COMPETITION IN GROCERY RETAILING: THE IMPACT OF A NEW STRATEGIC GROUP ON BLS PRICE INCREASES

by

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I. Background

The concept of minimal service, low-price grocery retailing dates back to the advent of the supermarket in the 1930s. Independent grocers in selected areas have successfully operated warehouse-type stores for decades. However, it was not until the economically turbulent 1970s that the warehouse store began making significant inroads into a number of urban grocery markets. Early warehouse store efforts by chains such as Penn Fruit, Thriftmart, Acme and A&P were primarily last-ditch attempts to save failing stores (Progressive Grocer 1972). Although many of those conversions ultimately failed, successful adaptation of the format throughout the 1970s and 1980s resulted in warehouse and super warehouse stores' capturing 30 percent or more of sales in some markets.

Throughout this paper, warehouse stores and super warehouse stores will be referred to separately by those names, and collectively under the rubric "depot stores." In total, "depot stores" accounted for 10 percent of U.S. grocery store sales in 1993 (Food Institute Report, 1994). We do not include wholesale clubs within "depot stores". While wholesale clubs provide price competition on certain food products, we believe that clubs are not in the same product market as supermarkets.

In this article, we focus on the competitive impact of depot stores during the period 1977-1992. These stores represent new retail "formats" with substantially lower costs and prices than traditional supermarkets (Progressive Grocer 1985; Grocer's Spotlight 1985; Supermarket News 1986). The significantly lower prices in depot stores led to aggressive responses by some conventional supermarkets when depot stores invaded their territory. A 1990 study of the Washington, D.C. market is a case in point. At Giant and Safeway stores not located near a warehouse store, prices were 13 percent higher than Shoppers Food Warehouse stores and nearly

20 percent above Food Lion, a new discount price entrant (Swisher 1990). However Giant and Safeway stores located near a depot store had prices that were 7 to 13 percent lower than their remaining stores. Zone pricing, as this type of geographic price discrimination is called in food retailing, has been used in response to depot stores in Indianapolis, Chicago, San Antonio, Atlanta and numerous other markets. In yet other markets, conventional supermarkets have avoided a price response and have countered depot stores by emphasizing quality and service attributes.

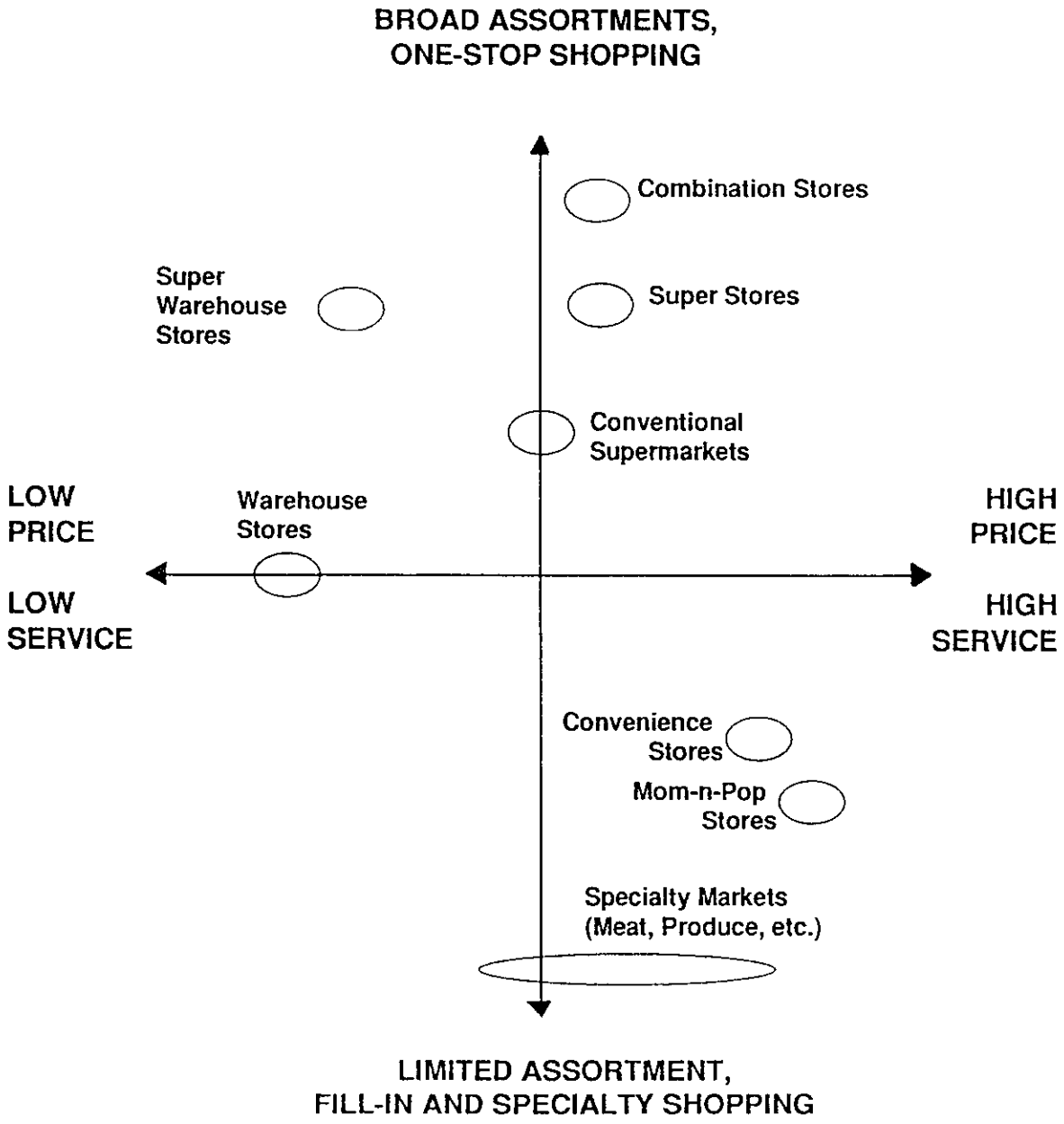
We believe that in most markets which depot stores have successfully entered, their presence will provide a downward pressure on market prices. However, once they have been operating for a certain period, we expect a new equilibrium to develop; the negative impact of depot stores on market prices will be reduced or eliminated. These are the primary hypotheses that this study tested. Additional hypotheses tested are that when other factors are held constant, change in market concentration will be positively related to change in food prices, and denovo entry will be negatively related to change in prices.

