Price and Promotion Effects of Supermarket Mergers

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Abstract
Using a unique data set of transaction-level retail food sales, I find that food prices are negatively related to supermarket chains' shares of total US food sales. The negative relationship suggests that supermarket chains enjoy economies of scale or benefit from an improved post-merger bargaining position. In contrast, the regressions also show an increase in price after a merger which is independent from changes in observable control variables. Subsequent fractional logit analysis suggests mergers are associated with decreases in the frequency and depth of price-promotions. These latter effects suggest supermarkets enjoy greater unilateral pricing power post-merger, perhaps due to improved brand identity.

JEL Codes: L81, L11, D4

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1. Introduction

Mergers between some of the largest supermarkets in the US have resulted in sales concentrated among a few large firms and raised concerns about competitiveness. Because most retail food markets are local, anticompetitive effects of ownership concentration seem most likely to occur at that local level. At the same time, concentration of ownership through mergers may have effects beyond the local market if scale effects are important. Some argue supermarket mergers are driven by attempts to capture scale economies and to consolidate bargaining power over suppliers in order to better compete with new entrants into food retailing, including club-stores and "big-box" retailers (Balto, 1999; Kaufman, 1999; Kinsey,1998).

I use a unique data-set of retail food prices to analyze supermarket concentration of ownership at the national level. As chains merge, their share of national sales increases; a chain's share of the total retail food industry proxies for firm scale and bargaining position with suppliers. In reduced-form price regressions I find that chains with larger national-shares are associated with lower food prices. As in other merger studies, I include a merger dummy variable which, in contrast, suggests an independent increase in prices. An increase in cooperation between firms seems unlikely as regulators restrict changes in post-merger local-market structure. Instead I find evidence of unilateral strategic changes in pricing promotions; temporary price reductions (sales) decreased in depth and frequency following mergers explaining a portion of the post-merger increase in price. Supermarkets may have benefited from a stronger brand-identity post-merger which required less-frequent and smaller-price promotions.

2. Supermarket Mergers, Concentration of Ownership, and Food Prices

Measuring the effects of mergers is an important empirical question in industrial organization because mergers offer the possibility for counteracting effects. Mergers may increase market power and result in

higher prices for the good or service being offered. On the other hand, mergers may result in a more efficient, lower-cost entity and with sufficient competition from rivals, lead to lower prices. Despite the question's importance, relatively few studies have directly examined the effect of mergers on price, and most of those are of regulated industries such as airlines or banking (Pautler, 2001).

The empirical question in the supermarket industry seems especially intriguing. Mergers among some of the nation's largest food chains have left the industry with a few retailers with large shares of the national market and created concerns about competitiveness. However, competition between food retailers is largely local and local market shares have not been as dramatically affected as national shares (Kaufman, 2000).[1] While a merger may affect local competition as the strategic game changes, these changes cannot be approximated by changes in market concentration levels.[2]

Supermarket merger activity in the US peaked during the previous decade between 1997 and 1999. During these three years 3,492 stores with over $67 million in sales were acquired (Kaufman, 2000). This consolidation activity is reflected in nationwide four-firm concentration ratios (CR4) which increased from 15.9 in 1992 to 28.8 in 1998. However, local effects were more modest and the average CR4 in the largest 100 metropolitan areas increased only 3.7 percentage points between 1992 and 1998 (Kaufman, 2000). Small increases in local concentration reflect efforts of the Federal Trade Commission (FTC) to restrain the anti-competitive effects of mergers by focusing on local-market shares. In many instances, the FTC required acquiring firms to divest their own stores, or sell acquired stores when there was substantial market overlap between chains.[3]

Mergers among supermarkets may be a reaction by these traditional food retailers to increased competition from non-traditional entrants into food retailing – including club stores and supercenters (Tucker, 2003). When acquiring other chains, food retailers frequently cite the need to exploit efficiencies through economies of size in order to improve their competitive position relative to discount

[1] The Federal Trade Commission examines expected post-merger HHIs in local markets to determine whether to challenge a proposed merger or to require store divestitures (Simpson and Hosken, 2001).
[2] Vita and Sacher (2001) suggest that this may explain the relative dearth of merger/ price research. FTC actions apparently reduce the likelihood of increased post-merger coordination.
[3] Balto (1999) notes the divestitures required by the FTC.

