foodstore sales in an SMSA during the 5 years preceding the price survey. Foodstore sales by SMSA were obtained from Progressive Grocer's *Market Scope*. Change in market size is a potential determinant of supermarket prices in the short run, since capacity is relatively fixed. As a result, greater market growth is expected to increase firm prices when controlling for other factors.

MARKET ENTRY--Measures the level of large-scale market entry among the six leading firms in an SMSA.[7/] The MARKET ENTRY variable is calculated as the sum of market shares (in 1982) of those leading firms entering the market during the previous 5 years. Entering firms needed to account for 5 percent or more market share in 1982 to qualify as a large-scale entrant. Progressive Grocer's *Market Scope*, 1977-81 annual issues, identified entering firms. Because existing firms wish to protect their market positions, prices are likely lower in markets having greater large-scale entry, all other factors held constant. Relatively high market average prices or rates of market growth may initially motivate the entry of new firms. New entrants may subsequently undercut incumbent firm prices to build sales volume. Ensuing rivalry among firms would eventually lead to lower market average prices compared with markets with less entry. Price and market entry are thus hypothesized to be negatively related.

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7/ It is not possible to monitor entry of very small firms, but this may not be a serious omission because: (1) it is not difficult for firms to enter on a small scale by finding a market niche; (2) small-firm entry is largely offset by small-firm failures; and (3) only conditions of large-scale entry are likely to significantly affect supermarket prices within an SMSA.

To specifically test our hypotheses about firm price differences, the following double-log regression equation is estimated:

$$\ln \text{PRICE} = b_0 + b_1 \ln \text{MARKET SHARE} + b_2 \ln \text{MARKET CONCENTRATION} + b_3 \ln \text{SALES*SIZE} + b_4 \text{FIRM INTEGRATION} + b_5 \ln \text{OCCUPANCY COST} + b_6 \ln \text{STORE SERVICES} + b_7 \ln \text{LABOR COMPENSATION} + b_8 \text{WAREHOUSE STORE(S)} + b_9 \ln \text{MARKET RIVALRY} + b_{10} \text{MARKET TURBULENCE} + b_{11} \text{MARKET GROWTH} + b_{12} \text{MARKET ENTRY} + u.$$

with the hypotheses:

$$b_1 \neq 0,\ b_2 \neq 0,\ b_3 < 0,\ b_4 < 0,\ b_5 > 0,$$
$$b_6 > 0,\ b_7 \neq 0,\ b_8 < 0,\ b_9 < 0,\ b_{10} < 0,$$
$$b_{11} > 0,\ b_{12} < 0.$$

Where:

| | | |
|---|---|---|
| PRICE | = | Firm average price index. |
| MARKET SHARE | = | Firm market share as a percentage of grocery store sales. |
| MARKET CONCENTRATION | = | Four-firm partial Herfindahl. |
| SALES*SIZE | = | Average store sales volume multiplied by average store selling area in square feet. |
| FIRM INTEGRATION | = | Binary variable. |
| OCCUPANCY COST | = | Firm occupancy cost index of rent and utilities. |
| STORE SERVICES | = | Value of firm average store services. |
| LABOR COMPENSATION | = | Firm average hourly compensation. |
| WAREHOUSE STORE(S) | = | Firms that include warehouse stores in the sample (binary). |
| MARKET RIVALRY | = | Change in leading firms' market share. |
| MARKET TURBULENCE | = | Unusual price competition during price collection (binary). |
| MARKET GROWTH | = | Five-year annual average market growth. |
| MARKET ENTRY | = | Leading firm market entry prior to price collection. |
| u | = | Error term, iid, $\approx N(O, \sigma^2)$. |

An observation at the firm level consists of data for a single firm-in-market, of which there are 321 located in 28 SMSA's. All continuous positive variables were specified in log form.

### Deleted Variables

A "cost of transportation" variable was constructed from shipments and distance data for fresh meat, dairy, and produce departments. The transportation cost variable was specified as an SMSA-wide proxy for differences in "cost of goods sold" among the survey cities. Prices of items in these three supermarket departments were hypothesized to most likely vary with differences in wholesale prices due to transportation cost differences. Packaged dry grocery products, both food and nonfood, seemed least affected by shipping distances because manufacturers typically internalize transportation cost differences to practice uniform pricing.

Early regressions incorporating the transportation cost variable produced questionable results. Its coefficient was unusually large and inversely related to firm price, contrary to our hypothesis. Regression diagnostics indicated a high degree of collinearity, including unrelated explanatory variables in the model. Methods used to calculate transportation costs were based on certain broad assumptions, including constant rate structures across transportation modes, and, due to limited secondary sources, could not be verified by actual data. A related study using the same transportation cost measure noted that true costs vary widely with distance, commodity, season, and shipment size (Nelson and MacDonald, 1988). Given both the technical and practical difficulties encountered, the transportation variable was deleted from the regression analysis.

## Summary Statistics

**The broad range of data presented here underscores the variety of food retailing markets, firms, and stores in the survey sample.**

Summary statistics for all variables in the analysis appear in table 9. Average four-firm concentration for the 28-SMSA sample was 52 percent and varied from 29.8 percent to 83.7 percent of total market sales. Sales per supermarket averaged more than $6.5 million annually, but ranged from $465,000 to $32.8 million. Average employee labor costs ranged between $3.35 and $17.60 per hour. The store services variable, having a possible score of 24, averaged 12.9, with a standard deviation of 3.1. Services totals varied from 2 to 19.3.

**Table 9--Summary statistics 1/**

| Variable | Mean | Standard deviation | Minimum | Maximum |
|---|---|---|---|---|
| PRICE | 100.000 | 5.490 | 73.034 | 121.536 |
| $CR_4$ | 52.048 | 13.960 | 29.800 | 83.700 |
| MARKET CONCENTRATION (Herfindahl) | .090 | .057 | .025 | .306 |
| MARKET SHARE | 10.538 | 12.985 | .036 | 58.200 |
| SALES | 6,632,550 | 5,275,253 | 465,000 | 32,864,260 |
| SELLING AREA (square feet) | 16,713.000 | 10,247.500 | 3,000.000 | 68,381.000 |
| SALES*SIZE | 1.5E+11 | 2.1E+11 | 1.425E+9 | 1.466E+12 |
| OCCUPANCY COST | 100.000 | 24.325 | 63.704 | 168.935 |
| STORE SERVICES | 12.906 | 3.135 | 2.000 | 19.300 |
| LABOR COMPENSATION | 8.878 | 3.112 | 3.350 | 17.600 |
| WAREHOUSE STORE(S) | .065 | .246 | .000 | 1.000 |
| MARKET ENTRY | 2.220 | 5.120 | .000 | 24.000 |
| MARKET GROWTH | .006 | .043 | -.090 | .106 |
| MARKET RIVALRY | .116 | .063 | .045 | .293 |
| MARKET TURBULENCE | .160 | .367 | .000 | 1.000 |

1/ All values expressed as natural numbers.

## Little Evidence of Oligopoly Market Power

**Neither market concentration nor firm market share contributed to higher firm prices when other influences were considered.**

Hypothesized city, firm, and store-level determinants accounted for 35.2 percent of the variation in firm price from estimated coefficients ($R^2$=0.35). The model was significant at the 1-percent level (F=13.965). We consider the fit of the regression equation to be reasonable given the scope of the study and its inherent diversity (see table 9).

Controlling for other hypothesized factors, the regression analysis indicates that MARKET SHARE is not related to firm price differences (table 10). This result also held when relative measures of market share were substituted (Appendix F). The estimated coefficient was negative but was not statistically significant at the 90-percent confidence level (t= -1.174). An inverse association between price and market share would exist if size economies in advertising and capital formation were realized as firm share increased. Differences in operating efficiencies, an effect potentially measured by market share, are accounted for by the SALES*SIZE variable.

The partial Herfindahl measure of MARKET CONCENTRATION ($H_4$) was likewise found not associated with firm prices when controlling for other hypothesized factors. The estimated coefficient of the partial Herfindahl was negatively signed and was not statistically significant (t=-1.574). A similar result was obtained when the traditional four-firm concentration measure was substituted (Appendix F). An alternative measure of market share, relative-firm market share (RFMS), was also not significant when substituted in the regression equation. Higher firm prices were not associated with highly concentrated markets, despite the potential for greater inter-

**Table 10--Firm price regression result**

| Price determinant | Percentage change in price for a 10-percent increase in price determinant | Estimated coefficient | t-ratio |
|---|---|---|---|
| Market Share | -0.03 | -0.003 | -1.174 |
| Market Concentration ($H_4$) | -.08 | -.008 | -1.574 |
| Sales*Size | -.15** | -.015** | -5.184 |
| Firm Integration | NA | -.001 | -.081 |
| Occupancy Cost | .55** | .055** | 3.233 |
| Store Services | .45** | .045** | 3.874 |
| Labor Compensation | -.02 | -.002 | -.184 |
| Warehouse Store(s) (binary) | NA | -.059** | -4.695 |
| Market Rivalry | -.16** | -.016** | -2.130 |
| Market Turbulence (binary) | NA | -.005 | -.682 |
| Market Growth | .02** | .004** | 3.716 |
| Market Entry | .04** | .002** | 2.731 |
| Model | | | |
| $R^2$ | .35 | | |
| F-ratio | 13.965 | | |

** = 5-percent significance level.
NA = Not applicable.

irm coordination and mutual interdependence among irms as concentation increases.[8/]

One may argue that concentration and market share are understated in cities large enough to have multiple submarkets. Reliance on marketwide SMSA definitions may, therefore, mask otherwise positive concentration-price and market share-price effects found within submarkets. The New York SMSA, for example, contains five boroughs that could be considered distinct submarkets, in addition to its other outlying areas. A separate analysis was made in which the only difference was the exclusion of New York SMSA observations. The regression results (Appendix F) are not materially affected by deleting New York observations, when compared to the full sample results. Higher operating costs within submarkets may contribute to price differences, however. The OCCUPANCY COST variable, along with SALES*SIZE and STORE SERVICES, can serve as proxy measures of submarket cost differences within larger SMSA's, thereby capturing potential sources of price differences within an SMSA-defined market.

Average store sales, given physical store size (SALES*SIZE) was significant and was negatively related to price (t=-5.184). A 10-percent increase in store volume, given store size, results in a 0.2-percent fall in firm price, all else being equal. This result confirmed the finding of the National Commission on Food Marketing study that a strong inverse association exists between sales per square foot and store expenses as a percentage of sales. Given capacity (store selling area), short-term incremental costs should fall as output increases. The effect of store sales volume on average cost is a major competitive force within SMSA's. The presence of such economies would seem to dictate firm strategies that increase sales volume. A firm that unilaterally raises price risks loss of volume and higher costs per sales dollar, threatening its ability to effectively compete.

Turning to firm organization, there is no evidence to suggest that integrated supermarket firms have lower prices than nonintegrated firms, controlling for other differences (t=-0.081). The nonsignificance of FIRM INTEGRATION indicates that integrated firms either do not benefit from lower merchandise costs, or that these savings are not passed on to consumers in the form of lower prices. The former argument has validity in view of the size economies available to nonintegrated firms through full-service food wholesalers. These benefits may substitute for cost savings attributed to integrated firms. Most nonintegrated firms having higher prices also had smaller stores and higher occupancy and other costs compared with other firms--differences accounted for in the model. The size economies available to many nonintegrated firms through full-service food wholesalers may substitute for cost savings attributed to integrated firms.

Higher occupancy costs, a greater number of store services, and higher average hourly compensation were also hypothesized to increase firm prices. Store OCCUPANCY COST (rent and utilities) had a positive and significant price effect (t=3.233). A 10-percent increase in occupancy costs results in a 0.6-percent increase in firm price, all other differences being equal. The coefficient on OCCUPANCY COST appears disproportionately large, given that occupancy costs account for an average of only 14 percent of store operating expenses. Because occupancy cost data were available at the SMSA and sub-SMSA level rather than for individual supermarkets, OCCUPANCY COST may serve as a proxy for other market or submarket price influences such as store location. That is, higher occupancy costs may indicate within-market locations that permit stores to charge higher prices. Net marginal revenue must be positive, however, to justify the store location cost premium.

An increase in STORE SERVICES had a positive and significant effect on prices, as expected (t=3.874). A 10-percent increase in the level of store services (approximately two additional services) raises firm prices 0.5 percent, other factors held constant. This positive price effect likely captures the higher costs of services, as well as some degree of market power due to firm differentiation. The extent to which the marginal price increase for an additional service exceeds the cost of providing that service reflects returns to enterprise differentiation.

8/ In the Nelson-MacDonald analysis, the four-firm partial Herfindahl--a market concentration measure--was positively and significantly related to a limited-item store-price index. A 10-percent increase in the four-firm partial Herfindahl resulted in a 0.2-percent increase in the store-price index. The authors explain that only 10 cities were represented in the sample and that one city (Denver) dominated the concentration-price relationship. Statistical tests showed that the Herfindahl coefficient was very sensitive to the choice of other independent variables used in the analysis. Taken together, the authors conclude that "therefore, we should not place great confidence in the result."

Although higher wages were expected to produce higher prices, the coefficient on LABOR COMPENSATION was negative and was not significant at the 90-percent confidence level (t=-0.184), controlling for other factors. Differences in labor productivity are not accounted for in this study, which may somewhat mitigate the labor compensation differences between firms. Contrary to the stated hypothesis, firms with higher average hourly labor costs are apparently unable to offset these costs through higher prices. Firms may not be able to adjust prices to reflect higher labor costs unless all market participants are similarly affected, a result consistent with competitive markets.

Firms with warehouse stores had significantly lower prices than did other firms. The warehouse store delimiter--WAREHOUSE STORE(S)--accounted for 6-percent lower average firm-level prices than non-warehouse store retailers. Sales per labor hour data suggest that considerable cost savings result from the reduced labor input requirements of warehouse store firms. Other factors contributing to cost savings of warehouse supermarkets include fewer items and higher turnover, lower occupancy costs, and reduced merchandise costs due to purchasing practices.

The effect of MARKET RIVALRY on firm price was correctly hypothesized. Changes in sales share among leading firms in a market were inversely related to firm price and were significant at the 95-percent confidence level (t=-2.130). For a 10-percent increase in the combined annual change in market shares of the leading six firms, prices fell nearly 0.2 percent, controlling for other differences.

Transient price effects due to unusual market conditions at the time of price collection were measured by MARKET TURBULENCE. Only four cities (Boston, Detroit, Philadelphia, and Las Vegas) were identified as having greater than usual market turbulence during the survey period. The coefficient on MARKET TURBULENCE was not significant. We caution that the nonsignificant MARKET TURBULENCE determinant may be due to the absence of price wars or other aberrations during the price collection waves. The importance of market turbulence should not be discounted based on our results.

MARKET GROWTH, a shortrun price determinant, was significant and had the expected positive association with price, all other factors held constant. A 10-percent rise in market growth produces a 0.02-percent increase in firm price, with MARKET GROWTH set at its mean value. Market growth heightens demand for supermarket products and services (due to capacity constraints) that allow firms to raise prices in the short term.

Changes in MARKET ENTRY are significantly and positively related to firm price, contrary to the hypothesized inverse relationship. For a 10-percent increase in MARKET ENTRY, firm price increases by 0.04 percent, controlling for other factors, including market growth. This unexpected result may be due to several factors:

- The entry variable does not distinguish between types of entrants, such as warehouse store firms or conventional supermarket firms, that may differ significantly in their market effect.
- Only post-entry prices are available; a comparison of pre- and post-entry firm prices would provide a better estimate of the price-altering effects of entry.
- Other events and developments taking place during the 5-year entry period, such as market exits, mergers, and divestitures may influence firm prices, yet may not be fully captured by hypothesized determinants.
- Firms may more often enter growing markets where prices are already rising.

A positive correlation of market entry with price would be consistent if the occurrence of entry is in response to higher average prices, contrary to the stated independent relationship of entry. The appropriate analytical model should then allow for their simultaneous determination. We conducted a separate analysis in which firm price and market entry (as a limited dependent variable) are jointly estimated in a system of two equations. The results of this two-stage least squares regression fail to confirm a simultaneous entry-price relationship (Appendix G). We conclude that the original single equation regression is valid for analyzing price determinants.

## Conclusions

**Both descriptive analysis and formal regression analysis found no consistent relationship between market concentration or market share and price.**

The introduction of innovations and refinements in sample design and aggregation procedures, combined with the use of detailed store cost and characteristics data have contributed to a more representative and complete analysis of supermarket price determinants. The scientific selection of cities, firms, stores, and supermarket items, the instore collection of item prices, the use of price-relative indexes, and the collection of detailed store cost and characteristics data has provided a robust data set for analyzing supermarket prices.