Strategic Groups in Retail Food Markets

Porter (1979) comments: "An industry can...be viewed as composed of clusters or groups of firms, where each group consists of firms following similar strategies in terms of key decision variables....I define such groups as strategic groups" (p. 215).

Marion (1984) has suggested that each of the food store formats illustrated in Figure 1 is a strategic group. Each format offers a unique mix of price, service, and products. The eight strategic groups in Figure 1 fall into at least two relevant markets: those on or above the horizontal axis compete with each other for the major shopping trips of consumers; the

Figure 1. Retail Food Store Formats



remaining three groups largely compete for fill-in shopping. The major shopping market can be labelled the "supermarket market". The stores in this market account for about 75 percent of food store sales and have the greatest effect on prices charged to consumers.

To have a positive effect on supermarket rivalry, depot stores must capture or be expected to capture a significant share of the "supermarket market." If they never capture more than 1 or 2 percent of a market's sales, depot stores would remain part of the fringe that the major competitors can ignore. Some observers have estimated the market share potential of depot stores at 15-20 percent (Supermarket News 1983, 1984). Depot stores have already far exceeded this share in a few markets. Thus, these stores hold the potential of increasing the number of strategic groups and adding a significant competitor in many metropolitan areas. Those incumbent strategic groups that are strategically closest to the new group are expected to be affected the most and to respond the most aggressively.

Depot stores may enhance price rivalry in the supermarket sub-market for several reasons: 1) because depot stores represent a significant innovation with particular appeal to price-oriented customers, they provide a means of overcoming the significant barriers to entry into the supermarket sub-market of many metropolitan areas[1], 2) they represent new strategic groups which are likely to reduce the ability of incumbent supermarkets to coordinate their competitive actions, and 3) because depot stores emphasize low prices, their presence is likely to stimulate price rivalry with at least some incumbent retailers.

The first factor--lower entry barriers for depot stores--will affect market rivalry primarily

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[1] The development of a new strategic group in a market requires denovo entry and capacity expansion in many cases. This has been true with depot stores in some MSAs, although in the majority of MSAs examined, depot stores were first introduced by supermarket firms already in the MSA.

during the period of entry and market penetration. Although the existence of warehouse store companies "waiting in the wings" could also affect competition in markets they have not yet entered, we hypothesize that the prices of incumbent superstores and conventional supermarkets will mainly be affected by actual entry of depot stores as compared to potential entry.

Significant denovo entry is normally expected to affect market rivalry simply because of the addition of capacity and the resulting displacement effect of the new entrant. The entry of depot stores is expected to have an additional impact on market prices because of the substantially lower prices of these firms.