retailers (Balto, 1999). Wal-Mart is now the US' largest food retailer. Other supercenters and club stores continue to encroach on supermarkets' share of total food sales. Food sales at warehouse club stores and supercenters were estimated at 2.4 percent of all at-home food expenditures in 1990, while supermarkets garnered a 61.2 percent share. In 2002, the share of food sales at warehouse clubs and supercenters had increased to 8 percent, and the share of sales at supermarkets had decreased to 57.8 percent in (ERS, 2002). Wal-Mart seems an increasingly important competitor as their efficient supply chain and their bargaining position with suppliers allows them to pass their lower costs to consumers as lower prices (*Business Week Online).*

A search for size economies, supply efficiencies, and an improved bargaining position with suppliers may be a motivation for supermarket consolidation. Some suggest reducing costs is a strategy supermarkets have employed to adapt to the new competition (Kaufman, 2000; Kinsey, 1998). Kaufman (1999) suggests several sources of efficiencies that consolidating food retailers may encounter, including reductions in operating, procurement, marketing, and distribution costs. Implicit in this argument is that costs decrease as chains' grow in scale. The veracity of cost declines remains in question, as to my knowledge no studies have examined the issue.

Studies that have explicitly examined the effect of supermarket mergers on food prices include Park and Weliwita (1999). The authors use data from 1967 through 1992 to examine the effect of merger activity on equilibrium quantities and prices, and find that merger activity decreased industry output by about 1.8%. Simpson and Hosken (2001) conduct an event study analysis of stock prices to examine six supermarket mergers in the late 1980s and early 1990s. They find little evidence that mergers increase stock prices. Chevalier (1995) finds that retail food prices increase following a leveraged buyout (LBO), if rival firms are highly leveraged. However, prices fall following an LBO if rivals are not highly leveraged and if there is a single large competitor with low leverage.

A related literature examines the relationship between food prices and concentration in local markets.[4] Cotterill, (1986) uses a cross-section of Vermont supermarkets and finds a significant positive relationship between market concentration and food store (supermarket and grocery store) prices. Lamm (1981) also finds a positive relationship between price and market concentration. In contrast, a study by Kaufman and Handy (1989) find a negative relationship between price and concentration. Similarly, Newmark (1990) did not find a relationship between price and market concentration. Binkley and Connor (1996) examine competition from new sources and conclude that competition from new store formats (warehouse stores, superstores) and others including fast food restaurants affect grocery prices. Marion (1998) also finds that markets with substantial warehouse stores experienced smaller price increases than did areas with no warehouse club stores.

3. Theory

I follow Stewart and Davis (2005) to motivate an empirical model of spatial competition. I assume there are M markets with aggregate demand for food in each market represented by D_m. Aggregate demand varies with the number of consumers in each market and with social and demographic characteristics. Consumer's pay the retail price of food, but also incur a transportation, or search, cost for travelling to a retail outlet. I let N_m denote the number of stores in market m and let T_m denote a vector of variables capturing transportation costs in market m. I assume there is a fixed cost of establishing a store within a market, and denote that cost as C_m. N_m is decreasing in C_m, but increasing in T_m and D_m. In general,

$$N_m = N(C_m, D_m, T_m). \quad (1)$$

Demand at food store j, in market m is represented as a price relation. Prices are a function of marginal costs, $MC_{j,m}$, T_m and N_m,

[4]FTC merger analysis examines expected increases in concentration, because increases in concentration are thought to indicate increases in the ability of firms to coordinate activities. In merger reviews, the FTC also examines other theories of competitive effect including unilateral effects. "In unilateral theories, the merged entity has unilateral ability profitably to increase its prices" (Coleman, Meyer, and Scheffman, 2003).

$$P_{j,m} = P\left(MC_{j,m}, T_m, N_m\right). \quad (2)$$

In equation 2, price is increasing in marginal costs, and transportation costs, but decreasing in the number of stores.

I substitute equation 1 into equation 2 to get a reduced form equation for price,

$$P_{j,m} = P\left(MC_{j,m}, T_m, C_m, D_m\right). \quad (3)$$

In equation 3, there is a direct relationship between price, marginal costs, and fixed costs. Higher fixed costs imply fewer stores, less competition, and higher prices. The relationship between price and transportation costs is ambiguous. Higher transportation costs imply higher search costs, which allow stores to increase prices. But, higher transportation costs imply more stores, and thus lower prices. Market demand is inversely related to price; increases in demand increase the number of stores, which lowers price.