The analysis of price variation within multistore firms and the evidence from the ANOVA tests of within-market price variation stress the importance of store-level sampling and data collection. The present study has incorporated procedures that recognize within-SMSA differences. Earlier investigations often relied on firm-supplied price lists, nonrepresentative cities, firms, and stores, and marketwide measures of operating costs and other data to conduct price analysis. Differences in findings from earlier studies may be due in part to methodology and data collection procedures.

The analysis found that oligopolistic firm market power did not play a significant price-determining role. We do not deny the possibility that market concentration may be associated with higher prices in a particular city or market area. This result would not, however, establish a causal relationship. It is also possible that at extremely high levels--above those observed in the present survey--concentration may potentially contribute to higher firm prices.

There was evidence of higher costs among firms with higher prices, all else being equal. These conditions provide disincentives for unilateral price increases, based on market power. The price patterns of leading firms also support the finding that market share and market concentration are not the cause of price differences. Consistent price strategies by multimarket firms tend to weaken any positive concentration-price or market share-price association as well.

Market competitive forces may explain why higher labor-cost firms did not charge proportionately higher prices. There was no evidence that firms with higher than average labor compensation charge higher prices, contradicting Lamm (1981). A firm may not be able to adjust prices to reflect higher labor costs unless all market participants are similarly affected. Given large differences in average hourly compensation found within cities, this outcome helps to explain why many food retailers faced with new, lower-cost competitors have demanded wage concessions or have even exited markets in recent years.

Firms operating both warehouse and nonwarehouse supermarkets had prices about 6 percent lower than the all-firm average. Hourly average labor costs for warehouse stores were only slightly lower than for nonwarehouse stores. However, warehouse stores' labor costs per dollar of sales averaged 40 percent less than the all-supermarkets average. Both Nelson and MacDonald (1988) and Handy and Stafford (1980) also found that nonwarehouse supermarkets located near a warehouse store had significantly lower prices than other supermarkets. The effect of warehouse supermarkets on the prices of supermarkets in its proximity, if fully accounted for, would likely increase the warehouse supermarket price differential.

Price differences due to firm integration were not significant when controlling for other influences. Many nonintegrated firms had prices, store sales, and store size characteristics comparable to integrated firms. These nonintegrated firms probably benefit from size economies available to integrated firms through affiliation with a full-service food wholesaler. Full-service food wholesalers supply independents and small chains with both merchandise and business services, such as computer support, site selection, management training, accounting, and financial needs. The remaining nonintegrated firms had above-average prices, below-average store sales, and smaller store size than the average firm. These nonintegrated "market niche" firms survive partly because they are located in neighborhoods not well-served by competitors.

Additional store services were associated with higher firm prices in the regression analysis. Store services are one of the elements of enterprise differentiation used by supermarket firms to distinguish themselves from competitors. A firm able to raise prices such that net marginal revenue (total additional revenue minus total additional costs) is greater than zero is said to possess market power. We cannot be certain that a price increase would exceed the cost of providing an additional store service, however, since cost of services data were not available.

The findings taken together suggest that supermarket firms operate in an environment somewhere between the extremes of pure competition and oligopoly. Firms rely on enterprise differentiation to alter their individual demand curves, but oligopolistic market power was not evident. Given that markets have many, highly differentiated competitors, supermarket firms, by and large, operate under conditions of monopolistic competition.

## References


American Chamber of Commerce Researchers Association (ACCRA). *Intercity Cost of Living Indicators*. 1987.

Benson, Bruce L., and Merle D. Fanunow. "An Alternative View of Pricing in Retail Food Markets," *American Journal of Agricultural Economics*, Vol. 67, No. 2 (May 1985), pp. 296-306.

Brandow, G.E. "Market Power and Its Sources in the Food Industry," *American Journal of Agricultural Economics*, Vol. 51, No. 1 (Feb. 1969), pp. 1-12.

Chamberlin, Edward. *The Theory of Monopolistic Competition*. 8th ed. Cambridge, MA: Harvard Univ. Press, 1962.

Congress of the United States, Joint Economic Committee. *Prices and Profits of Leading Food Chains, 1970-1974*. 1977.

Cotterill, Ronald W. "Market Power in the Retail Food Industry: Evidence From Vermont," *The Review of Economics and Statistics*. Vol. 68, No. 3 (Aug. 1986), pp. 379-86.

Federal Trade Commission. *Chain Store Inquiry*. 1933.

Gale, Bradley T., and Ben S. Branch. "Concentration Versus Market Share: Which Determines Performance and Why Does It Matter?" *The Antitrust Bulletin*, Vol. 27, No. 1 (Spring 1982), pp. 83-105.

Geithman, Federick E., and Bruce W. Marion. "A Critique of the Use of BLS Data for Market Structure-Price Analysis," *American Journal of Agricultural Economics*, Vol. 60, No. 4 (Nov. 1978), pp. 701-05.

Gorman, William D., and H. Mori. "Economic Theory and Explanation of Differences in Price Levels Among Local Retail Markets," *Journal of Farm Economics*, Vol. 48, No. 5 (Dec. 1966), pp. 1496-1502.

Greene, William H. *LIMDEP Version 5*. New York: William H. Greene, 1988.

Grinnell, G., T. Crawford, and J. Feaster. "The Impact of Market Structure on Grocery Store Pricing." Paper presented at American Agricultural Economic Association annual meeting, University Park, PA, August 1978.

Grinnell, Gerald E., Russell C. Parker, and Lawrence A. Rens. *Grocery Retailing Concentration in Metropolitan Areas, Economic Census Years 1954-72*. U.S. Dept. Agr., Econ. Res. Serv., 1979.

Handy, Charles, and Tom Stafford. "Supermarkets React to Warehouse and Box Stores," *National Food Review*. NFR-120. U.S. Dept. Agr., Econ. Res. Serv., Fall 1980, pp. 8-9.

Hoffman, A.C. *Large-Scale Organization in the Food Industries*. Monograph 35, Temporary National Economic Commission, 1940.

Holdren, Bob R. *The Structure of a Retail Market and Market Behavior of Retail Units*. Englewood Cliffs, NJ: Prentice-Hall, 1960.

Jermolowicz, Andrew, Michael Reed, Jerry Skees, and Lynn Robbins. "The Effects of Firm Exit in a Retail Grocery Market," *Journal of Food Distribution Research*, Vol. XVI, No. 2 (Sept. 1986), pp. 16-24.

Kaufman, Phillip R., and James M. MacDonald. "Competition, Location, and Supermarket Pricing." Paper presented at Southern Economics Association annual meeting, Washington, DC, November 1987.

Lamm, McFall R. "Unionism and Prices in the Food Retailing Industry," *Journal of Labor Research*, Vol. III, No. 1 (Winter 1982), pp. 69-79.

_____. "Prices and Concentration in the Food Retailing Industry," *Journal of Industrial Economics*. Sept. 1981, pp. 67-77.

Maddala, G.S. *Limited-dependent and Qualitative Variables in Econometrics*. New York: Cambridge Univ. Press, 1983.

Marion, B., W.F. Mueller, R.W. Cotterill, F.E. Geithman, and J.R. Schmelzer. *The Food Retailing Industry: Market Structure, Profits and Prices.* New York: Praeger, 1979.

McLaughlin, Edward W., and Gerald F. Hawkes. *Operating Results of Food Chains, 1981-82.* Cornell Univ., Ithaca, NY. August 1982.

National Commission on Food Marketing. *Organization and Competition in Food Retailing.* Technical Study No. 7. June 1966.

Nelson, Paul E., Jr., and James M. MacDonald. *Food Cost Variations: Implications for the Food Stamp Program.* TB-1737. U.S. Dept. Agr., Econ. Res. Serv., Feb. 1987.

Nelson, Paul E., Jr., and L. Preston. "Price Merchandising in Food Retailing: A Case Study," Research Program in Marketing. Institute of Business and Economic Research. University of California Press, 1966.

Rice, William. "How the U.S. Stacks Up in a Nationwide Food Price Survey," *The Washington Post.* July 17, 1980.

Rothwell, Doris P. "Calculation of Average Retail Food Prices," *Monthly Labor Review*, Vol. 88, No. 1 (Jan. 1965), pp. 61-65.

Rourke, John, and John Wetterau. *Retail Milk Prices Reported by Market Administrators: A Summary and Analysis*, PAR 84-3. U.S. Dept. Agr., Agr. Mkt. Serv, 1982.

Salop, S., and J. Stiglitz. "Bargains and Ripoffs: A Model of Monopolistically Competitive Price Dispersion," *Review of Economic Studies*, Vol. 44, No. 138 (Oct. 1977), pp. 493-510.

Scherer, F.M. *Industrial Market Structure and Economic Performance.* 1st ed., New York: Rand McNally Publishing Co., 1970.

Society of Industrial Realtors. *Industrial Real Estate Market Survey: Fall 1982.* Washington, DC, 1982.

Uhl, Joseph N., Robert D. Boynton, and Brian F. Blake. "Effects of Comparative Foodstore Price Information on Price Structures and Consumer Behavior in Local Food Markets." Final Report to U.S. Dept. Agr., Agr. Mktg. Serv. from Dept. Agr. Econ., Purdue Univ., Feb. 1981.

U.S. Department of Commerce, Bureau of the Census. *Special Tabulation*, 1982.

U.S. Department of Energy. *Typical Electric Bills, Jan. 1, 1982.* DOE/EIA-0040 (82). Oct. 1982.

U.S. Federal Trade Commission. *Economic Inquiry into Food Marketing, Part I: Concentration and Integration in Retailing.* Staff Report. Jan. 1960.

Appendix A

## Sample Price Collection Survey Forms

**This appendix contains sample price survey forms for seven supermarket departments.**

### PRODUCE

| ITEM CODE | ITEM NAME (DESCRIPTION) | * DIAMETER | PRICE $ ¢ | WEIGHT OF ITEM(S) SOLD AT THAT PRICE lb. oz. | METRIC |
|---|---|---|---|---|---|
| **Lemons** | | | | | |
| 1-08-01- | Bulk (loose) | | . | – | |
| 1-08-01- | Bulk (loose) | | . | – | |
| 1-08-02- | Package, 2 lbs. or less | | . | – | |
| 1-08-03- | Package, more than 2 lbs. | | . | – | |
| **Peaches** | | | | | |
| 1-09-01- | Bulk (loose) | | . | – | |
| 1-09-02- | Package, 2.0 lbs. or less | | . | – | |
| 1-09-03- | Package, more than 2.0 lbs. | | . | – | |
| **Nectarines** | | | | | |
| 1-10-01- | Bulk (loose) | | . | – | |
| 1-10-02- | Package, 2.0 lbs. or less | | . | – | |
| 1-10-03- | Package, more than 2.0 lbs. | | . | – | |
| **Bananas** | | | | | |
| 1-11-01-91 | Bananas | | . | – | |
| 1-11-01-92 | Bananas | | . | – | |
| **Avocados** | | | | | |
| 1-12-01-91 | Bulk (loose) | | . | – | |
| 1-12-01-92 | Package | | . | – | |
| **Lettuce and Escarole** | | | | | |
| 1-13-01-91 | Iceberg | | . | – | |
| 1-13-01-92 | Iceberg | | . | – | |
| 1-13-02-91 | Bib | | . | – | |
| 1-13-03-91 | Boston | | . | – | |
| 1-13-04-91 | Green Leaf | | . | – | |
| 1-13-05-91 | Red Leaf | | . | – | |
| 1-13-06-91 | Romaine | | . | – | |
| 1-13-07-91 | Escarole | | . | – | |
| 1-13-08-91 | Endine | | . | – | |
| **Additional Items** | | | | | |
| | | | . | – | |
| | | | . | – | |
| | | | . | – | |

*Record diameter to nearest 1/4 inch

PRODUCE

# DAIRY CASE

| ITEM CODE | ITEM NAME (DESCRIPTION) | UNIT OF MEAS. | CONTAINER SIZE | METRIC | CONTAINERS SOLD TOGETHER | |
|---|---|---|---|---|---|---|
| | | | | | NUMBER | $ PRICE ¢ |
| **Margarine; Two 8-oz. tub containers per package; 16 oz. (Exclude margarine made from 100% corn oil or safflower oil. Exclude diet and unsalted margarine.)** | | | | | | |
| 2-22-01-11 | X Kraft | oz. | 16 | | | . |
| 2-22-01-12 | X Blue Bonnet | oz. | 16 | | | . |
| 2-22-01-13 | X | oz. | 16 | | | . |
| 2-22-01-14 | X | oz. | 16 | | | . |
| 2-22-01-15 | X | oz. | 16 | | | . |
| 2-22-01-16 | X | oz. | 16 | | | . |
| 2-22-01-51 | P/L | oz. | 16 | | | . |
| 2-22-01-71 | GEN | oz. | 16 | | | . |
| **Yogurt, Fruit-Filled, Apricot flavor; 6 oz. or less** | | | | | | |
| 2-23-01-11 | X La Yogurt | oz. | | | | . |
| 2-23-01-12 | X Yoplait | oz. | | | | . |
| 2-23-01-13 | X | oz. | | | | . |
| 2-23-01-51 | P/L | oz. | | | | . |
| 2-23-01-71 | GEN | oz. | | | | . |
| **Cream Cheese, plain; 8 oz.** | | | | | | |
| 2-24-01-11 | X Philadelphia Cream Cheese | oz. | 8 | | | . |
| 2-24-01-12 | X | oz. | 8 | | | . |
| 2-24-01-51 | P/L | oz. | 8 | | | . |
| 2-24-01-71 | GEN | oz. | 8 | | | . |
| **Sour Cream, plain; 8 oz. or less. (Exclude imitation non-butterfat sour cream, and Sour Cream with Chives).** | | | | | | |
| 2-25-01-11 | X Breakstone | oz. | | | | . |
| 2-25-01-12 | X Sealtest | oz. | | | | . |
| 2-25-01-13 | X | oz. | | | | . |
| 2-25-01-14 | X | oz. | | | | . |
| 2-25-01-51 | P/L | oz. | | | | . |
| 2-25-01-71 | GEN | oz. | | | | . |
| **Additional Items** | | | | | | |
| | | | | | | . |
| | | | | | | . |
| | | | | | | . |
| | | | | | | . |

# BAKED GOODS

| ITEM CODE | ITEM NAME (DESCRIPTION) | UNIT OF MEAS. | CONTAINER SIZE | METRIC | CONTAINERS SOLD TOGETHER | |
|---|---|---|---|---|---|---|
| | | | | | NUMBER | $ PRICE ¢ |
| **White Pan Bread, Fresh Regular Slices; 20-24oz. (Exclude Thin or Sandwich Slices)** | | | | | | |
| 7-80-01-11 | x Wonder Bread | oz. | | | | . |
| 7-80-01-12 | x | oz. | | | | . |
| 7-80-01-13 | x | oz. | | | | . |
| 7-80-01-14 | x | oz. | | | | . |
| 7-80-01-51 | P/L | oz. | | | | . |
| 7-80-01-51 | P/L | oz. | | | | . |
| 7-80-01-71 | Gen. | oz. | | | | . |
| **100% Whole Wheat Bread, Fresh; 20oz. or More. (Exclude All Breads, Such as Roman Meal, That Are Not Labled "100% Whole Wheat"** | | | | | | |
| 7-81-01-11 | x Pepperidge Farms Whole Wheat | oz. | | | | . |
| 7-81-01-12 | x Arnold 100% Whole Wheat | oz. | | | | . |
| 7-81-01-13 | x | oz. | | | | . |
| 7-81-01-14 | x | oz. | | | | . |
| 7-81-01-15 | x | oz. | | | | . |
| 7-81-01-51 | P/L | oz. | | | | . |
| 7-81-01-52 | P/L | oz. | | | | . |
| 7-81-01-71 | Gen. | oz. | | | | . |
| **Molasses Bread, Fresh; 20-24oz.** | | | | | | |
| 7-82-01-11 | x | oz. | | | | . |
| 7-82-01-12 | x | oz. | | | | . |
| 7-82-01-51 | P/L | oz. | | | | . |
| 7-82-01-71 | Gen. | oz. | | | | . |
| **Crumb Coffee Cake, Plain, Fresh; 16-20oz. (Exclude Danish Loaves and Any Cakes With Fruit Added)** | | | | | | |
| 7-83-01-11 | x | oz. | | | | . |
| 7-83-01-12 | x | oz. | | | | . |
| 7-83-01-51 | P/L | oz. | | | | . |
| 7-83-01-52 | P/L | oz. | | | | . |
| 7-83-01-71 | Gen. | oz. | | | | . |
| | **Additional Items** | | | | | |
| | | | | | | . |
| | | | | | | . |