Whether depot stores have a negative influence on market prices beyond the entry and market penetration period remains to be seen. If Porter is correct, oligopolistic coordination will be more difficult where depot store strategic groups exist; rivalry will be greater and prices lower. However, this is a hypothesis that remains to be tested. In addition, depot stores are likely to reduce average market prices vis a vis markets in which there are no depot stores because of the lower prices in depot stores. Even if a new equilibrium develops in which conventional supermarket and superstore prices return to levels similar to markets in which depot stores are not present, depot stores are expected to continue to charge lower prices. The effect on average market prices would depend upon the market share of depot stores and on the amount of time since their entry.

For the period examined in this study, we will primarily be examining the price effects of depot store introduction and expansion. However, there are a few markets where depot stores appear to have achieved their market share potential and where a new equilibrium has emerged. For these markets, we will examine how prices have responded under the new equilibrium.

Assessing the Impact of Warehouse and Super Warehouse Stores on Retail Food Markets

When warehouse or super warehouse stores or hypermarkets enter a market, we expect them to reduce the prices paid by consumers in two ways. First, since these stores carry significantly lower prices than conventional supermarkets, consumers who shop at depot stores receive directly the benefits of their lower prices. In addition, we expect the entry of depot stores to trigger price reductions by some incumbent retailers. Consumers shopping at the latter stores receive the "indirect" benefits of depot stores. Both sources of price reduction must be combined to understand the full impact of depot stores on market prices.

Unfortunately, data appropriate to assess both effects are unavailable. First, the most accurate and readily available price data, the Consumer Price Index (CPI) published by the U.S. Department of Labor, Bureau of Labor Statistics (BLS), do not allow meaningful comparisons of price levels across metropolitan areas (U.S. Department of Labor 1984, p. 6). Thus, it is necessary to restrict interarea analyses to comparisons of price changes over time. Second, the CPI does not capture the full effects of depot stores on area prices because BLS methodology intentionally obscures the "direct effect" of new outlets. Since BLS procedures are not widely understood and have a major influence on the meaning of the CPI for food consumed at home, we digress briefly to examine BLS methodology.

The Food At Home Component of the CPI: The primary objective of BLS in calculating the CPI is to measure changes in price for a fixed basket of goods and services, not to measure the prices consumers actually pay in the market. Stated differently, the intent is to create a price index, not a cost of living index. Thus, to maintain comparability of the CPI over time, BLS attempts to "filter out" what it perceives as qualitative changes in the goods and services being

priced.

To obtain a representative sample of food and other items with which to monitor price changes in an area, BLS combines information from two surveys, the Consumer Expenditure Survey (CE) and the Continuing Point of Purchase Survey (CPOPS). The CE has been conducted approximately once every ten years, and provides information on the absolute and relative amounts spent by consumers on various categories of goods and services in different BLS regions. The CPOPS has been conducted since 1977, and is intended to provide data for periodically updating the sample of outlets at which CPI items are priced; each year, one-fifth of the 87 metropolitan areas regularly surveyed by BLS are updated.

When the CPOPS updates the sample of outlets (and, hence, the specific items priced), it is necessary for BLS to "blend in" the price data obtained based upon a new CPOPS sample. To do so, in one month the BLS obtains prices for both the old and the new samples of outlets and items for the area being updated. Published CPI figures for that month are based on the price relative from the preceding to the current month in the old sample only; in the following month the CPI is based on the price relative in the new sample only. Using this procedure, BLS is able to blend in the price data from the new sample without directly comparing the price levels of the two different samples. A stylized example is:

	April	May	June
Market Basket Cost			
Old Sample w/o Depot Stores	$110	$121	----
New Sample w/ Depot Stores	----	$100	$110
CPI	100	110	121

Continuity of the CPI is maintained since BLS computes the CPI by a "chaining process" using price relatives, not price levels. In this process, the price relatives from the new sample are multiplied by the estimates (based on the old sample) of the previous month's expenditures in the stratum. Thus, in the above example, the CPI change from April to June is 21 percent.

In general, then, published CPI figures conceal reductions in area price levels that directly result from depot store entry. In the above example the published CPI figures would accurately reflect the monthly 10 percent increase in prices, but they would hide the lower level of prices in the new sample. Furthermore, the BLS holds weights given to different outlets constant between CPOPS surveys. So, even though depot stores might be represented in the BLS sample, the CPI would conceal any effect on area price levels due to increases in the market share of depot stores.

Note, however, that the CPI does capture the extent to which depot stores affect the prices charged by incumbent supermarkets--what we refer to as the indirect effect.[2] And, once depot sores are included in the sample of outlets, the CPI also captures the changes in depot stores prices that occur over time. During the early years of this study, CPI prices mainly reflected the indirect effect of depot stores because they were new formats in most markets. Toward the end of the period studied, the CPI captures both sources of price changes.

Empirical Model

Our analysis focuses on changes in food prices across markets. We limit our attention to large, urban metropolitan areas for which BLS data are available.