4. Data and Variables

The empirical specification is further motivated by previous merger studies. Taylor and Hosken (2004) note that there are three types of reduced form regressions most frequently used to analyze pre- and post-merger prices. The first regresses the merged firms' prices on the prices of a comparison group of firms that were not affected by the merger, a merger dummy variable, and time controls (e.g., Kim and Singal, 1993). A second regresses the merged firms' prices on a merger dummy variable with cost and demand controls. A third approach combines the first two and regresses the merged firm(s)' prices, relative to those of an unaffected comparison group, on relative cost and demand variables and a merger dummy variable (e.g., Vita and Sacher, 2001). I follow in this tradition and use reduced form equations to analyze mergers, measuring effects relative to a control group of non-merging firms.

4.1 Product Data

The source for product data is a detailed store-level supermarket data set from Information Resources Inc., (IRI). This data set is a record of weekly store-level sales of food items by Universal Product Code (UPC) and includes information for beverage and dairy products.[5] After eliminating drug stores and stores without complete data, weekly UPC item sales are recorded at 121 stores, in 23 metropolitan areas, for 156 weeks from the first week in 1997 through the last week in 1999.[6] Stores are identified by their chain affiliation and other variables include the price of the items sold and several product descriptors. The data also include information on the incidence and depth of price promotions for UPC items. Initial analysis focuses on price effects, while subsequent analysis examines the depth and frequency of temporary price reductions (TPR). TPR depth and frequency calculation are detailed later.

It is important to control for cost and demand shocks that may be correlated with the timing of a merger to isolate the effect of mergers. The data do not include high-frequency, weekly, store-specific cost variables, so I instead define a control group of supermarkets, not affected by merger, that face similar cost conditions. I first create time series of price observations for each UPC item at each store, restricting the sample to include only items with observations at a store for at least 153 weeks.[7] Next, I calculate an average-weekly price for the category (e.g., butter, carbonated beverages, etc.) to which an item belongs using observations at chains that do not merge at any time during the sample period. The weekly price of each item is divided by its weekly-average category price. The price variable measures the price of an item, relative to the average-weekly price of its category, which was calculated from the comparison group of non-merging chains. For a typical item i from a given category, at store j, during week t,

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[5] The UPC items belong to one of 19 categories: aseptic juice, baby formula, canned juice, concentrate juice, isotonics, non-fruit drinks, powdered milk, tea, butter, creams and creamers, frozen juice, ice cream, milk, natural cheese, refrigerated juice, carbonated beverages, shelf-stable juice, water, yogurt.

[6] The 23 MSAs are Pittsfield, MA; Eau Claire, WI; Midland, TX; Visalia, CA; Grand Junction, CO; Cedar Rapids, IA; Los Angeles, CA; New York, NY; Chicago, IL; Memphis, TN; Houston, TX; Pittsburgh, PA; Seattle/Tacoma, WA; Detroit, MI; St. Louis, MO; Kansas City, MO; Boston, MA; San Francisco/Oakland, CA; Tampa/St. Petersburg, FL; Minneapolis/St. Paul, MN; Denver, CO; Philadelphia, PA, and Atlanta, GA.

[7] All UPC items are converted to a price per-ounce.

$$RP_{i,j,t} = \frac{P_{i,j,t}}{\left(\frac{\sum_{i=1}^{n} P_{i,j,t}(\forall j \in NM)}{n} \right)} \tag{4}$$

where the denominator is the average price at non-merging (NM) stores for the category to which item i belongs.

Each item in the price calculation is identified as either a national brand or a private-label (store) brand. National-brand items are measured relative to the item's category average using only national brand items from non-merging stores. Private-label items are treated analogously.

I average this relative price for each store each week, and multiply it by 100, essentially creating a store specific, weekly-price index.

$$\overline{RP}_{j,t} = \frac{\sum_{i=1}^{n} RP_{i,j,t}}{n} * 100 \tag{5}$$

I create three different price series for each store, private-labels, national brands, and all products in aggregate.

An item's category average proxies for the item's cost and is unaffected by mergers since it is calculated from non-merging stores. Relative price differences across stores will be a function of differences in store-specific marginal costs, market transportation costs, market fixed costs, and market demand characteristics. The empirical model includes controls for each of these. If mergers affect prices, then I expect the relative price to change post-merger. An increase suggests prices increased relative to costs post-merger, whereas a decrease suggests prices decreased relative to costs post-merger.