# FROZEN FOODS

| ITEM CODE | ITEM NAME (DESCRIPTION) | UNIT OF MEAS. | CONTAINER SIZE | METRIC | CONTAINERS SOLD TOGETHER NUMBER | CONTAINERS SOLD TOGETHER $ PRICE ¢ |
|---|---|---|---|---|---|---|
| **Frozen Mixed Vegetables; 10.1-16 oz. (Exclude two-vegetable mixtures such as Peas and Carrots. Exclude mixed vegetables in a sauce or combined with non-vegetable ingredients.** | | | | | | |
| 7-60-01-11 | X Birds Eye | OZ. | | | | . |
| 7-60-01-12 | X Green Giant | OZ. | | | | . |
| 7-60-01-13 | X Frosty Acres | OZ. | | | | . |
| 7-60-01-14 | X | OZ. | | | | . |
| 7-60-01-15 | X | OZ. | | | | . |
| 7-60-01-51 | P/L | OZ. | | | | . |
| 7-60-01-71 | GEN | OZ. | | | | . |
| **Frozen Turnip Greens; 10 oz. or less (Exclude frozen turnips, and turnips with greens.)** | | | | | | |
| 7-61-01-11 | X Birds Eye Turnip Greens | OZ. | | | | . |
| 7-61-01-12 | X Stokely Turnip Greens | OZ. | | | | . |
| 7-61-01-13 | X | OZ. | | | | . |
| 7-61-01-14 | X | OZ. | | | | . |
| 7-61-01-51 | P/L | OZ. | | | | . |
| 7-61-01-71 | GEN | OZ. | | | | . |
| **Frozen Cauliflower; 17 oz. or more (Exclude Cauliflower Florets. Exclude cauliflower in a sauce, or mixed with other vegetables.)** | | | | | | |
| 7-62-01-11 | X Frosty Acres | OZ. | | | | . |
| 7-62-01-12 | X McKenzie | OZ. | | | | . |
| 7-62-01-13 | X | OZ. | | | | . |
| 7-62-01-14 | X | OZ. | | | | . |
| 7-62-01-51 | P/L | OZ. | | | | . |
| 7-62-01-71 | GEN | OZ. | | | | . |
| **Frozen Green Beans, French Cut; 10 oz. or less. (Exclude green beans in a sauce or mixed with other vegetables.)** | | | | | | |
| 7-63-01-11 | X Birds Eye | OZ. | | | | . |
| 7-63-01-12 | X Green Giant | OZ. | | | | . |
| 7-63-01-13 | X | OZ. | | | | . |
| 7-63-01-14 | X | OZ. | | | | . |
| 7-63-01-51 | P/L | OZ. | | | | . |
| 7-63-01-71 | GEN | OZ. | | | | . |
| | | | | | | . |
| | | | | | | . |

## OTHER FOODS

| ITEM CODE | ITEM NAME (DESCRIPTION) | UNIT OF MEAS. | CONTAINER SIZE | METRIC | CONTAINERS SOLD TOGETHER | |
|---|---|---|---|---|---|---|
| | | | | | NUMBER | $ PRICE ¢ |
| **Pre-Sweetened Cereal, Ready-to-Eat; 14.1-15oz.** | | | | | | |
| 7-30-01-11 | x Kelloggs Fruit Loops | oz. | | | | . |
| 7-30-01-12 | x Kelloggs Sugar Frosted Flakes | oz. | | | | . |
| 7-30-01-13 | x Kelloggs Apple Jacks | oz. | | | | . |
| 7-30-01-14 | x Post Alpha-Bits | oz. | | | | . |
| 7-30-01-15 | x Kelloggs Sugar Corn Pops | oz. | | | | . |
| 7-30-01-16 | x | oz. | | | | . |
| 7-30-01-17 | x | oz. | | | | . |
| 7-30-01-18 | x | oz. | | | | . |
| 7-30-01-51 | P/L | oz. | | | | . |
| 7-30-01-52 | P/L | oz. | | | | . |
| 7-30-01-71 | Gen. | oz. | | | | . |
| **Walnut Meats, Pieces or Mixed Halves and Pieces; 8.1-10oz. (Exclude Walnut Halves, Walnut Chips, Sliced, Diced or Ground Walnuts, and All Black Walnuts.)** | | | | | | |
| 7-31-01-11 | x Diamond Walnut Meats | oz. | | | | . |
| 7-31-01-12 | x | oz. | | | | . |
| 7-31-01-13 | x | oz. | | | | . |
| 7-31-01-51 | P/L | oz. | | | | . |
| 7-31-01-71 | Gen. | oz. | | | | . |
| **Raisins, Regular or Golden; 25-32oz.; (Exclude Raisins in Multi-Packs or Cello Bags)** | | | | | | |
| 7-32-01-11 | x Del Monte Seedless | oz. | | | | . |
| 7-32-01-12 | x Sun Maid Seedless | oz. | | | | . |
| 7-32-01-13 | x | oz. | | | | . |
| 7-32-01-14 | x | oz. | | | | . |
| 7-32-01-51 | P/L | oz. | | | | . |
| 7-32-01-52 | P/L | oz. | | | | . |
| 7-32-01-71 | Gen. | oz. | | | | . |
| **Apples, Dried or Evaporated; Less Than 9oz.** | | | | | | |
| 7-33-01-11 | x Del Monte Apples | oz. | | | | . |
| 7-33-01-12 | x Sunsweet Dried Apples | oz. | | | | . |
| 7-33-01-13 | x | oz. | | | | . |
| 7-33-01-14 | x | oz. | | | | . |
| 7-33-01-51 | P/L | oz. | | | | . |
| 7-33-01-71 | Gen. | oz. | | | | . |

| ITEM CODE | ITEM NAME (DESCRIPTION) | PRICE PER POUND | | |
|---|---|---|---|---|
| | | PRIME | CHOICE | OTHER |
| **Beef Steaks, Bone In** | | | | |
| Use the alphabetical list of item names below to record the prices of all Bone-In Beef Steaks. If the name on the package does not exactly match one of the names listed, write in the name exactly as it appears on the package using the space provided at the end of the alphabetical list. | | | | |
| 3-25-01- | Arm Chuck Steak | . | . | . |
| 3-25-01- | Arm Steak Beef Chuck | . | . | . |
| 3-25-01- | Arm Swiss Steak | . | . | . |
| 3-25-01- | Beef Chuck, Arm Steak (Bone-In) | . | . | . |
| 3-25- | Beef Chuck Blade Steak (Bone-In) | . | . | . |
| 3-25-03- | Beef Chuck, Blade Steak Cap Off | . | . | . |
| 3-25-02- | Beef Chuck, Seven-Bone Steak | . | . | . |
| 3-25-04- | Beef Chuck, Under Blade Steak (Bone-In) | . | . | . |
| 3-25-09- | Beef Loin, Porterhouse Steak | . | . | . |
| 3-25-14- | Beef Loin, Shell Sirloin Steak | . | . | . |
| 3-25- | Beef Loin, Sirloin Steak | . | . | . |
| 3-25-12- | Beef Loin, Sirloin Steak, Flat Bone | . | . | . |
| 3-25-13- | Beef Loin, Sirloin Steak, Pin Bone | . | . | . |
| 3-25-11- | Beef Loin, Sirloin Steak, Round Bone | . | . | . |
| 3-25-10- | Beef Loin, Sirloin Steak, Wedge Bone | . | . | . |
| 3-25-08- | Beef Loin, T-Bone Steak | . | . | . |
| 3-25-07- | Beef Loin, Top Loin Steak | . | . | . |
| 3-25- | Beef Rib Steak | . | . | . |
| 3-25- | Beef Rib Steak Bl | . | . | . |
| 3-25-06- | Beef Rib Steak, Small End | . | . | . |
| 3-25-05- | Beef Rib Steak, Large End | . | . | . |
| 3-25- | Beef Sirloin | . | . | . |
| 3-25-12- | Beef Sirloin Steak, Flat Bone | . | . | . |
| 3-25-13- | Beef Sirloin Steak, Pin Bone | . | . | . |
| 3-25-10- | Beef Sirloin Steak, Short Cut | . | . | . |
| 3-25-10- | Beef Sirloin Steak, Wedge bone | . | . | . |
| 3-25-15- | Blade Steak | . | . | . |
| 3-25-07- | Bone-In Club Sirloin Steak | . | . | . |
| 3-25-04- | Bottom Chuck Steak | . | . | . |
| 3-25-04- | California Steak | . | . | . |

# NON-FOODS

| ITEM CODE | ITEM NAME (DESCRIPTION) | UNIT OF MEAS. | CONTAINER SIZE | METRIC | CONTAINERS SOLD TOGETHER | |
|---|---|---|---|---|---|---|
| | | | | | NUMBER | $ PRICE ¢ |
| **Liquid Dishwashing Detergent; 23-32 oz.** | | | | | | |
| 8-01-01-11 | X Ivory Liquid | oz. | 32 | | | . |
| 8-01-01-12 | X Lux | oz. | | | | . |
| 8-01-01-13 | X Palmolive | oz. | | | | . |
| 8-01-01-14 | X Joy | oz. | | | | . |
| 8-01-01-15 | X | oz. | | | | . |
| 8-01-01-16 | X | oz. | | | | . |
| 8-01-01-17 | X | oz. | | | | . |
| 8-01-01-51 | P/L | oz. | | | | . |
| 8-01-01-52 | P/L | oz. | | | | . |
| 8-01-01-71 | GEN | oz. | | | | . |
| **Bar Soap, Blue Color; 4.75-5 oz. (Bath Size). (Exclude deodorant bars).** | | | | | | |
| 8-02-01-11 | X Camay, Blue | oz. | | | | . |
| 8-02-01-12 | X | oz. | | | | . |
| 8-02-01-13 | X | oz. | | | | . |
| 8-02-01-51 | P/L | oz. | | | | . |
| 8-02-01-71 | GEN | oz. | | | | . |
| **Toilet Tissue, Solid Color, White; 4-Pack.** | | | | | | |
| 8-03-01-11 | X Charmin | Sheets* | 400 | | 4 | . |
| 8-03-01-12 | X Cottonelle | Sheets* | | | 4 | . |
| 8-03-01-13 | X White Cloud | Sheets* | | | 4 | . |
| 8-03-01-14 | X | Sheets* | | | 4 | . |
| 8-03-01-15 | X | Sheets* | | | 4 | . |
| 8-03-01-16 | X | Sheets* | | | 4 | . |
| 8-03-01-17 | X | Sheets* | | | 4 | . |
| 8-03-01-51 | P/L | Sheets* | | | 4 | . |
| 8-03-01-52 | P/L | Sheets* | | | 4 | . |
| 8-03-01-71 | GEN | Sheets* | | | 4 | . |
| **Additional Items** | | | | | | |
| | | | | | | . |
| | | | | | | . |
| | | | | | | . |
| | | | | | | . |
| | | | | | | . |

*Sheets per roll

Appendix B

## Store Characteristics Questionnaire

**The following forms and instructions were used in the store characteristics survey.**

---

U.S.D.A. STORE SURVEY

STORE NAME_____ADDRESS_____CITY_____

INTERVIEWER_____DATE_____

1. LOCATION OF STORE

   a. Check one--Inner city _____ or Suburban _____

   b. Chect one-- Stand alone _____ or Shopping center (or mall) _____

2. SIZE OF STORE (SELLING AREA)

| | Length | Width | Unit of Measure (check): Feet | Paces | Floor tile count | Length of pace of floor tile |
|---|---|---|---|---|---|---|
| a. Main rectangular area | ____ | ____ | ____ | ____ | _____ | _____ |
| b. Minor rectangular area | ____ | ____ | ____ | ____ | _____ | _____ |
| c. Minor rectangular area | ____ | ____ | ____ | ____ | _____ | _____ |

3. TYPE OF STORE (Check one)

___ a. Traditional supermarket

___ b. Combination food-nonfood store or very large supermarket (sometimes called a super store)

___ c. No frills, limited assortment store (including box and warehouse stores)

___ d. Other, specify type _____

4. STORE HOURS

| | Open | Close |
|---|---|---|
| Monday | _____ | _____ |
| Tuesday | _____ | _____ |
| Wednesdy | _____ | _____ |
| Thursday | _____ | _____ |
| Friday | _____ | _____ |
| Saturday | _____ | _____ |
| Sunday | _____ | _____ |

5. STORE SERVICES--Which of the following services are offered or provided in this store? Write a "1" in the space provided if the service is offered. Write "0" if the service is not offered.

___a. Service Bakery

___b. Service Deli

___c. Service Meat

___d. Service Fish and Seafood

___e. Product Price Marking

___f. Unit Pricing

___g. Produce prepackaged

___h. Free Check Cashing

___i. Utility Bill Payments

___j. Coupon Redemption

___k. Express Check-Out Register

___l. Bagging Service

___m. Carryout Service

___n. Music in Store

___o. Employee Uniforms

___p. Trading Stamps or register tape program

___q. Contest or Game

___r. Continuity Program

___s. Front-end Scanners

## Instructions for U.S.D.A. STORE SURVEY

The purposed of the Store Survey is to collect information on the characteristics, features, and services offered by the supermarkets. The information described in this information set is to be recorded on the form entitled "U.S.D.A. Store Survey." It should not be necessary to ask questions of store personnel to complete this form. Please write clearly.

The following is a description of each question on the form and provides a definition for each of the possible responses.

1. Location of Store. Where is the store physically located?

a. Inner city. Store is located in the downtown or central city area of the city.

or

Suburban. Store is located outside the central area. In most cases, a suburban store will offer off-street parking. Suburban stores usually are located in suburban residential areas or in shopping centers in suburban residential areas.

b. Stand-Alone. Store is by itself; i.e., no other retail stores are connected with it. Include stores located on the ground floor of buildings in central city areas where the rest of the building and adjoining buildings are not linked together in a mall-type setting.

or

Shopping center. Store is located with other retail stores in a shopping complex or shopping mall.

2. Size of Store. How large is the selling area of the store?

Selling area is defined as the areas of the store where merchandise is displayed and where customers may walk, including the front end. Include the store manager's office if located next to the checkout counters or in a corner at the front of the store unless the

office is especially large (for example, larger than 15' x 25').

Some stores may not be rectangular. For example, there may be an alcove for meat, produce, wine, or other products. Or the store may be L- or T-shaped. For these stores, collect data on the dimensions for each of the rectangular areas that make up the total selling area.

Dimensions may be recorded in feet if known. More likely, it will be necessary to pace off the dimensions or count the number of floor tiles. If this procedure is used, record the number of paces or tiles for each dimension and also indicate the approximate length of one pace or one tile (whichever is used). It may be necessary to determine the length of your pace with a tape measure at home. Try to walk in uniform length paces. Floor tiles usually are 9", 12", or 36" squares. You may measure tile length with a tape measure or you could mark 9" and 12" lengths on the side of your clip board before going to the stores and use it to measure the tiles.

3. Type of Store.

   a. Traditional supermarket selling meat, produce, food and grocery products, and non-food items typically found in supermarkets, such as soaps and detergents, paper products, etc.

      or

   b. Combination food-drug or large super store offering a wide variety of products, many not traditionally found in a supermarket; specifically, such items as prescription drugs, clothing, or hard goods.

      or

   c. No-frills store with limited product assortment, typically classified as a box or ware house store. May or may not handle fresh meat, produce, and other perishable products.

   d. Specify any type of store other than those in a, b, or c.

4. Hours Store Open. What are the hours of operation that the store is open for retail customers?

   Record the opening and closing time of day for each day of the week.

   If the store is open 24 hours a day, record "24" in the closed column.

   If the store is not open on a certain day of the week, such as Sunday, place and "X" in the open and closed columns for that day.