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[2]Since the relative weights given different outlets are held constant between CPOPS surveys, if warehouse stores are eroding the market position of incumbent supermarkets the indirect effect of depot stores on changes in market prices may be somewhat overstated.

The model empirically tested is of the form:

$$Y = \alpha + \beta_i X + \beta_j Z + e$$

where the dependent variable (Y) is the percentage change in the BLS Food- at-Home Price Index, X represents a set of binary variables reflecting depot store activity, and Z are control variables suggested by economic theory that may affect changes in retail food prices. The analysis is performed on a data set that pools annual percentage price change observations from 1977-1992 across 25 Metropolitan Statistical Areas (n = 374). A similar analysis was performed on a second set that contains the percentage price change during the fifteen year period, 1977-1992, for 25 MSAs (n = 25). Due to similarities in the results, we present here only the results from the pooled data set.

1. The Variables and Their Measurement in the Pooled Data Set

Change In Food Prices: The annual percentage change in the BLS CPI for Food-at-Home for each MSA was calculated from the average annual price index published for each of 25 MSAs in the CPI detailed reports. These data are based on a sample of all food stores, and thus include a number of store types (e.g., convenience stores, meat markets, produce markets) that ideally would be excluded for purposes of this analysis. However, the prices of small stores and specialty markets receive relatively little weight in nearly all MSAs.

Depot Share Variables: Our hypothesis is that the emergence of a strong depot store strategic group(s) in a market results in lower food prices in that market. Since the lower prices charged by depot stores is not directly captured by BLS data, and since we are restricted to analyzing food price changes (not levels), our testable hypothesis is that markets with strong depot groups experience a reduction in food prices or a smaller increase in food prices compared to markets

without a significant depot store presence.

To test this hypothesis, five binary "dummy" variables were constructed to reflect the depot share[3] in a market in year t:

$0\% < D_1 \leq 5\%$
$5\% < D_2 \leq 10\%$
$10\% < D_3 \leq 20\%$
$20\% < D_4 \leq 30\%$
$30\% < D_5$

Change in Concentration: The linkage between market concentration and market prices has been well established by over 100 studies in a wide variety of industries (Weiss, 1989). The relationship between change in concentration and change in price has received much less attention. However, Kelton and Weiss found evidence of a long run relationship between changes in concentration and changes in prices in 458 U.S. manufacturing industries during 1958 to 1977. The linkage was particularly strong for 135 consumer goods product classes examined by Kelton and Weiss. The logical extension of the theoretical and empirical evidence that market concentration and prices are positively related is that *change* in concentration should be positively linked to change in prices. For this reason, a change in concentration variable was included in our model. Four-firm concentration ratios were calculated from shares reported by Metro Market Studies, with some adjustments.[4]

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[3]Depot shares were estimated using a variety of trade sources, including Metro Market Studies, Supermarket News, Market Scope, and others. The imprecise nature of the estimates obtained from such sources prevented us from constructing a reliable continuous measure of depot store shares.

[4]Since publication of Metro data lags collection of that data by one to two years, CR_4t was first calculated as the average of Metro $CR4_{t+1}$ + Metro $CR4_{t+2}$. The resulting figure was then adjusted by the ratio for that market: (1977 Census CR4)/ (1977 Metro CR4), or (1982 Census CR4)/(1982 Metro CR4), or (1987 Census CR4)/(1987 Metro CR4) or a combination of these ratios.

Change in Per Capita Income: Per capita income may influence store prices in at least two ways. First, demand is more inelastic in high income markets. This means that the monopoly price is higher in high income compared to low income markets. Second, as income per capita in an MSA increases, consumers are expected to shift their purchases towards higher priced products and towards stores with higher levels of service. Thus, we expect change in per capita income to be positively related to change in MSA prices.[5] The percentage change in personal disposable income was calculated using Sales and Marketing Management's (S&MM) estimate of "Effective Buying Income," as reported in the Annual Survey of Buying Power.

Change in Population: Change in population is a measure of growth in the MSAs examined. A faster rate of growth in population would be expected to expand demand and increase prices, all else the same. Rapid growth is likely to result in high capacity utilization. Conversely, slow or negative growth is more likely to encounter over capacity, greater rivalry and lower prices. Thus a positive sign is expected. We measure this variable by calculating the percentage change in population as estimated in S&MM's survey of buying power.