4.2 Merger Variables

The data include store identifiers and the store's chain affiliation.[8] I use the chain-affiliation data to identify the stores in the data set that were part of a merger as either an acquiring or target chain. Table 1 notes the dates for mergers that occurred in the supermarket industry for the time period covered by the data (1997 through 1999) and that coincide with chains included in the data set.[9] I wish to test whether mergers create efficiencies, improve bargaining position, or lower costs leading to price reductions. I expect mergers must be of sufficient size to generate these effects and so restrict the analysis to large mergers. Supermarkets frequently acquire individual stores from other chains or other small chains, but this study analyzes mergers in which over 100 stores changed ownership.

I define a merger-dummy variable (Merge=1) to control for unobservable merger effects. A merger may improve efficiency apart from increases in scale, or mergers may affect the ability of chains to unilaterally change prices. Mergers may also affect pricing or promotional strategies played between competing chains in local markets. The merger-dummy variable takes a value of zero for all weeks at stores that never merge, a value of zero at stores that do merge in the weeks prior to a merger, and a value of 1 for all post-merger observations.

Merger effects are also measured by a chain's share of national supermarket sales (National Share). I expect this variable to capture the effect of scale economies and changes in a chain's bargaining position with suppliers. As chains grow larger, their bargaining position with suppliers likely improves which allows them to lower their acquisition costs (Skitol, 2002). Competition between supermarkets occurs at a local level and so a chain's share of the national market is unlikely to capture market power.

Progressive Grocer's *Marketing Guidebook* reports supermarket sales for chains and for each chain's subsidiaries. Prior to a merger between chains, each chain has its own national sales value. After the merger, the new entity's sales are the sum of the sales of both merging entities. Dividing sales by

[8] Chain names do not always indicate ownership. I used Progressive Grocer's Marketing Guidebook to match chain names with the appropriate ownership.
[9] Merger dates are taken from Mergerstat, Supermarket Annual Reports and Press Releases, and media reports.

national supermarket sales completes the calculation of chains' national shares. Chains' national shares vary from two sources, growth and merger.

Table 1. Merging Supermarket Chains

Chain Name	National Share Before Merger	Merged with:	National Share Before Merger	Merger Date	National Share after Merger
Safeway	3.52	Vons	1.59	04/01/97	5.10
Safeway	5.15	Dominicks	0.74	11/20/98	5.89
Safeway	6.60	Randalls (Houston)	0.72	09/01/99	7.32
Ahold	4.68	Giant Food Inc.[a]	0.89	10/28/98	5.57
Ralphs	1.46	Fred Meyer[b]	1.60	11/7/97	3.37
Quality Food Center	0.31	Fred Meyer	1.60	11/7/97	3.37
Kroger	7.28	Fred Meyer	3.60	05/27/99	10.88
Albertson's	4.45	American Stores	3.95	06/23/99	8.40

4.3 Local-Market Demand and Cost Variables

I create several high-frequency store-level variables. A data set of household purchase transactions complements the product-level data set described above. This data set is from a separate, but related, file from IRI.[10] It includes data for purchases made by households at the stores included in the store-data set. Its benefit for the current purpose is that it includes several demographic variables for the households that make purchases at the stores in the store-data set. For each store, I calculate the following weekly

[10] IRI contracts with numerous supermarkets and matches store-level scanner data with IRI's data on household characteristics. Households are tracked by a "club-card" that they swipe each time they make a purchase at a supermarket. The data include three types of files, household purchase transactions, store-level price data, and household demographic data. I use data from the latter two files for prices, promotions, and household characteristics.

variables: average household income, the percent of households identifying their race as African American, the average age of the household head, and the proportion of households without children.[11] These variables capture store-specific transportation or search costs. For example, households with higher incomes likely have higher search costs, and are likely to be less-price sensitive. Older customers, and households with children, are likely to have lower search costs, and to be more price-sensitive. While the percent of African-American households is not directly suggested by the theoretical model, I include it as a regressor in order to make comparison with previous studies that examine price discrimination based on race.

I include total market income (Total Income), measured at the MSA level, to control for aggregate market demand and market size. As total income increases, aggregate demand increases, which increases the number of stores. However, Ellingson (2006) shows that the supermarket industry may be characterized as a natural oligopoly, where the number of stores does not necessarily increase with the size of the market. Instead, supermarkets increase store size in larger markets. According to Ellingson, an increase in market size does not imply a decrease in price. Instead, an opposite effect may result. Larger markets may result in larger, but fewer stores, implying higher equilibrium supermarket-prices.