5. Store Services.

   a. Service Bakery. An area of the store set aside for selling bakery items in which an employee assists customers. This could include such services as slicing bread, decorating cakes, etc.

   b. Service Deli. An area of the store set aside for delicatessen items in which an employee assists customers. Services could include the slicing of cold rolled meat and cheese, as well as filling salad containers, and so forth.

   c. Service Meat. An area of the store set aside to prepare customer-specified orders for meat. This is the primary way fresh meat is cut and wrapped in the store. Do not include stores if they prepackage fresh meat and offer to prepare customized cuts as an exception.

   d. Service Seafood. An area of the store set aside for purchasing fresh fish and seafood products in which an employee wraps the products upon request.

   e. Product Price Marked. Do the majority of items in the store contain tags and/or inked printing which specify a product's price? Specifically included are grocery items, such as cereal, canned products, etc.

   f. Unit Pricing. Does the store provide customers with a price per unit for most items? Normally, unit prices are printed on a shelftag and indicate the product's price per ounce, pound, count or other physical quantity.

g. Produce Wrapped. Are the majority of produce items prepackaged into individual customer packages?

h. Check Cashing. Does the store accept (without charge) payroll or personal checks for the purchase of groceries?

i. Utility Bill Payments. Does the store enable customers to pay utility bills (e.g., telephone, electricity, water, or gas) in the store?

j. Coupon Redemption. Does the store accept manufacturer (or store) price reduction (or cents off) coupons? This can be either at a central place in the store or at the checkout.

k. Express Checkout Register. Does the store have one or more registers, specifically noted as express or quick checkout? Such checkouts usually indicate the maximum number of items that should be checked out at this register.

l. Bagging Service. Does an employee of the store, either the checker or another employee, place customer purchases into a bag, box, or other container for carrying the purchases out of the store?

m. Carryout Service. Does the store offer to assist customers transport their purchases from the checkout to the customer's car or to load purchases into their cars at a specified pick-up point?

n. Music in Store. Is music played for customers to hear in the store?

o. Employee Uniforms. Do the majority of employees wear some form of common dress, e.g., same color, pattern, etc.?

p. Trading Stamps. Does the store offer trading stamps such as S&H, Triple-S, Supervalu, Top Value, etc.? Also indicate that the service is offered if customers may accumulate cash register receipts which can later be exchanged for merchandise (or cash) at some specified rate of exchange.

q. Contests or Games. Does the store currently offer some program of chance in which a customer is given a number with each purchase and that number, by itself or in combination with other numbers, makes the customer eligible to win money or a prize?

r. Continuity Program. Does the store sell dishes, flatware, encyclopedias, or other sets of products in which one or a few items is featured each week so that over time a customer may complete the set? Continuity merchandise may be sold at full retail price, at a discounted price, or given away.

s. Front End Scanners. Does the store use UPC scanning equipment at the checkout? Scanners read a product's UPC code and automatically record its price and description on the cash register tape.

Appendix C

## Labor Cost Questionnaire

**The following forms were used in the labor cost survey.**

O.M.B. No. 535-02 03; Approval Expires June 30, 1982

| | |
|---|---|
| Pinkerton, Inc.<br>acting as collecting agent<br>for<br>Economic Research Service<br>U.S. Department of Agriculture<br><br>SUPERMAREKT LABOR<br>COST SURVEY<br><br>Store Name and Address | NOTICE - The U.S. Department of agriculture is working on a project to analyze factors that cause differences in supermarket prices in various market areas. One factor the Department needs additional data on is labor costs. Your individual report will be kept confidential and combined with other supermarket reports for the study.<br><br>Response to this survey is voluntary and not required by law. However, your cooperation in answering this questionnaire is needed to make the survey as accurate as possible. |

| | |
|---|---|
| o ITEM 1--Are any employees of this store members of a union which is their recognized bargaining unit? | ___<br>/__/ YES<br>/__/ NO |
| o IMPORTANT; PLEASE READ--The remaining items pertain to operations of this store last week or a recent typical week if last week was not typical. If data are only available for a longer period (for example, the most recent four-week accounting period), include them and indicate the period covered. Period covered, if different from 1 week _____ | |
| o Please complete either items 2 and 3 OR item 4, whichever is easier. Carefully reasoned estimates are acceptable. | |
| o ITEM 2--What was the total hours worked by all hourly (non-salaried) employees in this store during the recent week or other period? | HOURS<br>____ |
| o ITEM 3--What was the total payroll for hourly employees for that recent week or other period? | $_____ |
| a. Does this total include fringe benefits? Fringe benefits include employers contribution to social security, unemployment compensation, workman's compensation, employee group health and life insurance, retirement plans, payment for vacation and sick leave, and so forth. | ___<br>/__/ YES<br>/__/ NO |
| b. What was the value of fringe benefits during the recent week or other period referred to above? | $ |

| | |
|---|---|
| If the dollar value of fringe benefits is not available, please estimate-- | |
| (1) Fringe benefits as a percentage of total payroll | _____% |
| OR | |
| (2) Fringe benefits per hour worked | $_____ |

o ITEM 4--Please complete the following table for hourly employees if any part of items 2 and 3 cannot be completed.

| Employees | Number of employees in a recent week or other period | Average number of hours worked per person during the week or other period | Average hourly wage rate | | |
|---|---|---|---|---|---|
| | | | Excluding fringe benefits | Fringe benefits | Total |
| | Number | Hours/week | Wage rate | | |
| Full-time | ____ | _____ | ____ | ____ | ____ |
| Part-time | ____ | _____ | ____ | ____ | ____ |

Remarks

Thank you for cooperating in this survey

o Person who could answer questions about information provided on this questionnaire:

Name _____

Phone Number (include area code)_____

Inquiries about how to complete this questionnaire should be directed to Fred Paulen at Pinkerton (212-285-4834) or Gerald Grinnell or Charles Handy at USDA (202-447-6363).

Appendix D

## Aggregation Procedures for Price Indexes

**This converts the price to index units that equal averages for each brand type, department, store, firm, and SMSA.**

---

Three FORTRAN computer programs were written to handle the calculations. The following steps were involved in calculating price indexes:

I. Calculate the all-store average price for each brand-type in each product subcategory.

   a. Calculate each item's unit price by dividing price by quantity.

   b. Reclassify second-line private labels into the generic category. Only one private-label item remained (the one with the highest unit price) in each subcategory. This adjustment was made because second-line private-label products are generally comparable to generic in quality and price, and several chains offer second-line private labels, known as neogenerics, that have replaced their array of existing second-line labels. Neogenerics carry brand names but were introduced to compete with other retailers' true generic (no brand name) products.

   c. The average unit price for all items in each brand type in each subcategory was determined for each store.

      (1) Calculate the average unit price of all advertised brands in each subcategory in each store (each item has equal weight).

      (2) Calculate the average unit price of private labels in each subcategory in each store. (Step I.b. above required that there be only one private-label item in each subcategory in each store.)

      (3) Calculate the average unit price of all generic items in each subcategory in each store (each item has equal weight).

      (4) Calculate the average unit price of all unbranded items in each subcategory in each store (each item has equal weight).

   d. Average the values calculated in step I.c. between all stores in an SMSA to obtain the SMSA-average advertised-brand unit price, private-label unit price, generic unit price, and unbranded unit price for each subcategory. Each of the leading firms was assigned a weight equal to its share of SMSA sales. The sample stores operated by these firms were assigned a pro rata share of their own firm's weight (each store within a firm had equal weight). Sample stores selected to represent the less-than-leading firms in an SMSA had equal weights. The combined weights of these stores equaled the less-than-leading firms' share of total sales in the market.

   e. Average the values calculated in step I.d. across all SMSA's in the study. The result is the average unit price of each brand type in each subcategory included in the sample of products for one wave.

II. Convert all prices to index units and aggregate into department and total-store averages for each store in the study.

   a. Divide the unit price of each supermarket item by the all-SMSA average unit price for the appropriate brand type and subcategory. Multiply by 100 to express as index units.

   b. Calculate the average index value for all items of the same brand type in each subcategory (each item had equal weight).

   c. Calculate the all-brand average index value for each subcategory. Each brand

type was weighted by its share of total subcategory sales.

d. Calculate average index values for each brand type and the all-brand average for each category. Subcategory (by brand-type) weights equaled each subcategory's share of category sales. When sales weights were not available, weights were estimated by counting the number of items price-checked in each subcategory in all of the sample stores. At the all-brand level, subcategories within a category were given equal weight (e.g., produce and fresh meat items).

e. Aggregate category averages into departmental averages. Each category's weight equaled the number of times it was selected when the categories were randomly chosen.

f. Aggregate departmental averages to total-store averages. Each department's weight equaled its share of total supermarket sales. Steps e. and f. produced the basic price index values used in most of the analyses performed in the study.

## Price Patterns Within Cities

**Figures 1-28 show variation in pricing patterns of the four leading firms in our 28 sample cities.**

Figures 1-28 also show how the four leading firms' prices in each city compare to the city's all-firm weighted average prices. To facilitate this analysis, the cities are grouped under three general levels of four-firm concentration: (1) below 50 percent; (2) 50 to 59 percent; and (3) 60 percent and above.

### Four-firm Concentration Below 50 Percent

Of our 28 sample cities, 12 had relatively low concentration. In figure 1, a large eastern city, the market share leader (firm A) had, by far, the lowest prices among the top four firms. Firms B and C had nearly identical prices, while firm D's prices were slightly lower. There was very little switching in the relative price rankings over the three survey periods. Each of the four leading firms' prices were below this city's average prices for all firms. Figure 2 represents a medium-sized eastern city in which firm A had both a dominant market share and the lowest average prices across the three survey periods. Considerable switching occurred among three of the top four firms. In figure 3, a large eastern city, prices varied widely among the four leading firms. Little switching occurred. There was no dominant firm. In figure 4, a medium-sized eastern city, firm C had the lowest prices, followed closely by firm A. Firms D and B had similar but clearly higher prices. Switching occurred among both sets of firms. In figure 5, a large eastern city, firm A had a dominant market share and the lowest average prices. However, price differences were not large among the leading firms, and switching was common.

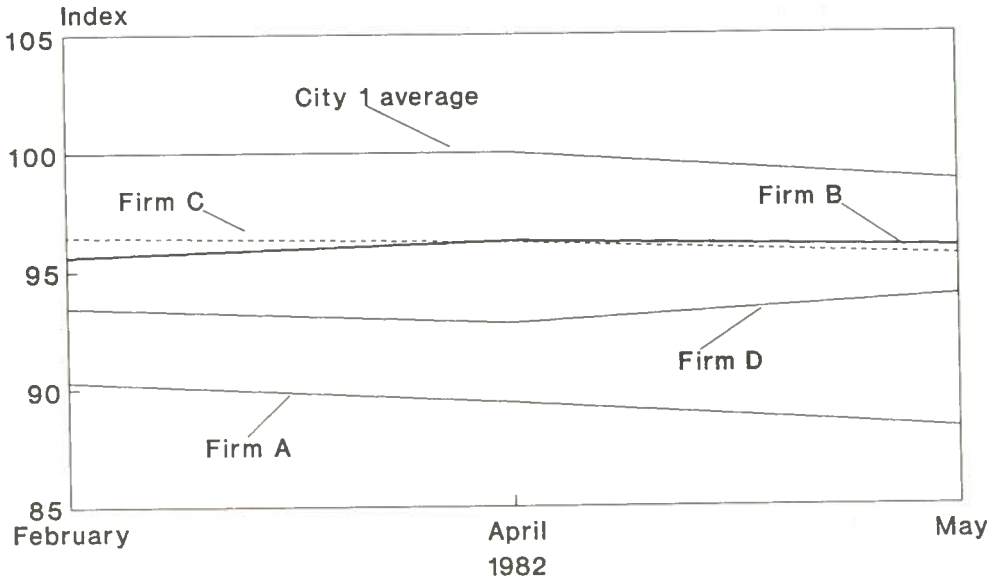
In figure 6, a medium-sized southern city, there was no dominant firm. Firm C had the lowest average prices, and firm B had the highest average prices. There was relatively wide variation in average price levels, and there was also moderate switching. In figure 7, a small eastern city, firm D had the lowest prices, while firm A had the second-lowest. There was moderate switching. In figure 8, a large eastern city, the dominant market share leader had the second-highest prices among the top four firms. Firm D had a very low market share and the highest average prices.

In figure 9, a large midwestern city, average prices for firms A and B were significantly lower than the price levels of firms C and D. There was no dominant market share leader. In figure 10, a small western city, the market share leader had the highest average prices among the top four firms. Firm D's price index was considerably below the other leading firms' prices. This firm (which does not operate warehouse stores) had consistently low average price levels in the other five sample cities in which it operated. Switching occurred among the top three firms.

Figure 11 was a small mid-western city. The dominant market share leader had the lowest average prices among the four leading firms. Considerable switching occurred. In figure 12, a medium-sized midwestern city, firm D had the highest average prices, followed by firm A, which had a dominant market share.

Figure 1

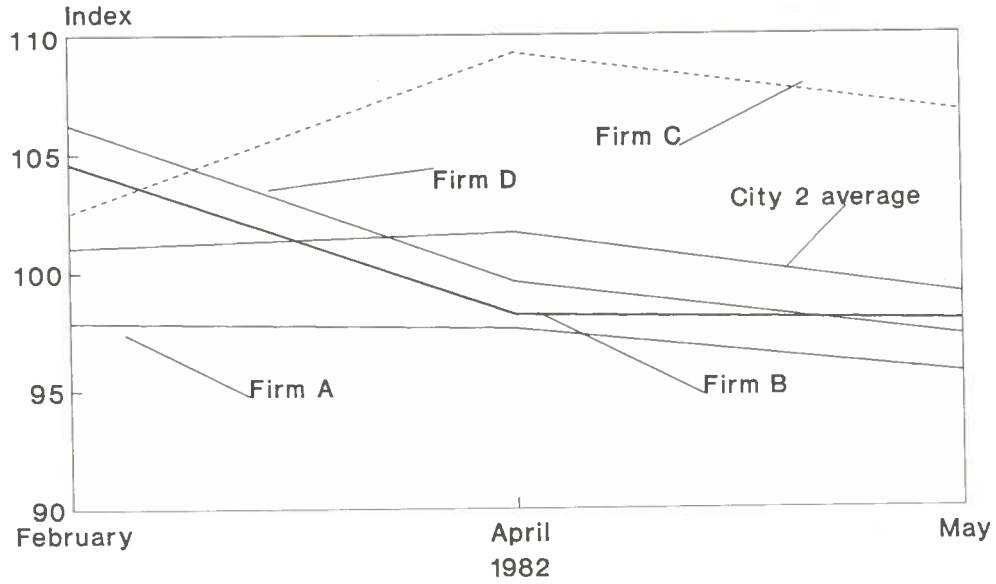
## Price indexes for leading firms in city 1




100 = National average price.
Firms are ranked A to D with A having the largest market share.

Figure 2

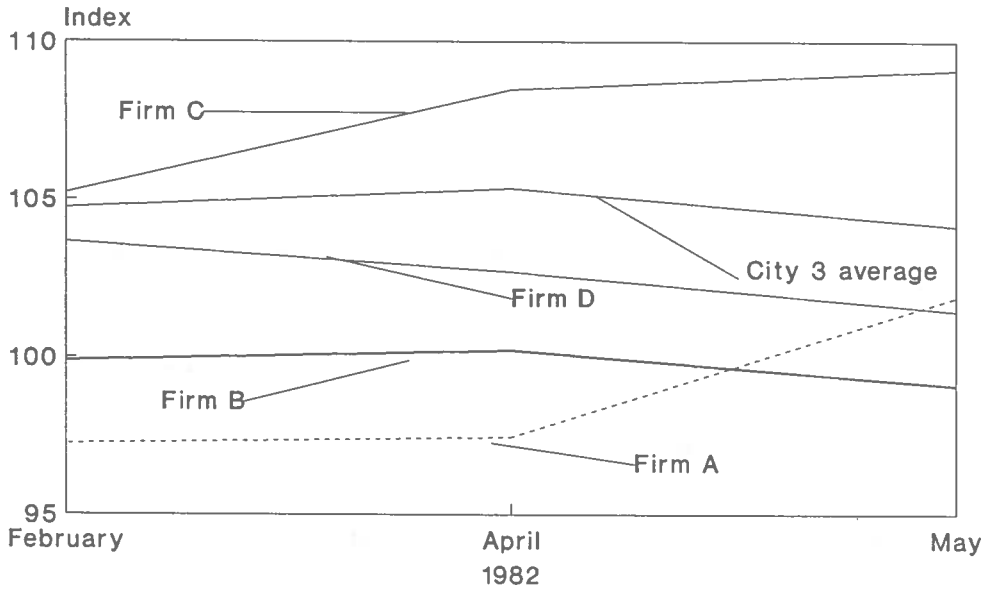
## Price indexes for leading firms in city 2




100 = National average price.
Firms are ranked A to D with A having the largest market share.