The following table shows the weights assigned to each coefficient of adjustment for all the years:

Year:	77	78	79	80	81	82	83	84 ...	87	88-92
Coef1: (C77/M77)	(1)	(.8)	(.6)	(.4)	(.2)	(.0)	(.0)	(.0) ...	(.0)	(.0)
Coef2: (C82/M82)	(.0)	(.2)	(.4)	(.6)	(.8)	(1)	(.8)	(.6) ...	(.0)	(.0)
Coef3: (C87/M87)	(.0)	(.0)	(.0)	(.0)	(.0)	(.0)	(.2)	(.4) ...	(1)	(1)

[5]Given the relatively short period of this empirical study and BLS methodology, it may not be possible to detect the expected positive relationship between price change and income change. For the five year periods between CPOPS surveys, the products and outlets on which BLS collects prices and the weights used are held constant. If consumers shift towards higher service stores as incomes increase, that will only be detected by BLS when a new CPOPS survey is conducted. Then--because of the bridging procedure followed, the shift in consumer patronage to high service-high priced stores (or low price stores) is not allowed to influence the change in CPI. Thus the nature of the BLS data set conceals certain effects of changes in income.

Change in Operating Costs: The combination of utility and rental costs account for 10-12 percent of grocery store operating costs and roughly 2 percent of grocery stores sales. As a proxy for the cost of these inputs to store owners, CPI data for fuels and for residential rent were combined to form an "energy plus rent" price index. The annual percentage change in this index was then calculated. The "energy plus rent" index was calculated as a simple average of the two price indices since grocery industry data show that utilities (excluding telephone service) accounted for roughly the same percentage of operating costs as did rent payments during 1978-1982 (Progressive Grocer, April 1983 p. 96). We expect that price changes for these inputs are similar for consumers and commercial purchasers. A positive relationship is expected.

Change in Labor Costs: By far the largest single operating expense for food stores is payroll, accounting for nearly 60 percent of operating expenses (Progressive Grocer 1985). Lamm and Wescott (1981) found changes in wages of food and grocery store employees to be a large and significant factor contributing to national changes in grocery prices over time. Such wage changes differ considerably across markets due to, inter alia, differing levels of unionization and union success in affecting wages (Lamm 1982; Harp 1979), and differing levels of unemployment.

The effects of changing wage rates on prices depends upon the extent to which productivity also changes. Thus, payroll per dollar of sales is preferred to wage rates as a measure of labor costs since it incorporates changes in wages, productivity and the mix of employees (part-time v. full-time). Change in labor costs were measured as the annual

percentage change in payroll as a percent of sales.[6]

Entry: In some markets, depot stores have been developed by supermarket firms already in the market. In other cases, depot stores were introduced by new entrants. In the latter cases, a new competitor is added to the market whereas in the former cases, only a new strategic group is added. We hypothesize that the response of the market will be different in the two situations. An entry dummy variable is included in most models to distinguish between the two methods of introducing depot stores and to also capture the effects of denovo entry by major supermarket firms. The dummy variable has a value of one for the year of entry and the following year. A negative sign is expected.

Empirical Results

A. Pooled Data Set

The pooled data set consisted of 374 observations: fifteen annual observations for 24 geographic markets for the years 1977-1992, plus fourteen annual observations for the Miami MSA (data for 1977 were unavailable). The average annual percentage changes in the Food-at-Home CPI for observations grouped by depot market share are shown in Table 1. On average, the percentage change in CPI tends to drop as depot store shares increase up to 20 to 30 percent of the market.

[6]Payroll data were calculated from Bureau of Census County Business Pattern data which reports gross wages and other compensation for civilian employees of food stores. The geographic areas for these data were generally identical to BLS areas. Sales data for each MSA and year were from S&MM Survey of Buying Power, which estimates sales of stores selling food primarily for home consumption.

The regression model estimated using the pooled data set was:

$$FOODP_{it} = \alpha + \beta_1 D1_{it} + \beta_2 D2_{it} + \beta_3 D3_{it} + \beta_4 D4_{it} + \beta_5 D_{5it} + \beta_6 \Delta CR4_{it} + \beta_7 E_{it} + \beta_8 \Delta INC_{it} + \beta_9 \Delta POP_{it} + \beta_{10} \Delta FRP_{it} + \beta_{11} \Delta PAYRAT_{it} + \beta_j Tj_t + e_{it}$$

where:

i,t = area, year subscripts;

	Expected Sign
FOODP = percentage change in BLS Food-at-Home price index expressed in decimals	
D0 = 1 if depot store share is 0	=0
D1 = 1 if depot store share is $0 < D_1 \leq 5\%$, 0 otherwise	<0
D2 = 1 if depot store share is $5 < D_2 \leq 10\%$, 0 otherwise	<0
D3 = 1 if depot store share is $10 < D_3 \leq 20\%$, 0 otherwise	<0
D4 = 1 if depot store share is $20 < D_4 \leq 30\%$, 0 otherwise	<0
D5 = 1 if depot store share is >30%, 0 otherwise	<0
ΔCR4 = change in CR4 expressed in decimals	>0
E = entry dummy which equals 1 if denovo entry by depot store or major supermarket firm occurred during year or during previous year	<0
ΔINC = percentage change in per capita disposable income expressed in decimals	>0
ΔPOP = percentage change in population expressed in decimals	>0
ΔFRP = percentage change in price index of energy plus rent in decimals	>0
ΔPAYRAT = percentage change in payroll/sales expressed in decimals	>0
Tj_t = 1 when year = t, 0 otherwise. An alternative variable, the change in the U.S. Food-At-Home CPI, was used in some models instead of the time dummies.	≠0