I control for market fixed-costs with a proxy for real-estate costs measured by residential rental rates. Rental rates (RENT) come from the Department of Housing and Urban Development (HUD). Each year HUD publishes a measure of "fair market rents" for MSAs. Fair market rents are the rent level below which 40 percent of "standard-quality" rental units are rented. Higher fixed costs should result in fewer stores and higher prices.[12]

Trade Dimensions collects sales data on supermarket chains by metropolitan statistical area (MSA) annually and publishes data summaries in *Market Scope*®. I use *Market Scope*® data to create a chain-specific proxy for store size by taking a chain's annual sales in an MSA divided by the chain's total

[11] Household income is reported as a categorical value in the data. I convert the categorical data to a continuous value by assigning each household the mid-point income from the appropriate range of incomes. The highest income range was $100,000+. For these households, I assigned a value of $200,000.

[12] Some studies (e.g., Stewart and Davis; Ellingson) use a measure of housing price to proxy for fixed cost. Rental rates should closely track housing prices.

number of stores in the MSA (Average Store Size). I expect that chains with large store sizes will have lower acquisition and operating costs, and therefore lower prices.

Using chain names, I am able to identify which stores are characterized as "discount" stores, or stores that offer fewer amenities and services than full-service supermarkets. I include a dummy variable for these types of stores (Discount). I expect a negative relationship between the discount dummy and price, since discount stores should have lower costs, and lower prices than full-service stores.

Each chain's share in an MSA is available from a proprietary data set from Trade Dimensions (Own Share). Own share captures the effect of search costs. A chain with a large local footprint implies fewer alternatives for consumers; search costs are higher and I expect higher prices. I include the food-market shares for a large non-traditional food retailer, Wal-Mart which was capturing increasing proportions of food sales during the late 1990s.

4.4 Promotion Variables

The data also indicate which items were on sale and the depth of the price discount. I use the designation temporary price reduction (TPR) instead of sales to avoid confusion with the other common use of the word in which it indicates total revenue (e.g., total sales). I measure promotion depth by averaging temporary price reductions at each store, each week, for the items included in the data (TPR Depth). To measure frequency, I sum the number of items on promotion ("on sale") in a week at a store. Where "sale" is defined as any item for which TPR is greater than zero. I divide this number by the total number of items at that store, giving the proportion of items on sale at that store in a given week (TPR Frequency).

5. Data Summary and Statistics

The original data set included 8,746,763 weekly UPC- observations. I eliminated UPC items at a store if they were not recorded at that store for at least 153 weeks, which left 4,220,882 observations. I then calculated weekly averages for each store providing a panel of 156 weekly observations at 121 stores, or 18,876 observations.

I expect that retailers use different pricing strategies for national-brand products and private-label products, and I constructed separate data sets for them. I was able to calculate a complete data set for national brands with 18,876 observations, but 5 stores were completely devoid of any valid private-label observations, and other stores were missing private-label observations for 3 other weeks, leaving only 18,093 private-label observations. National brands represent the majority of observations with 191.72 useable items per store, while there were only 23.38 useable private-label items per store.

Summary statistics are in table 2, which also shows the between and within standard deviation for each variable. The average national-share is 3.11 percent, but ranges from less than .01 percent to 10.88 percent. TPR depth averages only 3.8 percent, but ranges from 0 to 25.2 percent. About 19 percent of items are offered "on sale" on average each week. Table 2 shows that several variables have relatively little within store variation (e.g., HH head Age, Rent, Total Income, Own Share) as compared to between store variation which has implications for the estimation strategy.

Figure 1 shows the all-products weekly-average relative price for 1997 – 1999. The data are divided into observations from stores that merged (Merge firms) and from stores that did not merge (Non Merge firms). In figure 1, merging stores' prices are trending upward. At first glance the trend may seem to be evidence of post-merger price increases, perhaps due to market power. But, the trend may pre-date mergers and another possibility is that the trend is caused as these chains are updating their stores in a form of non-price competition with large discount retailers. The notion that stores are updating to compete is frequently noted. Binkley and Connor (1998) note this form of non-price competition, and Bonanno and Lopez (2009) note that supermarkets are increasing services offered which they show