Figure 3

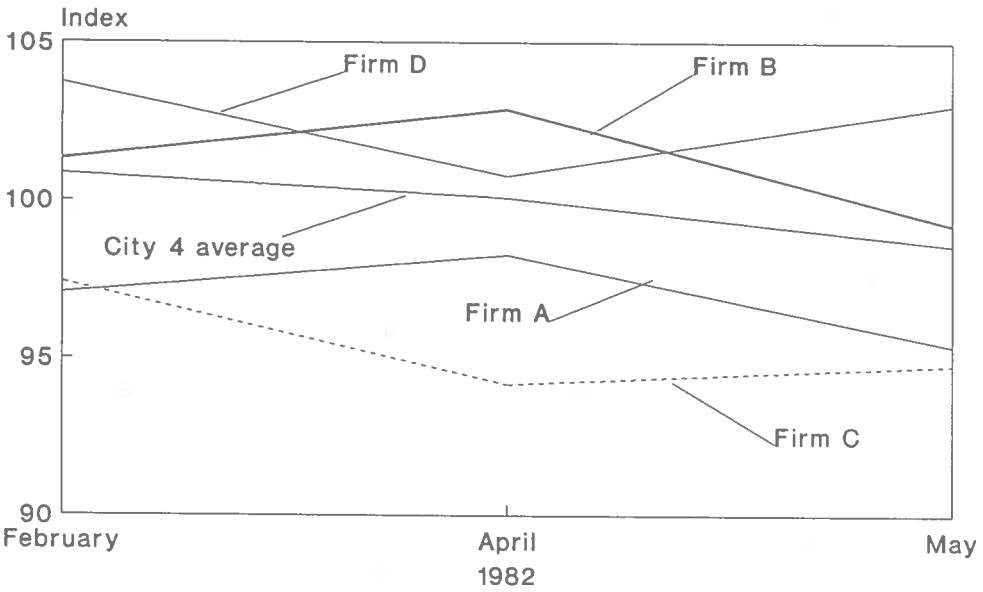
## Price indexes for leading firms in city 3




100 = National average price.
Firms are ranked A to D with A having the largest market share.

Figure 4

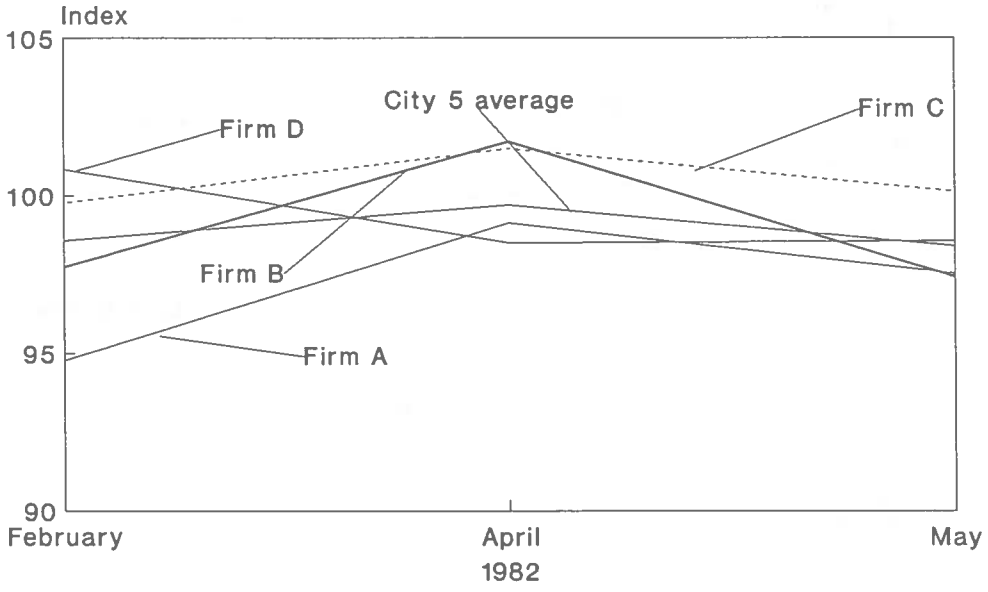
## Price indexes for leading firms in city 4




100 = National average price.
Firms are ranked A to D with A having the largest market share.

Figure 5

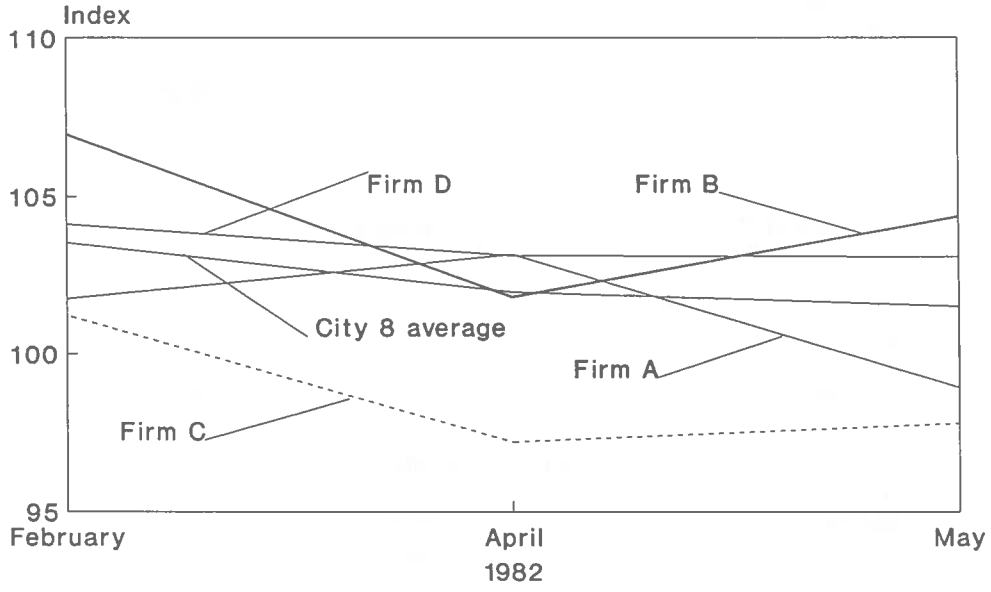
## Price indexes for leading firms in city 5




100 = National average price.
Firms are ranked A to D with A having the largest market share.

Figure 6

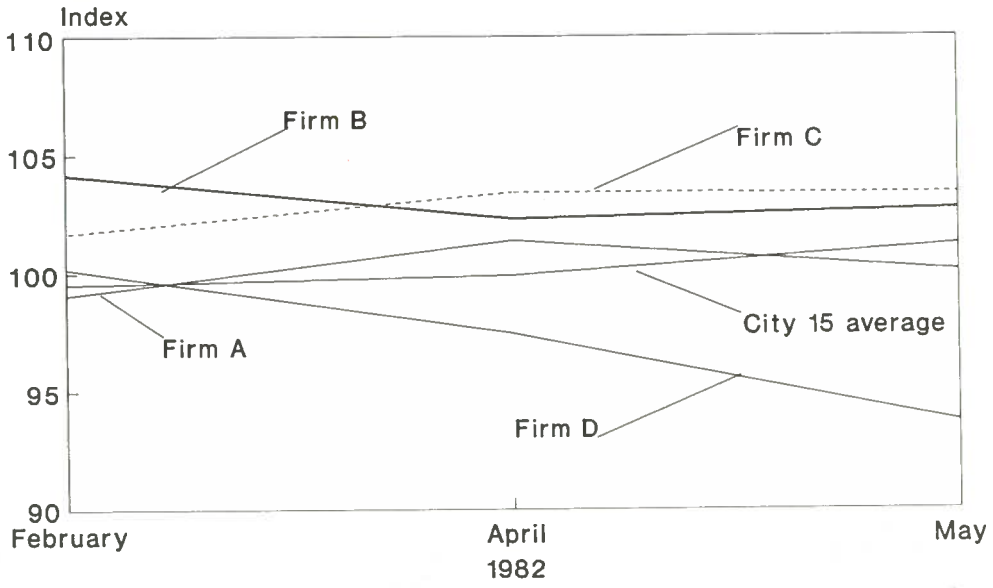
## Price indexes for leading firms in city 8




100 = National average price.
Firms are ranked A to D with A having the largest market share.

Figure 7

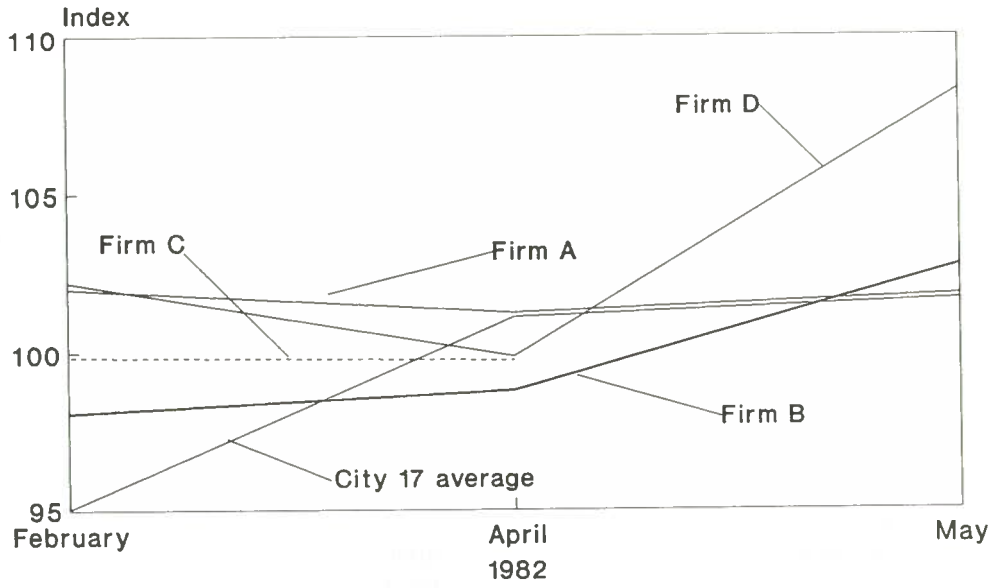
## Price indexes for leading firms in city 15




100 = National average price.
Firms are ranked A to D with A having the largest market share.

Figure 8

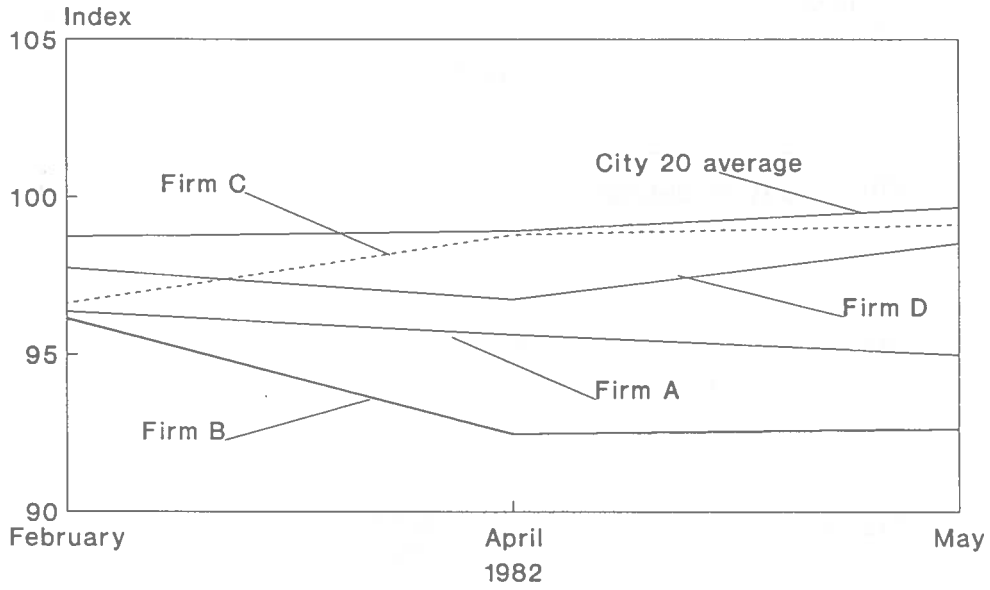
## Price indexes for leading firms in city 17




100 = National average price.
Firms are ranked A to D with A having the largest market share.

Figure 9

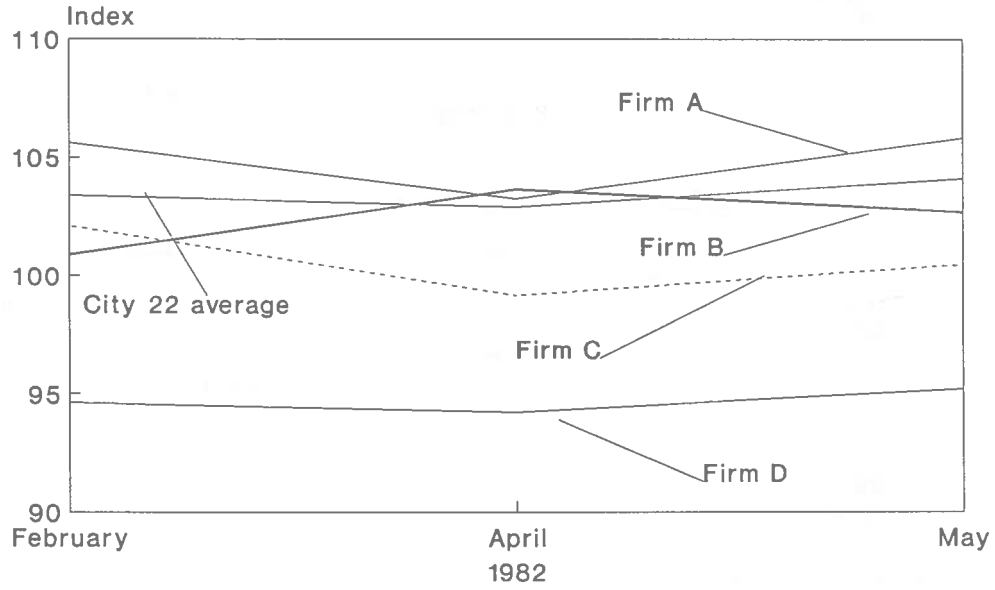
## Price indexes for leading firms in city 20




100 = National average price.
Firms are ranked A to D with A having the largest market share.

Figure 10

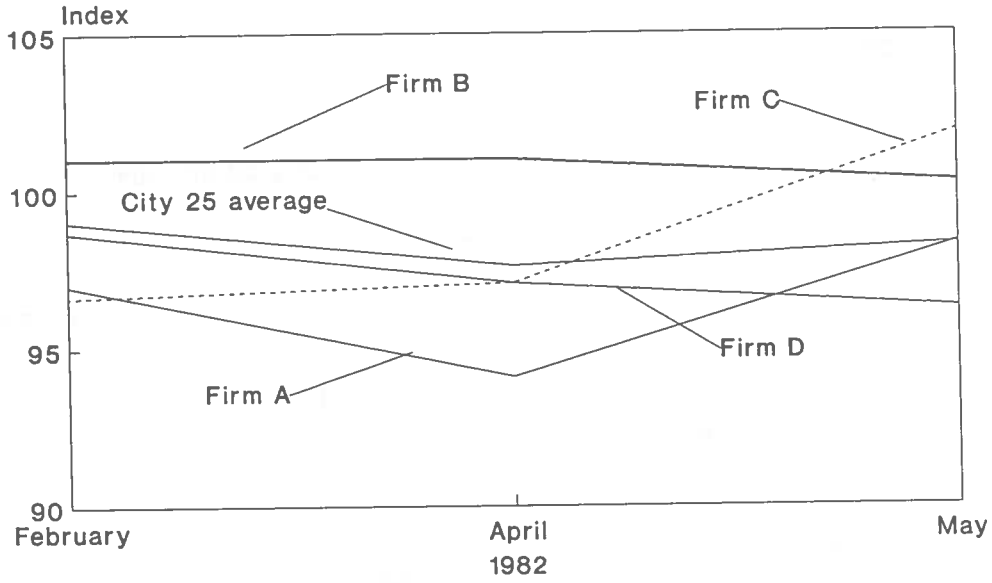
## Price indexes for leading firms in city 22




100 = National average price.
Firms are ranked A to D with A having the largest market share.