Table 1. Descriptive Statistics, Pooled Data Set

Depot Shares	D0 0	D1 $0 < D_1 \leq 5\%$	D2 $5 < D_2 \leq 10\%$	D3 $10 < D_3 \leq 20\%$	D4 $20 < D_4 \leq 30\%$	D5 >30%
Average Annual % ΔMSA CPI	6.11%	5.08%	4.04%	4.38%	1.95%	3.69%
Average Annual % ΔMSA CPI - ΔU.S.CPI	.156%	.009%	-.022%	-.275%	-.645%	-.085%
Average Annual % ΔCR4	2.25%	-.44%	2.29%	3.59%	-1.09%	-1.00%
# Observation	147	47	103	39	13	25
# Areas	18	17	16	10	5	3

The set of time-related dummy variables was introduced to control for the impact of other trend-related factors on food price such as inflationary expectations, recession, and worldwide price fluctuations. Without a time trend, these factors would be partially captured by the warehouse dummies since warehouse market share generally increases with time. The percentage change in the U.S. food-at-home CPI was used instead of time dummies in some models. The annual change in this index ranged from slightly over 10 percent to .7 percent during 1977-92.

Tests on OLS residuals showed a strong positive correlation between the logarithm of the squared residuals and the logarithm on the concentration ratio so that we may assume that Var $(e^2) = \propto + ß_o CR4$. For this reason, generalized least squares (GLS) was computed for all the models.

Regression results strongly support our hypothesis that the introduction of depot stores and the increase in their market share affected food prices negatively (Table 2). Whenever depot stores made significant inroads into a market, capturing a 5 to 30 percent share (D2, D3 and D4), food price increases were negatively affected. The similarity in the coefficients on D2 and D3 (especially in the GLS results) suggests that these two categories could be combined (5 to 20 percent).[7] The coefficient on D1 is not statistically significant, indicating that this level of penetration was insufficient to significantly affect prices market-wide.

For those few MSAs in which depot share exceeded 30 percent (D5), the market reaction to depot stores appears to have played itself out. We will have more to say about this later.

From a policy standpoint, one of the more interesting results is the strong positive impact of an increase in the four-firm concentration ratio on food price increases. A 10 percentage point increase in CR4 was associated, on average, with an increase in food prices of .30 percent.

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[7] If D2 and D3 are combined in Model A, the "t" value on this variable is -1.98 in the OLS regression and -1.68 in the GLS regression. Combining D2 and D3 has almost no effect on the other variables in Model A.

The entry variable also had the expected sign and was marginally significant. Thus, when depot stores were introduced into an MSA by denovo entry, the prices of incumbent supermarkets were negatively affected even more than when the depot stores were introduced by an incumbent retailer. Based upon the GLS coefficients, the entry effect on prices was roughly equal to depot stores capturing 20 to 30 percent of the market.

All of the yearly dummy variables are significant in Model A. There was considerable variation in average price change from year to year. For example, prices increased only 1.2 percent, on average, from 1982 to 1983, but rose 10.5 percent from 1978 to 1979. The remaining control variables were not significant.

B. Different Model Specification

Table 2 also provides regression results in which the time dummies are replaced with a variable measuring the change in U.S. CPI for food-consumed-at-home (Model B). This is an alternative way to control for the impact of some trend-related factors. The results using the full sample are similar to the results in Model A. Depot stores have a significant negative effect on the rate of MSA price increase when depot store share is between 5 and 10 percent and 20 and 30 percent percent. Again, the similarity between the coefficients on D2 and D3 suggests that these two categories can be combined.[8] Entry also has a marginally significant negative impact on price increases. Change in four-firm concentration has a significant positive effect as in Model A. The change in U.S. CPI for food-consumed-at-home has the expected strong positive relation to price changes in MSAs. Of the remaining variables, only the change in per capita disposable income was significant (both on OLS and GLS), and positive as hypothesized.

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[8] The GLS results for Model B when D2 and D3 are combined are very similar to the results shown in Table 2. The "t" value on D2 and D3 combined is -1.70; the coefficient is -.0032.