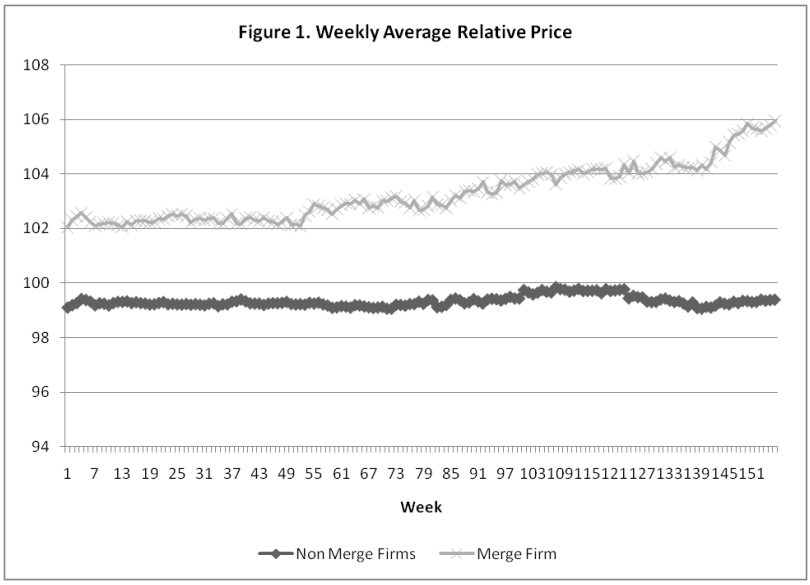
results in more market power and higher milk-prices. If chains are updating and adding services to appeal to consumers, then prices likely also increase from increased costs and market power. Failing to control for these changes may bias merger variables upward. Because I lack detailed store-level cost data, I

Table 2. Summary Statistics

Variable	Variation type	Mean	Std. Dev.	Variable	Variation type	Mean	Std. Dev.
Relative Net Price	Overall	101.18	11.54	Rent (x 100 $)	Overall	6.06	1.56
	Between		11.18		Between		1.55
	Within		3.07		Within		0.25
Relative Shelf Price	Overall	101.10	11.33	Total Income (x 100 mil $)	Overall	1185.38	1599.02
	Between		11.18		Between		1602.47
	Within		2.11		Within		100.22
TPR Depth	Overall	3.80	2.66	Own (Local) Share	Overall	24.34	17.97
	Between		1.71		Between		17.94
	Within		2.04		Within		1.91
TPR Frequency	Overall	18.79	11.84	Average Store Size (x 1 mil. $)	Overall	18.90	7.49
	Between		7.28		Between		7.31
	Within		9.36		Within		1.79
Average Income	Overall	44.46	11.19	National Share	Overall	3.11	2.92
	Between		10.56		Between		2.69
	Within		3.82		Within		1.16
HH head age	Overall	45.68	3.69	Discount = 1	Overall	0.12	0.32
	Between		3.15		Between		0.32
	Within		1.95		Within		0.00
PCT w/o kids	Overall	57.99	11.45	Merge Firm = 1	Overall	0.45	0.50
	Between		9.82		Between		0.50
	Within		5.95		Within		0.00
Afr. Amer. Pct.	Overall	6.19	11.22	Merge	Overall	0.16	0.37
	Between		10.83		Between		0.26
	Within		3.11		Within		0.26
Wal-Mart Share	Overall	2.41	4.32	Trend	Overall	35.03	49.27
	Between		3.80		Between		39.19
	Within		2.09		Within		30.08
				Merge x Trend	Overall	8.71	26.37
					Between		18.37
					Within		18.99

create a linear trend variable to control for these unobservable (to the econometrician) changes. In Figure 1, merging stores' average prices are higher than non-merging stores. This may result from higher store

costs, or from merging stores offering a different, higher priced, mix of products. I include a dummy variable in the regressions that follow to account for overall higher prices at merging firms (Merge Firm=1). The variable takes a value of one for each observation at stores from merging firms and zero for all observations from stores that never merge.



6. Empirical Model

I assume a linear relationship between price and all independent variables and use a difference-in-difference like approach to estimate merger effects. A difference-in-difference model can be written

$$p_{j,g,t} = \lambda_t + \alpha_g + x'_{j,t}\beta + m'_{g,t}\gamma + v_{j,t} \quad (6)$$

where λ_t is a time effect (time trend), α_g is a group effect (Merge Firm =1), $p_{j,g,t}$ is relative price at store j in group g, $x_{j,t}$ is a vector of store-specific exogenous variables, $m_{g,t}$ is a merger dummy variable, $v_{j,t}$ is a disturbance term, and β and γ are parameters to estimate. Stores belong to one of two groups, the first consists of stores that never merge, and the other group is of stores that merge at some point during the sample period.