Figure 11

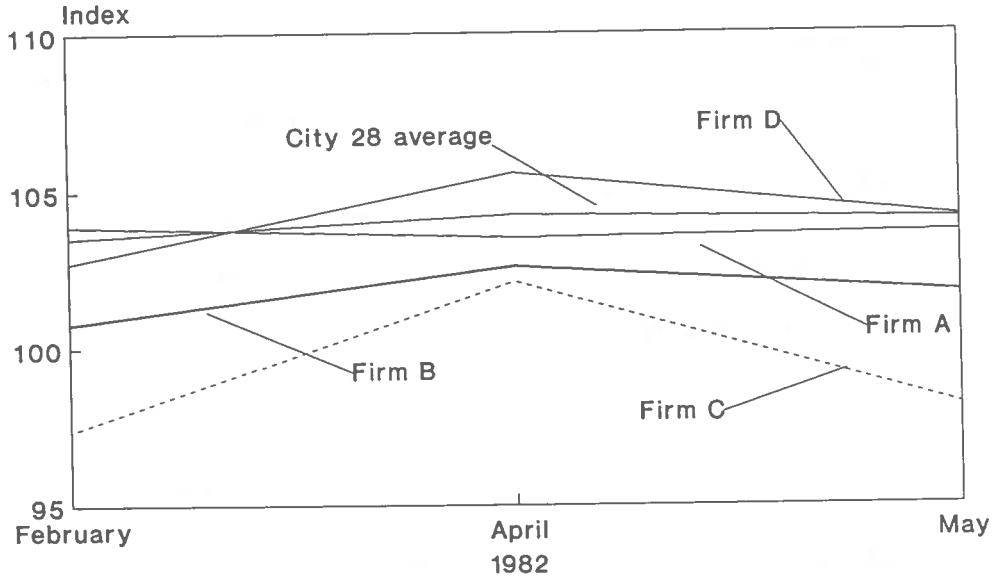
## Price indexes for leading firms in city 25




100 = National average price.
Firms are ranked A to D with A having the largest market share.

Figure 12

## Price indexes for leading firms in city 28




100 = National average price.
Firms are ranked A to D with A having the largest market share.

### Four-firm Concentration Between 50 and 59 Percent

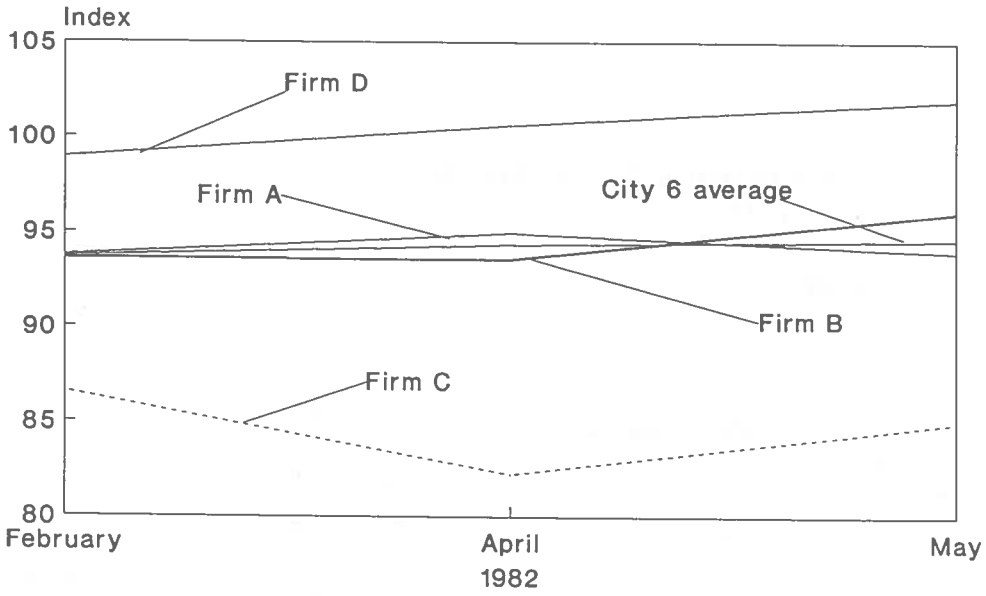
Seven of our sample cities had concentration between 50 and 59 percent. In figure 13, a small eastern city, firm A had a dominant market share. Firms A and B had similar average price levels and switched rankings from one survey period to another. The top three firms' average prices were considerably below the national average. In figure 14, a large southern city, there was little price variation among the leading firms. Considerable switching occurred.

Figure 15, a medium-sized mid-western city, had no dominant firm and there was little switching. In figure 16, a large mid-western city, the dominant market share leader had the lowest average prices among the top four firms. In figure 17, a small mid-western city, the market share leader had the lowest average prices followed closely by the third-place firm.

In figure 18, a medium-sized mid-western city, firm C had the highest prices, followed by firm A, the dominant market share leader. In figure 19, a large mid-western city, there was very little price variance among the top three firms. There was no dominant firm.

Figure 13

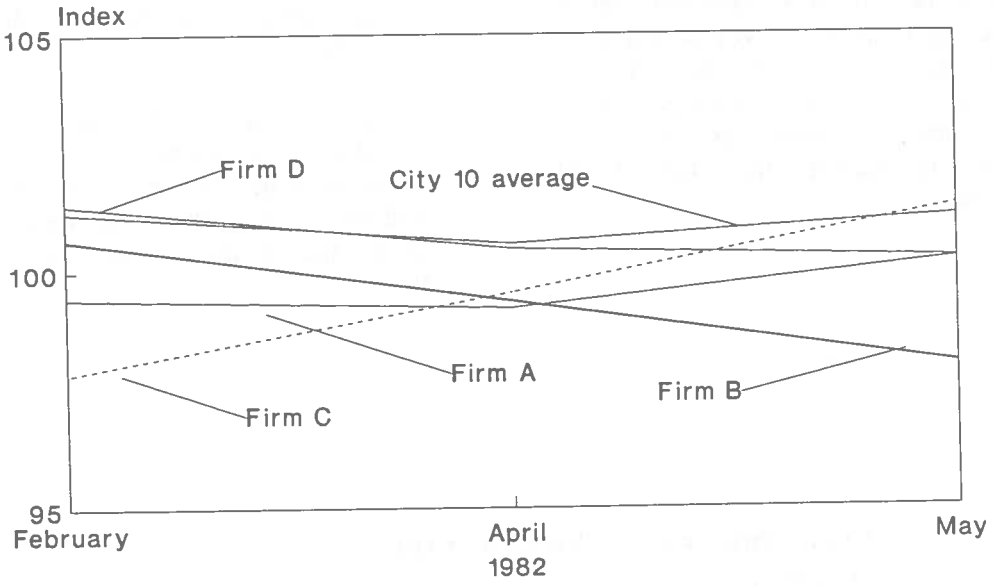
Price indexes for leading firms in city 6




100 = National average price.
Firms are ranked A to D with A having the largest market share.

Figure 14

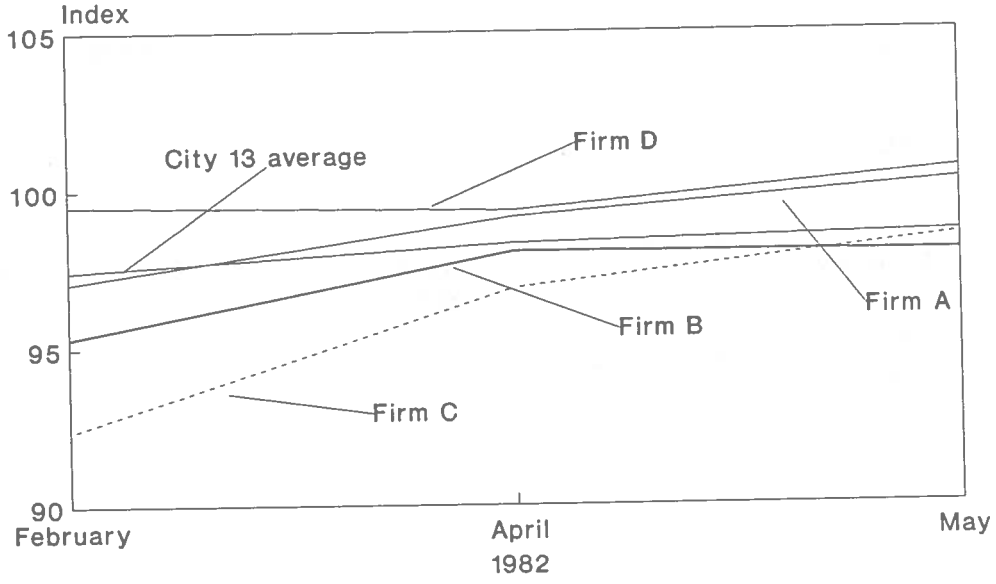
## Price indexes for leading firms in city 10




100 = National average price.
Firms are ranked A to D with A having the largest market share.

Figure 15

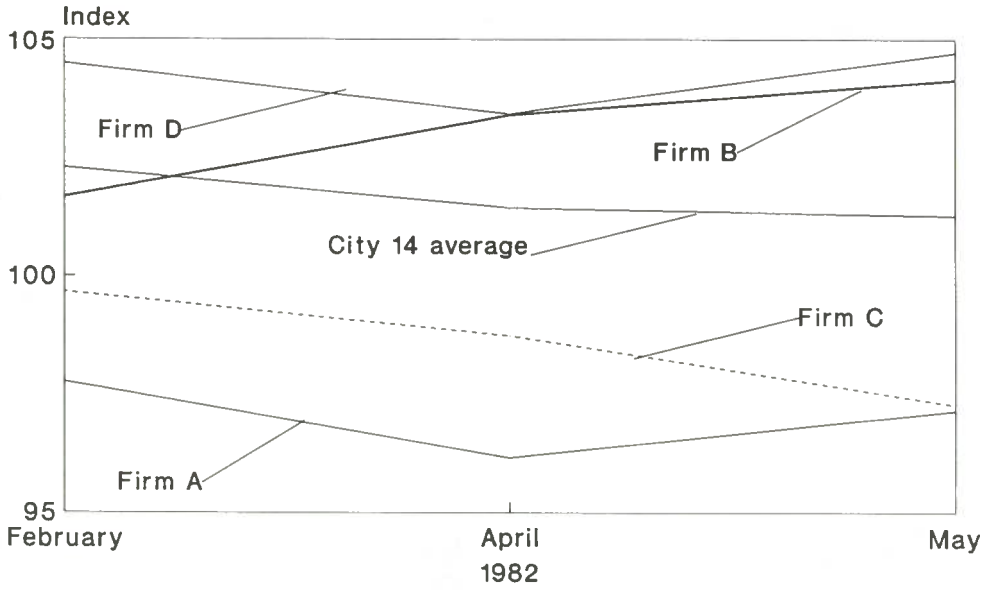
## Price indexes for leading firms in city 13




100 = National average price.
Firms are ranked A to D with A having the largest market share.

Figure 16

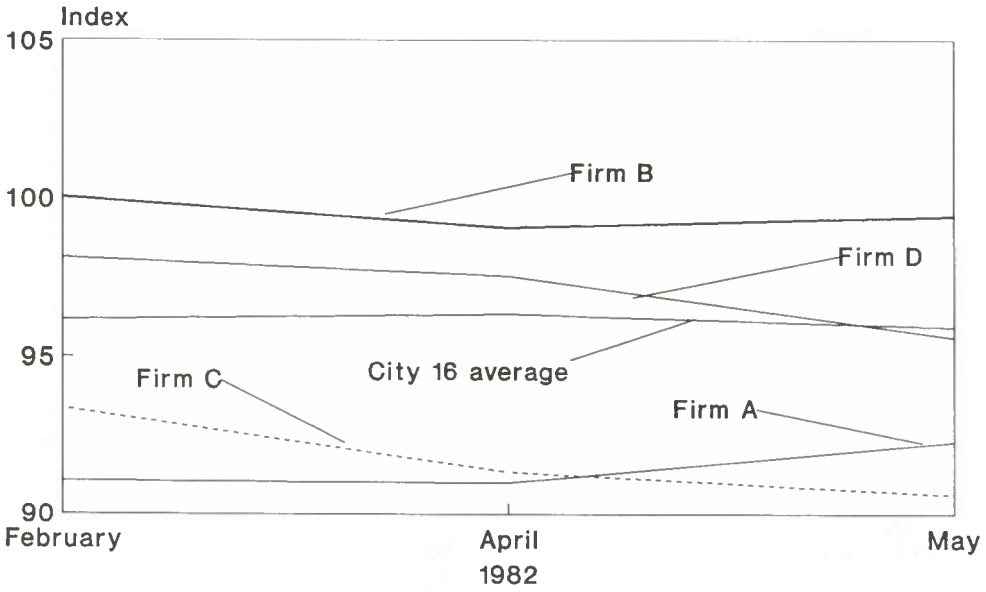
## Price indexes for leading firms in city 14




100 = National average price.
Firms are ranked A to D with A having the largest market share.

Figure 17

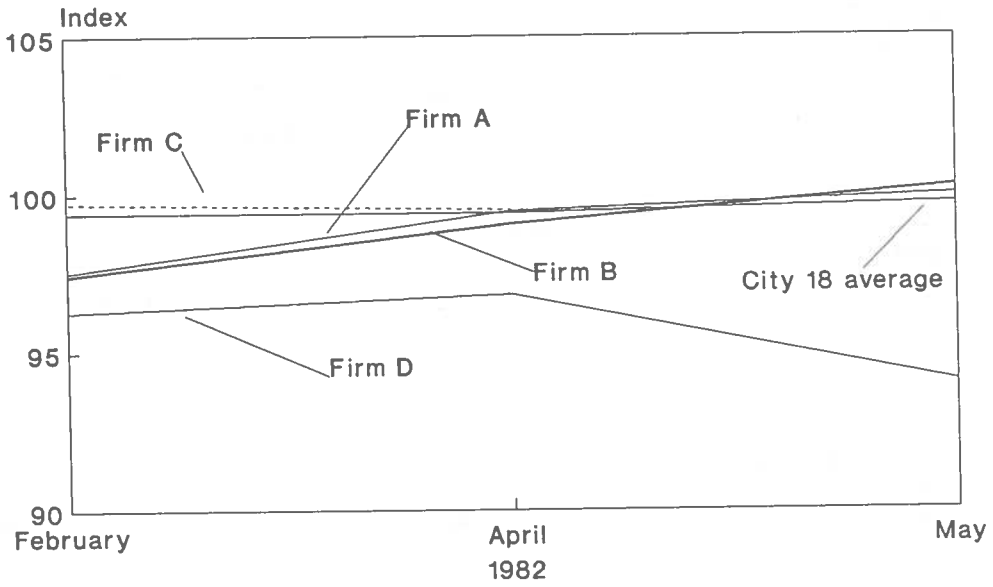
## Price indexes for leading firms in city 16




100 = National average price.
Firms are ranked A to D with A having the largest market share.

Figure 18

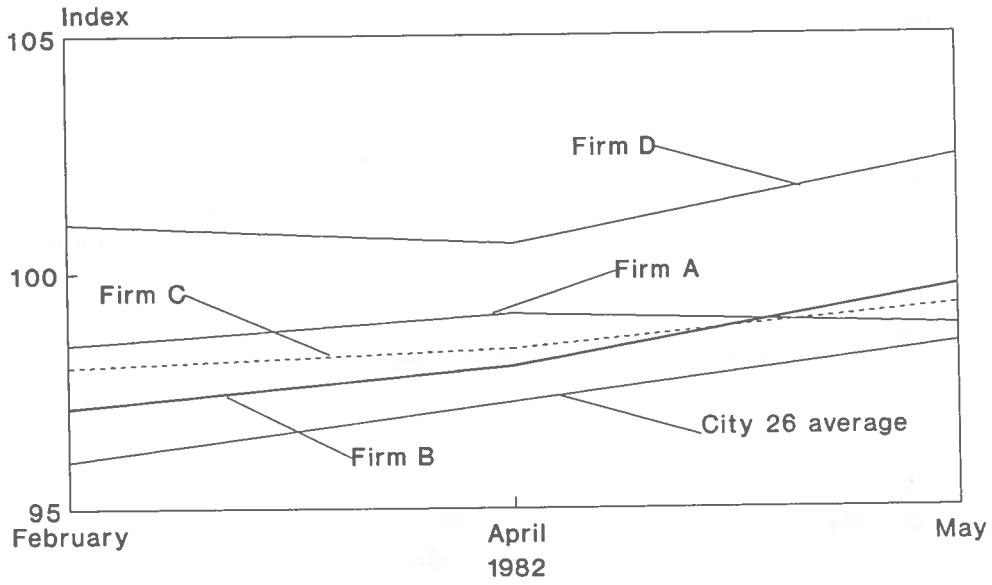
## Price indexes for leading firms in city 18




100 = National average price.
Firms are ranked A to D with A having the largest market share.