Table 2. Regression Analysis Explaining Annual Change in BLS Food-At-Home Prices in 25 Metropolitan Areas, 1977-1992[9]

	Model A.		Model B.	
Variable	OLS	GLS	OLS	GLS
D1	-.0015 (-.5819)	-.0015 (-.5697)	-.0014 (-.5269)	-.0014 (-.5256)
D2	-.0033 (-1.605)	-.0028 (-1.346)	-.0036 (-1.780)	-.0033 (-1.614)
D3	-.0037 (-1.361)	-.0028 (-1.021)	-.0033 (-1.204)	-.0028 (-1.023)
D4	-.0075 (-1.664)	-.0077 (-1.675)	-.0076 (-1.702)	-.0077 (-1.692)
D5	-.0007 (-.2057)	-.0001 (-.0035)	-.0005 (-.1567)	-.0003 (.0805)
ΔCR4	.0293 (1.928)	.0292 (2.006)	.0324 (2.176)	.0320 (2.204)
ΔINC	-.0005 (-.0189)	.0050 (.1992)	.0324 (1.787)	.0337 (1.859)
ΔPOP	.0087 (.2223)	.0105 (.2649)	-.0030 (-.0795)	-.0027 (-.0707)
ΔFRP	.0113 (.4558)	.0143 (.5735)	-.0004 (-.0210)	.0016 (-.0933)
ΔPAYRAT	-.0018 (-.1808)	-.0006 (-.0571)	-.0018 (-.1936)	-.0016 (-.1688)
ENTRY	-.0055 (-1.749)	-.0052 (-1.648)	-.0049 (-1.542)	-.0047 (-1.497)
T78	.0990 (20.31)	.0989 (20.26)		
T79	.1048 (20.06)	.1050 (20.06)		
T80	.0690 (12.13)	.0688 (12.06)		
T81	.0671 (12.60)	.0671 (12.60)		
T82	.0311 (6.342)	.0315 (6.399)		
T83	.0122 (2.709)	.0123 (2.719)		
T84	.0301 (6.649)	.0296 (6.589)		
T85	.0127 (2.892)	.0128 (2.921)		
T86	.0256 (5.917)	.0256 (5.906)		
T87	.0352 (8.058)	.0354 (8.133)		
T88	.0286 (5.854)	.0294 (6.020)		
T89	.0667 (15.17)	.0660 (15.21)		
T90	.0644 (15.07)	.0645 (15.11)		
T91	.0229 (5.301)	.0228 (5.257)		
ΔU.S. CPI			.9741 (32.23)	.9746 (32.23)
CONSTANT	.0057 (1.564)	.0048 (1.304)	.0008 (.3608)	.0004 (.1767)
R^2	.8298	.8293	.8183	.8181
R^2 adj	.8176	.8170	.8123	.8121

[9]1978-1992 for Miami

C. Sub-Period Analysis

Our regression results indicate that during 1977-1992, the presence of depot stores in metropolitan areas provided a downward pressure on market prices when those stores had captured 5 percent or more of MSA grocery store sales. We now want to test the hypothesis that this negative impact on prices was stronger during the first years of depot store entry into a market, and that after a certain period, this negative impact was lost. For that purpose, we divided our pooled data set into two periods, the first from 1977 to 1985 (n=199), and the second from 1985 to 1992 (n=175).

Table 3 shows the regression results. The model specification is the one used in Model B of Table 2 (includes change in CPI). The same analysis was done using the time dummy variables. Because the results were similar, it is not presented here.

The results for the first period are similar to those of Model B (full sample), although D2 loses its significance. However, depot shares of 10 to 30 percent have a significant negative effect on food price increases. Change in concentration and entry are statistically significant and have the same signs as in Table 2. The results change for the second period. The impact of depot stores declines as hypothesized; none of the depot dummies are significant. And, change in CR4 and entry become insignificant. Whereas during 1977-1985, prices in the 25 MSAs increased slower than the U.S. CPI, all else held constant, during 1985-1992, the reverse was true. Prices in the 25 MSAs increased 5 percent faster than for the total U.S., all else held constant. Perhaps what we are observing is catch-up price increases in these MSAs after eight years of below average price increases.

The results suggest a change in the response of these markets to depot stores. There were fewer differences across the 25 MSAs in price changes. We believe a new equilibrium developed.

Table 3. Two Period[10] Regression Analysis Explaining Annual Change in BLS Food-At-Home Prices in 25 Metropolitan Areas.