The dependent variable is measured relative to an item's category mean from non-merging stores which eliminates time effects for non-merging stores. I define time effects for merging stores with a time-trend. A group effect is defined with the Merge Firm dummy variable.[13]

In equation 6, β and γ are identified from time-series and cross-section variation in the data. An alternative estimation method would use a panel-data fixed-effects estimator in which parameters are identified by within-store variation only. Data considerations suggest against the fixed-effects estimator. Many independent variables, including National Share, have relatively little within-store variation (table 2). While the fixed-effect estimator is consistent, it ignores between variation when identifying estimates which can make them unreliable in the face of little within variation (Plumper and Troeger, 2009). And, some authors have shown that pooled OLS provides reliable estimates of long-term relationships between variables (Baltagi, 2000). The difference-in-difference method controls for heterogeneity between merging and non-merging stores, but is otherwise a pooled OLS estimator.[14]

Bertrand, Duflo, and Mullainathan (2004) show that serially correlated errors in difference-in-difference models can dramatically affect standard errors and hypothesis tests. I test for within-store serial correlation using the method suggested by Wooldridge (2002, 282-83) and test for heteroskedasticy using a likelihood ratio test comparing maximum likelihood results from iterated GLS with heteroskedasticity to iterated GLS with homoskedasticity. I find evidence that serial correlation and heteroskedasticity are present. Following the suggestion of Bertrand, Duflo, and Mullainathan I correct standard errors using a cluster-robust sandwich variance-covariance estimator that is robust to arbitrary within correlation and hetereoskedasticity (i.e., clustering).

I conduct subsequent analysis using TPR depth and TPR frequency as dependant variables. TPR depth and frequency are measured as proportions. I adopt the method suggested by Papke and Wooldridge

[13] Normally in difference-in-difference models, time effects are interacted with the group effect. However, here the dependent variable is relative to the "control" group and so time effects in the control group are accounted for in the dependent variable. I also interact the time effect with the merger effect in an alternative empirical specification, as is the norm in difference-in-difference models.

[14] Plumper and Troeger (2007) suggest a fixed-effects vector decomposition method when some variables are rarely changing in panel data. However, recent work suggests against the appropriateness of this method (Greene, 2010).

(1996) and estimate a fractional logit model for cross-section data. A fractional logit model has advantages over other alternatives. For example, the traditional log-odds ratio method disallows the dependent variable taking a value of zero or one, and other methods impose questionable distributional assumptions (Papke and Wooldridge, 1996).[15]

7. Merger Effects: Price

It is not clear the best price to examine because TPRs, or "sales," are frequently implemented in supermarkets. It is possible that mergers affect the depth or frequency of TPRs, and effects may differ between shelf prices and net prices (shelf prices, net of temporary price reductions). I present results when each is used as the dependent variable in the tables below.

Table 3 presents results for two specifications for each of the product designations (all products, private-label, nationally branded) using relative net price as the dependent variable. Table 4 presents results using shelf price as the dependent variable. The first column for each product designation is the least restricted specification and includes a merge-trend interaction variable (Merge x Trend). The second column eliminates the merge-trend interaction. In general, control variables have the expected signs or are not significant. Some control-variable coefficients are notable and are discussed after key merger results.

A key finding is the negative and significant coefficient for national share in every specification in every price table. The coefficient is relatively large and suggests that when a chain's national share increases by 1 percent prices decrease by about 1-2 percent. The result provides support for the notion that larger firms benefit from scale economies and are more able to bargain for better terms from manufacturers and then pass these concessions to customers as lower prices.

The merger-dummy coefficient is positive, significant, and relatively large in all specifications. A post-merger price increase is not necessarily expected since mergers did not increase local-market

[15] Papke and Wooldridge (2008) extend their earlier work to panel-data applications. However, as mentioned a shortcoming of the data in this analysis is the lack of within cross-section variation in many variables and so I do not use a panel data approach.

concentration. Traditional theories of market conduct that suggest structure determines performance would not predict a change in pricing behavior. Here, the evidence suggests supermarkets may have unilaterally changed pricing strategies post-merger which resulted in higher prices. Mergers may result in an improvement in brand identification; in effect all customers become more price-insensitive post merger allowing merged firms to raise price. Mergers generated considerable "free" advertising from articles in newspapers, and some chains changed names post-merger (Los Angeles Business Journal, 1999).