Figure 19

## Price indexes for leading firms in city 26




100 = National average price.
Firms are ranked A to D with A having the largest market share.

### our-firm Concentration 60 Percent and Above

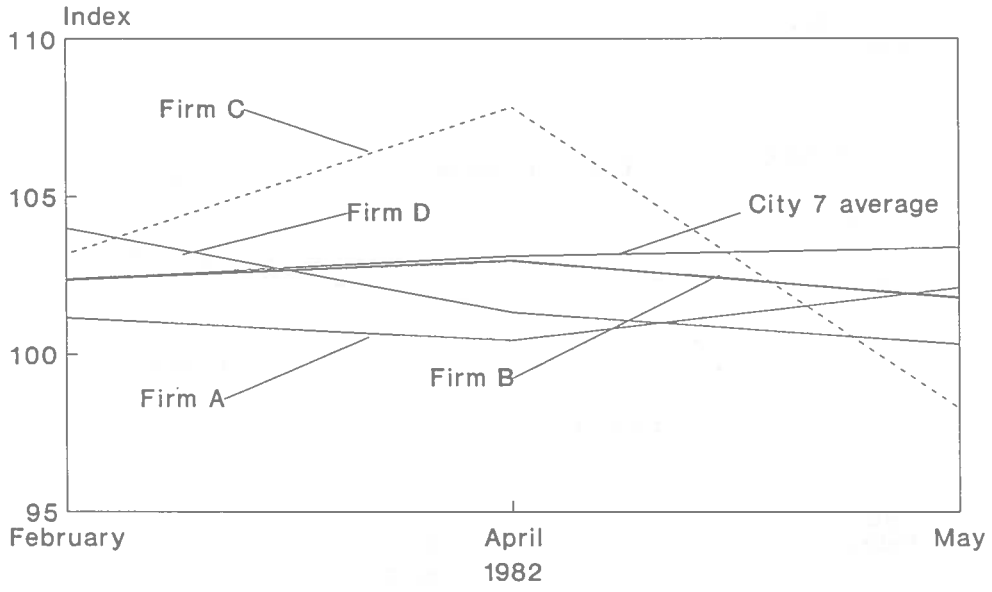
line of our 28 sample cities had relatively high oncentration. In figure 20, a large eastern city, irm A had the lowest average prices, although price ariation among firms A, B, and D was small. witching was common among these leading firms. n figure 21, a large eastern city, both firms A and 3 had dominant market shares. These market share eaders had the second- and third-lowest prices.

n figure 22, a small southern city, firm A had a ominant market share. Firms A and B had the owest average prices among the leading firms. Considerable switching occurred. In figure 33, a arge eastern city, firm C had the lowest average rices, followed by firms A, B, and D. Moderate witching occurred.

n figure 24, a medium-sized western city, the four eading firms had similar market shares. This was ne of two cities in our sample in which the market hare leader had the highest average prices among he top four firms. Switching occurred between irms A and B and between firms C and D. In figure 25, a large western city, each of the top four firms again had similar market shares. The fourth-ranked firm had the highest prices, followed by the market leader. The second- and third-ranked firms had the lowest and second-lowest prices among the leaders. There was no switching during the survey periods.

In figure 26, a medium-sized western city, a wide dispersion in average price levels existed among the leading firms. These firms had similar market shares. The fourth-ranked firm had the highest average price level, followed by firm A. In figure 27, a large western city, firm A had a dominant market share and the second-lowest average prices. Firms C and B had nearly identical average prices and frequently switched their relative price ranking. In figure 28, a small mid-western city, considerable switching occurred. The leading firm for this city is not represented in figure 28, since we were able to obtain this firm's price data only for the first of the three survey periods. This firm's wave 1 average price index was almost identical to the all-firm average for this city. Firm B had the highest average prices among the market leaders, followed by firm D, firm A, and firm B.

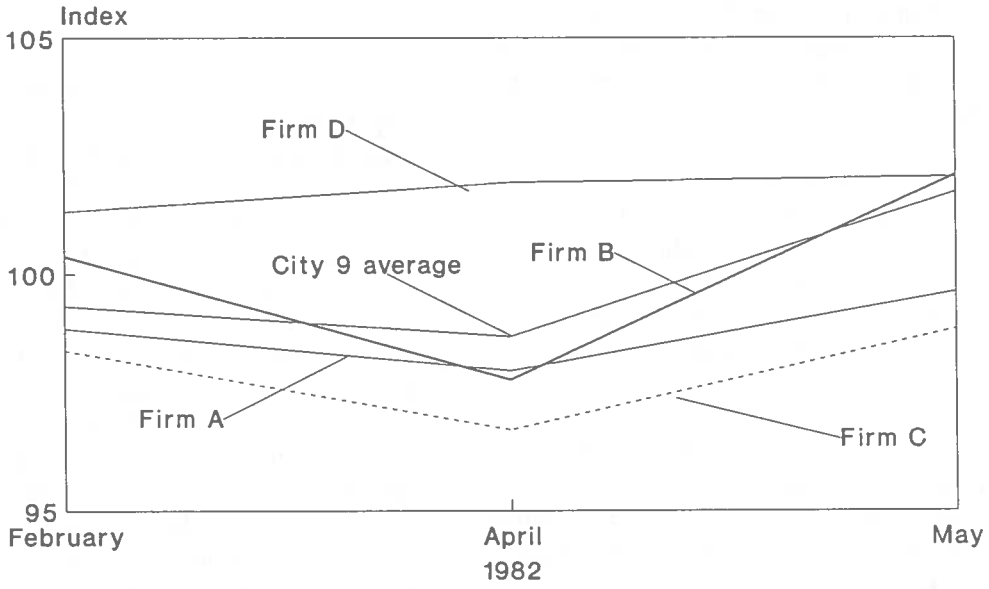
Figure 20
Price indexes for leading firms in city 7




100 = National average price.
Firms are ranked A to D with A having the largest market share.

Figure 21

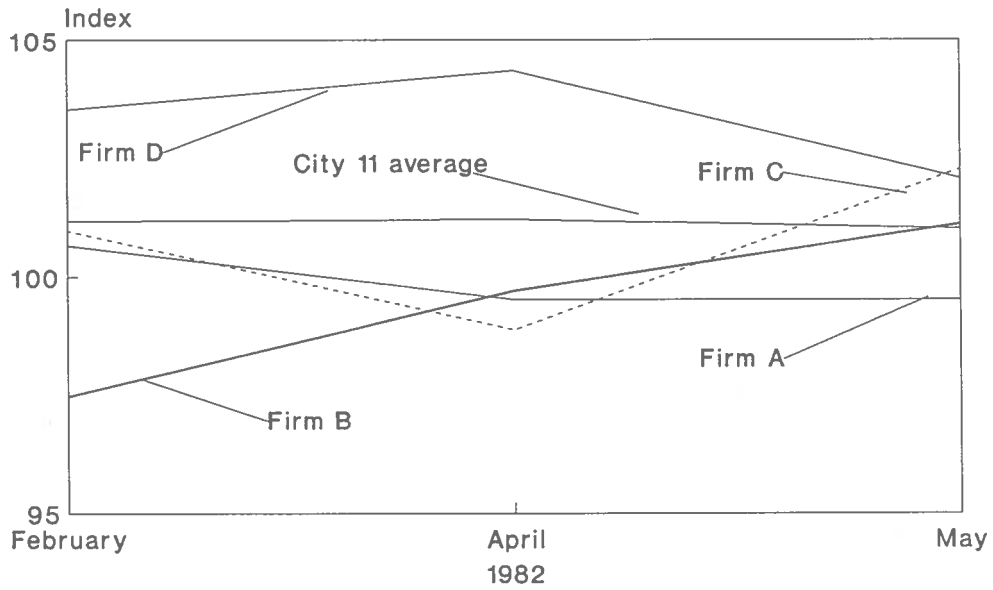
## Price indexes for leading firms in city 9




100 = National average price.
Firms are ranked A to D with A having the largest market share.

Figure 22

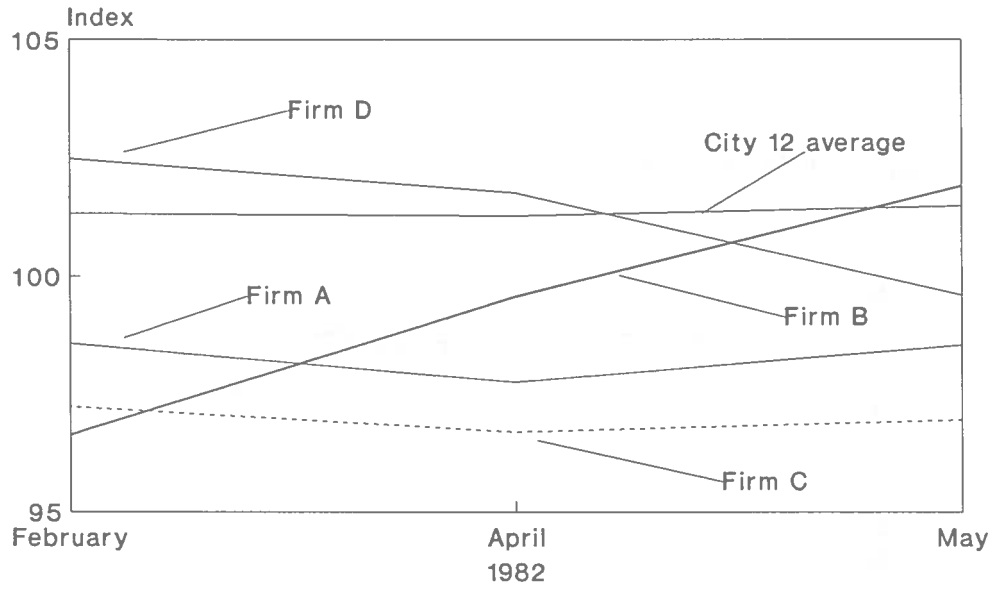
## Price indexes for leading firms city 11




100 = National average price.
Firms are ranked A to D with A having the largest market share.

Figure 23

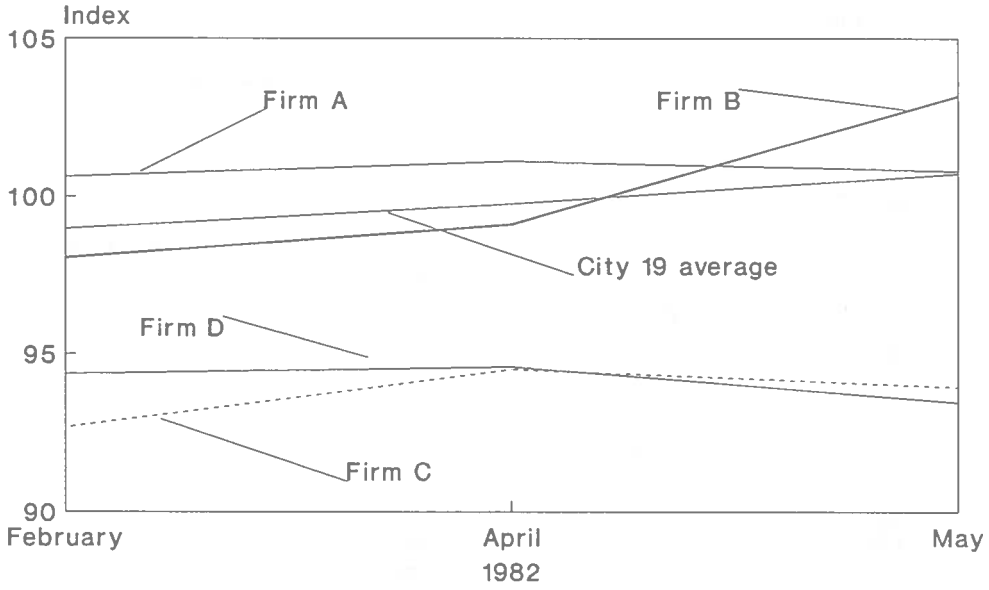
## Price indexes for leading firms in city 12




100 = National average price.
Firms are ranked A to D with A having the largest market share.

Figure 24

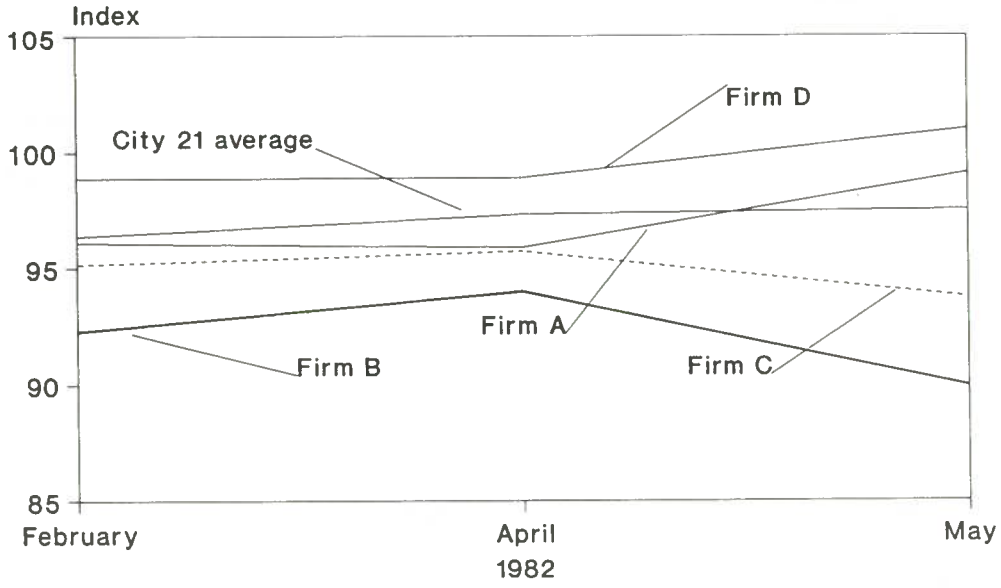
## Price indexes for leading firms in city 19




100 = National average price.
Firms are ranked A to D with A having the largest market share.

Figure 25

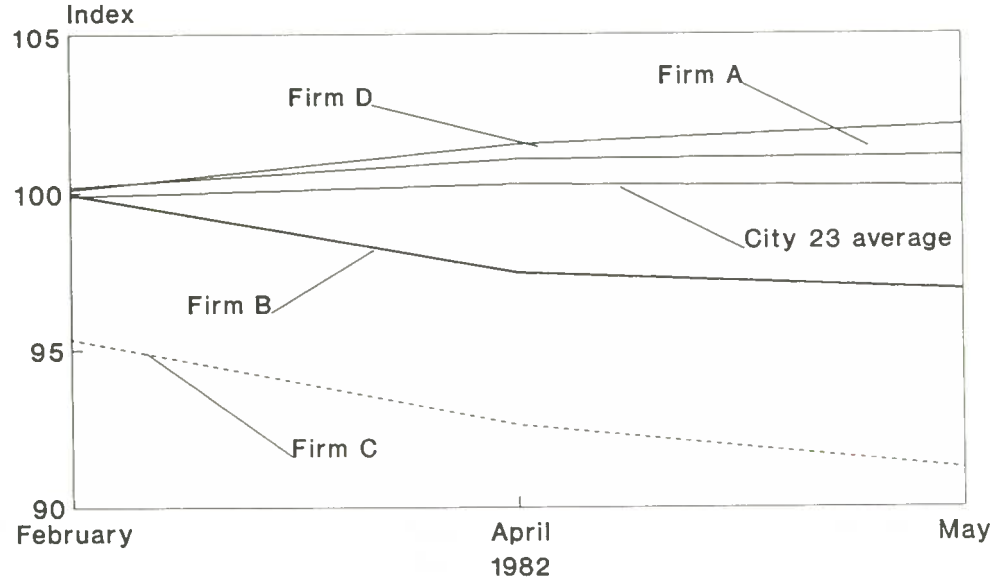
## Price indexes for leading firms in city 21




100 = National average price.
Firms are ranked A to D with A having the largest market share.