	First Period		Second Period	
Variable	OLS	GLS	OLS	GLS
D1	-.0005	-.0006	-.0057	-.0042
	(-.1860)	(-.2056)	(-1.125)	(-.821)
D2	-.0023	-.0023	-.0046	-.0031
	(-.8171)	(-.8028)	(-1.650)	(-1.140)
D3	-.0054	-.0053	-.0028	-.0010
	(-1.423)	(-1.387)	(-.734)	(-.273)
D4	-.0123	-.0123	-.0001	.0010
	(-2.241)	(-2.243)	(-.017)	(.137)
D5	.0016	.0016	-.0011	-.0001
	(.2192)	(.2160)	(-.272)	(-.029)
ΔCR4	.0473	.0469	.0107	.0112
	(2.334)	(2.329)	(.505)	(.573)
ΔINC	.0138	.0142	.0433	.0470
	(.4022)	(.4130)	(1.923)	(2.10)
ΔPOP	.0220	.0218	-.0124	-.0055
	(.4345)	(.4282)	(- .221)	(-.102)
ΔFRP	-.0125	-.0120	.0736	.0779
	(-.6112)	(-.5847)	(1.677)	(1.805)
ΔPAYRAT	-.0036	-.0036	.0046	.0051
	(-.3298)	(-.3307)	(.279)	(.313)
ENTRY	-.0111	-.0111	-.0030	-.0031
	(-2.177)	(-2.164)	(-.795)	(-.842)
ΔU.S. CPI	.9508	.9508	1.056	1.054
	(26.29)	(26.24)	(18.91)	(19.23)
CONSTANT	.0048	.0047	-.0032	-.0046
	(1.385)	(1.360)	(-.946)	(-1.381)
R^2	.8740	.8735	.6849	.7000
R^2 adj	.8659	.8654	.6647	.6808

[10]First Period: 1977-1985 (1978-1985 for Miami); Second Period:1985-1992.

Summary and Conclusions

The analysis in this paper indicates that metropolitan areas with a significant presence by depot stores experienced lower retail food price increases during the fifteen year period studied than did areas without warehouse store activity. The point at which this negative influence is exerted seems to vary some for different MSAs. No significant effect was found where depot stores had less than a 5 percent market share. In some MSAs, a negative effect was found when depot stores had 5 to 10 percent of the market. For all MSAs, however, the negative influence of depot stores became statistically significant when the depot store share was between 10 and 30 percent. The negative impact of depot stores on food prices occurred largely during the first half of the 15-year period. During the last half of the period, none of the depot store variables were significant although 4 out of 5 had a negative sign. Change in CR4 dropped to insignificance in the latter period as did the entry variable. Thus, there is evidence that the negative influence of depot stores eventually runs out of steam. Incumbent supermarkets may have learned how to survive with depot stores and still enjoy average price increases. A new equilibrium seems to have emerged.

The results are consistent with the hypothesis that depot stores constitute a strategic group that is sufficiently interdependent with other supermarket formats to be an important competitive force that increases rivalry and leads to substantial consumer benefits. The results provide at least modest support for Porter's hypotheses concerning the rivalry effects of strategic groups. Additional insights into the competitive behavior of retail food markets can be gained by considering the structure and conduct characteristics of strategic groups.

The results also support the hypothesis concerning the price effects of entry. Entry of a "significant competitor" had a consistent negative influence on food price increases in the two years

following entry. This effect was in addition to the impact of depot stores on prices.

The results also support the hypothesis that retail food prices are positively related to MSA concentration. Although in this case, change in retail prices was related to change in concentration, the main theoretical basis for testing such a relationship is that concentration and price are expected to be positively linked.

This finding takes on added significance given the "no relationship" findings of the USDA study (Kaufman and Handy, 1989) and the agnostic review of food retailing structure - performance studies by Anderson (1990). Because of the way the analysis was done, this study sheds some light on two of Anderson's concerns. Anderson contended that price comparison studies aimed at measuring market power must in some way deal with the possibility that, 1) costs may differ across markets and/or 2) that quality and service may vary across markets. While we disagree with Anderson's contention that these have been inadequately accounted for in previous studies, the present study avoids this criticism. Here we are examining the change in prices of the same market over time. BLS strives to hold quality/service constant over time. Two change-in-cost variables were included in our models. Both were insignificant at even the 10 percent level in the full-period models. Thus, our results find a positive linkage between concentration and prices even after holding costs and quality/service constant.

The results of this study are consistent with six other studies that found a significant positive relationship between grocery store prices and the concentration of sales in local markets (Marion et al 1979; Hall, Schmitz and Cothern 1979; Lamm 1981; Meyer 1983; Cotterill 1983; Cotterill 1986). The results are also consistent with Weiss's conclusions after his massive review of concentration-price studies in a wide variety of industries (Weiss 1989).

Our results do suggest that the presence of depot stores in MSAs must be accounted for in studying supermarket market power. Those studies that ignore the influence of depot stores are likely misspecified.

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