Figure 26

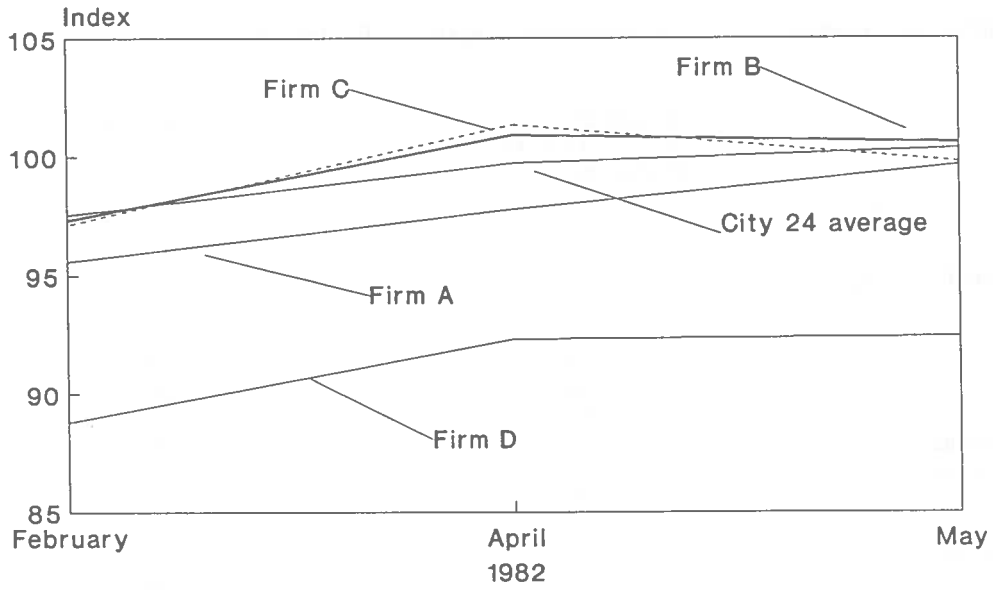
## Price indexes for leading firms in city 23




100 = National average price.
Firms are ranked A to D with A having the largest market share.

Figure 27

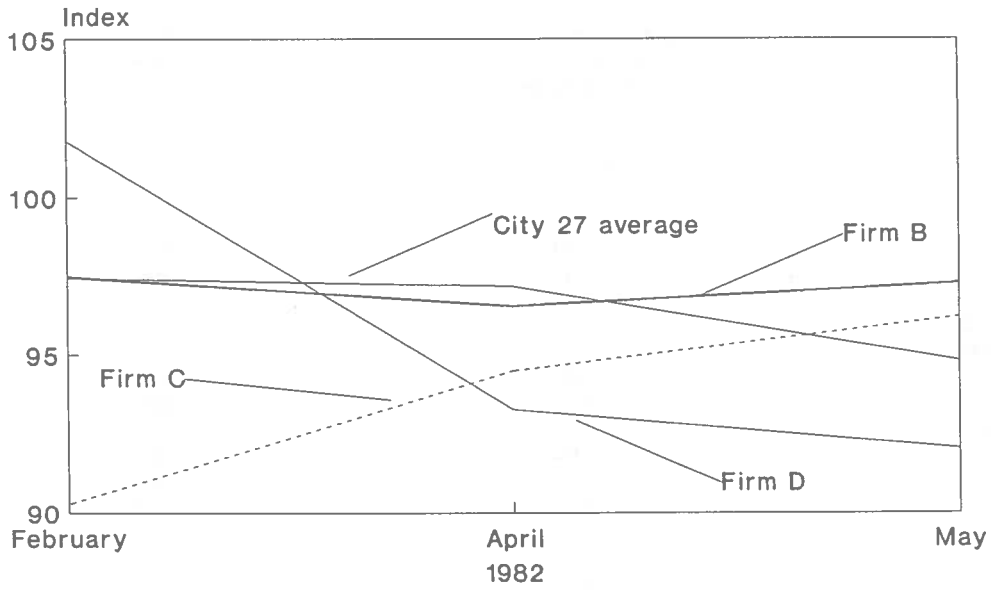
## Price indexes for leading firms in city 24




100 = National average price.
Firms are ranked A to D with A having the largest market share.

Figure 28

## Price indexes for leading firms in city 27




100 = National average price.
Firms are ranked A to D with A having the largest market share.

Appendix F

## Other Regression Results

**The effects of substituting a different variable into the original equation are shown in the following tables.**

### Appendix table 1--Substitution of concentration measure $CR_4$ for $H_4$

| Price determinant | Percentage change in price for a 10-percent increase in price determinant | Estimated coefficient | t-ratio |
|---|---|---|---|
| Market Share | -0.03 | -0.003 | -1.131 |
| Market Concentration ($CR_4$) | -.15 | -.015 | -1.307 |
| Sales*Size | -.15** | -.015** | -5.187 |
| Firm Integration (binary) | NA | -.001 | -.081 |
| Occupancy Cost | .54** | .054** | 3.194 |
| Store Services | .45** | .045** | 3.823 |
| Labor Compensation | -.016 | -.002 | -.169 |
| Warehouse Store(s) (binary) | NA | -.06** | -4.755 |
| Market Rivalry | -.2** | -.017** | -2.330 |
| Market Turbulence (binary) | NA | -.006 | -.756 |
| Market Growth | .02** | .004** | 3.613 |
| Market Entry | .04** | .002** | 2.928 |
| Model | | | |
| $R^2$ | .35 | | |
| F-ratio | 13.867 | | |

** = 5-percent significance level; * = 10-percent significance level. NA = Not applicable.

### Appendix table 2--Substitution of RELATIVE FIRM MARKET SHARE (RFMS) for MARKET SHARE

| Price determinant | Percentage change in price for a 10-percent increase in price determinant | Estimated coefficient | t-ratio |
|---|---|---|---|
| RFMS | -0.03 | -0.003 | -1.214 |
| Market Concentration | -.1* | -.01* | -1.803 |
| Sales*Size | -.15** | -.015** | -5.147 |
| Firm Integration | NA | -.000 | -.062 |
| Occupancy Cost | .55** | .055** | 3.231 |
| Store Services | .45** | .045** | 3.885 |
| Labor Compensation | -.02 | -.002 | -.174 |
| Warehouse Store(s) (binary) | -.59** | -.059** | -4.683 |
| Market Rivalry | -.16** | -.016** | -2.082 |
| Market Turbulence (binary) | NA | -.005 | -.675 |
| Market Growth | .02** | .380** | 3.694 |
| Market Entry | .04** | .002** | 2.708 |
| Model | | | |
| $R^2$ | .35 | | |
| F-ratio | 13.978 | | |

** = 5-percent significance level; * = 10-percent significance level. NA = Not applicable.

## ppendix table 3--Use of firm integration binary variables

| Price determinant | Percentage change in price for a 10-percent increase in price determinant | Estimated coefficient | t-ratio |
|---|---|---|---|
| Market Share | -0.04 | -0.004 | -1.132 |
| Market Concentration | -.09 | -.009 | -1.634 |
| Sales*Size | -.15** | -.015** | -5.162 |
| Degree of firm integration 1/ | | | |
| Fully integrated | NA | .007 | .716 |
| Substantially integrated | NA | -.011 | -1.055 |
| Partially integrated | NA | .002 | .192 |
| Occupancy Cost | .55** | .055** | 3.233 |
| Store Services | .474** | .047** | 4.057 |
| Labor Compensation | -.037 | -.004 | -.388 |
| Warehouse Store(s) (binary) | NA | -.053** | -4.055 |
| Market Rivalry | -.152** | -.015** | -2.004 |
| Market Turbulence (binary) | NA | -.006 | -.761 |
| Market Growth | .02** | .375** | 3.659 |
| Market Entry | .04** | .002** | 2.619 |
| Model | | | |
| R2 | .36 | | |
| F-ratio | 12.310 | | |

** = 5-percent significance level; * = 10-percent significance level.
NA = Not applicable.
1/ Binary variables.

## Appendix table 4--New York SMSA observations excluded

| Price determinant | Percentage change in price for a 10-percent increase in price determinant | Estimated coefficient | t-ratio |
|---|---|---|---|
| Market Share | -0.03 | -0.003 | -1.300 |
| Market Concentration | -.07 | -.007 | -1.228 |
| Sales*Size | -.14** | -.014** | -4.732 |
| Firm Integration | NA | -.002 | -.302 |
| Occupancy Cost | .49** | .049** | 2.646 |
| Store Services | .48** | .048** | 3.945 |
| Labor Compensation | .01 | .001 | .125 |
| Warehouse Store(s) (binary) | NA | -.057** | -4.471 |
| Market Rivalry | -.14** | -.014** | -1.764 |
| Market Turbulence (binary) | NA | -.003 | -.383 |
| Market Growth | .03** | .375** | 3.607 |
| Market Entry | .05** | .002** | 2.592 |
| Model | | | |
| R2 | .35 | | |
| F-ratio | 12.840 | | |

** = 5-percent significance level; * = 10-percent significance level.
NA = Not applicable.

Appendix G

## Simultaneous Equations Analysis

**We used a two-equation model in which dependent variables firm price and market entry are jointly determined.**

The single equation model used to test our hypotheses about firm price determinants revealed a positive and significant association between PRICE and MARKET ENTRY variables (table 10). This result is contrary to the expected inverse association, in which market entry influences firm price. The positive PRICE-MARKET ENTRY association suggests that higher firm prices in a market may provide incentives for new firms to enter, in which case MARKET ENTRY is not independent of the level of firm prices as originally hypothesized. The PRICE equation is the original single-equation model. The ENTRY equation is given as:

$$\text{ENTRY} = b_0 + b_1 \text{ MARKET GROWTH} + b_2 \ln \text{PRICE} + b_3 \ln \text{MARKET CONCENTRATION} + b_4 \ln \text{SALES*SIZE} + b_5 \ln \text{LABOR COMPENSATION} + b_6 \ln \text{MARKET SALES} + u,$$

with the hypotheses: $b_1>0$, $b_2>0$, $b_3<0$, $b_4>0$, $b_5\neq0$, and $b_6,\neq0$, and all continuous, positive variables are specified in log form.

Higher rates of market growth are hypothesized to be positively related to MARKET ENTRY. In an industry characterized by slow, stable growth, supermarket retailers are constantly seeking new opportunities to increase sales. Expanding market areas also offer greater access to desirable store sites, a potential barrier in more stable markets.

The firm price variable (PRICE) tests whether firm price is a significant determinant of MARKET ENTRY. Higher incumbent firm prices may provide incentives for new firms to enter a market, all else being equal. If firm price has a positive, significant association with market entry, then the inclusion of MARKET ENTRY as an exogenous, independent variable in a single-equation model is not valid. A two-equation simultaneous regression model would be more appropriate under these circumstances.

We expect MARKET CONCENTRATION, measured as the four-firm partial Herfindahl, to have a negative influence on MARKET ENTRY. To the extent markets are concentrated--that is, characterized by the low number of firms, each with large market shares--large-scale entry may be more difficult. Other factors being equal, the displacement effect of large-scale entry may threaten the market shares of leading firms, resulting in entry-forestalling tactics by incumbents. Highly concentrated markets likely offer limited access to new store locations, have relatively high advertising levels, and exhibit significant costs devoted to firm differentiation.

Low average store sales, given size of store (SALES*SIZE), may be due to excess capacity or "over-storing" in a market area. When SALES*SIZE is low, unit costs are relatively high. A large-scale entrant may be less able to achieve required scale economies in markets with excess capacity. Entry is more likely to occur in markets having greater sales, given store size, because new firms have a greater potential to build sales volume.

Higher labor costs measured as average hourly compensation (LABOR COMPENSATION) may serve to discourage entry, other factors being equal. Smaller entrants may be able to minimize labor costs by operating less labor-intensive store formats, such as warehouse supermarkets, and by hiring non-union employees. The leading firms most frequently operate high service content and labor-intensive supermarkets, and are most likely to employ workers earning union wages and benefits. High labor cost cities may provide incentives for potential large-scale entrants with relatively low labor costs, however. We therefore leave the effect of labor costs on market entry to empirical test.

Large-scale entry may more likely occur in markets with greater total grocery store sales (MARKET SALES), all else being equal. Due to their size, larger markets may more easily absorb new firms because the displacement effect of entry on

established firm sales is less than similar entry in smaller market areas, controlling for other differences. These factors would contribute to a positive association between MARKET ENTRY and total grocery store sales. Marion (1987) argues that entry barriers may be higher in large cities. He cites multistore economies, capital costs and risk, and entry-forestalling practices by established firms as entry barriers due to market size. Because of these conceptual differences, the relationship of MARKET SALES to market entry is indeterminate and therefore left to empirical test.

### Estimation Results

A two-stage least squares simultaneous estimation of the two-equation model was initially proposed. Because many sample SMSA's did not experience large-scale market entry--new firms with a five-percent or more market share in 1982--the ENTRY equation did not provide for a continuous dependent variable. A modified simultaneous estimation procedure was used in which the MARKET ENTRY variable is treated as a limited, dependent variable as described by Maddala (1983) and made operational by Green (1988).

We focus on the results for market entry in the PRICE equation, and on the PRICE variable in the ENTRY equation, to determine the presence of simultaneity. If firm price and market entry are jointly determined--contrary to the hypothesized independent relationship of the two variables--then market entry is expected to have a positive, significant influence on firm price in the PRICE equation. The PRICE variable should also have a positive, significant effect on MARKET ENTRY in the ENTRY equation. Appendix table 5 contains the estimated simultaneous model. The earlier single-equation results are included for ease of comparison.

Comparing PRICE equations of the single and simultaneous regression models (Appendix table 5) shows that the coefficient on market entry in the simultaneous model PRICE equation was positive, as in the single equation model, but was not significant (t=1.057). Similarly, the sign of the coefficients for the scale economies measure SALES*SIZE, OCCUPANCY COST, STORE SERVICES, and WAREHOUSE STORE(S) were unchanged and were all significant in both price equations. Both MARKET SHARE and MARKET CONCENTRATION had negative and significant firm price effects in the simultaneous PRICE equation, however. MARKET GROWTH and MARKET RIVALRY were not significant in the simultaneous PRICE equation. Neither FIRM INTEGRATION nor MARKET TURBULENCE were significant at the 10-percent level in either regression model.

To be consistent with simultaneity, the price variable should also be positively related to the level of market entry in the ENTRY equation. The PRICE coefficient had a negative sign and was a significant determinant of market entry (t=-3.517), contrary to the jointly determined PRICE-ENTRY hypothesis.

Of the remaining entry determinants, MARKET GROWTH and MARKET CONCENTRATION had the expected signs, but only MARKET GROWTH was significant (t=5.558). The coefficient on MARKET SALES was negatively signed and significant (t=-3.629). For our sample and time period, larger markets are likely to have less entry, all else being equal. The scale economies measure SALES*SIZE had an inverse association with market entry, and its coefficient was significant (t=-1.626). Rather than discourage entry, established firms with excess capacity may encourage more efficient firms to enter. Labor costs (LABOR COMPENSATION) did not have a significant effect on market entry, indicating its relative neutrality as an entry barrier.

The analysis offers some insights about the source of barriers to market entry as well. The insignificance of concentration and labor cost variables coupled with the strong, positive influence of market growth provide evidence of low entry barriers. Declining levels of entry associated with greater total market sales may be due to market size barriers.

## Appendix table 5--Single and simultaneous equation regression models

| Item 1/ | Regression Model 2/ | | |
|---|---|---|---|
| | Single-equation | Simultaneous-equation | |
| Dependent variable | PRICE | PRICE | ENTRY |
| Intercept | 4.592** (45.239) | 4.529** (53.460) | 3.253** (14.670) |
| Market Share | -.003 (-1.188) | -.004* (-1.831) | NA |
| Market Concentration ($H_4$) | -.008 (-1.557) | -.009** (-2.203) | .003 (.232) |
| Sales*Size | -.015** (-5.150) | -.014** (-5.865) | -.009* (-1.626) |
| Price | NA | NA | -.533** (-3.517) |
| Firm Integration | -.001 (-.116) | .003 (.434) | NA |
| Occupancy Cost | .055** (3.207) | .060** (4.493) | NA |
| Store Services | .045** (3.864) | .528** (2.815) | NA |
| Labor Compensation | -.002 (-.188) | -.122 (-1.108) | .015 (.629) |
| Warehouse Store(s) | -.061** (-4.839) | -.533** (-5.058) | NA |
| Market Growth | .382** (3.737) | .2541 (1.053) | .582** (5.558) |
| Market Entry | .002** (2.743) | .185 (1.057) | NA |
| Market Turbulence | -.005 (-.665) | .002 (.234) | NA |
| Market Rivalry | -.016** (-2.181) | -.029 (-1.396) | NA |
| Market Sales | NA | NA | -.033** (-3.629) |
| Model | | | |
| $R^2$ | .36 | NA | NA |
| F-statistic | 14.218 | NA | NA |

** = 5-percent significance level; * = 10-percent significance level.
NA = Not applicable.
1/ All positive, continuous variables in log form.
2/ t-ratios in parentheses.

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