Table 3. Net price regression

	All products		Private Label		Nationally Branded	
National Share	-1.754***	-1.756***	-2.0046***	-2.0103***	-1.6722***	-1.6745***
	(0.4514)	(0.4528)	(0.5209)	(0.5187)	(0.4608)	(0.4624)
Merge=1	3.992**	4.997**	5.8728**	8.2936**	3.8517**	4.8805**
	(1.6050)	(2.0902)	(2.3291)	(3.1472)	(1.5992)	(2.0764)
Trend	0.0486***	0.0515***	0.0473**	0.0544***	0.0464***	0.0494***
	(0.0154)	(0.0139)	(0.0211)	(0.0188)	(0.0152)	(0.0138)
Merge x Trend	0.0217		0.0518*		0.0222	
	(0.0178)		(0.0271)		(0.0178)	
Average Store Size	-0.223**	-0.225**	-0.7875***	-0.7918***	-0.2233**	-0.2252**
	(0.0946)	(0.0948)	(0.2096)	(0.2080)	(0.0963)	(0.0964)
Discount Store=1	-5.346**	-5.321**	-9.7275***	-9.6690***	-5.4818**	-5.4563**
	(2.0936)	(2.0886)	(2.6950)	(2.7190)	(2.2170)	(2.2120)
Rent	0.740	0.7652	1.3511	1.4073	0.7793	0.8050
	(0.6955)	(0.7048)	(0.9560)	(0.9648)	(0.7037)	(0.7147)
Total Income	0.004***	0.0036***	0.0010	0.0010	0.0036***	0.0036***
	(0.0006)	(0.0006)	(0.0008)	(0.0008)	(0.0006)	(0.0006)
HH head age	0.227	0.2245	-0.0813	-0.0907	0.2602	0.2579
	(0.1849)	(0.1845)	(0.2040)	(0.2013)	(0.1946)	(0.1943)
PCT w/o kids	-0.057	-0.0577	-0.0298	-0.0313	-0.0624	-0.0632
	(0.0594)	(0.0593)	(0.0610)	(0.0616)	(0.0629)	(0.0627)
Average income	0.133**	0.1334**	0.0994	0.1004	0.1379**	0.1381**
	(0.0602)	(0.0603)	(0.0651)	(0.0662)	(0.0627)	(0.0628)
African Amer. Pct.	-0.173***	-0.175***	-0.1939***	-0.1997***	-0.1444**	-0.1467**
	(0.0659)	(0.0661)	(0.0637)	(0.0635)	(0.0679)	(0.0682)
Walmart Share	-0.099	-0.1028	-0.1991	-0.2108	-0.1078	-0.1122
	(0.1078)	(0.1087)	(0.2016)	(0.2045)	(0.1091)	(0.1100)
Own Share	0.0878*	0.0889*	0.1780***	0.1806***	0.0935*	0.0947*
	(0.0475)	(0.0478)	(0.0610)	(0.0611)	(0.0487)	(0.0491)
Merge Firm=1	4.299*	4.1087*	0.4671	0.0083	4.2292*	4.0339*
	(2.2852)	(2.2489)	(3.0992)	(3.0217)	(2.2941)	(2.2615)
Constant	84.44***	84.49***	92.3895***	92.6665***	83.3832***	83.4319***
	(8.6180)	(8.7202)	(10.3908)	(10.4266)	(9.0194)	(9.1248)
Observations	18,876	18,876	18,093	18,093	18,876	18,876
R-squared	0.5429	0.5419	.3126	.3090	.5272	.5262

*** p<0.01, ** p<0.05, * p<0.1

Standard errors in () robust to arbitrary within correlation and heteroskedasticty (clustering)

Also interesting is the negative and significant coefficient on the African-American percent variable. Some previous studies have examined racial discrimination in food pricing (e.g., Graddy, 1997; Hayes, 2000). The results here suggest against racial discrimination and instead point to more price sensitive African-American customers. Rent is always positive and frequently significant, suggesting fixed costs reduce the number of stores in a market which results in higher prices. Own chain share is always positive and frequently significant, which suggests that when a chain's total sales in a market are large relative to its rivals its stores have the ability to charge higher prices. However, the average store size coefficient is negative and significant suggesting that chains with larger sized-stores have lower prices. Similarly, prices at discount stores are lower than at full-service stores, but discount stores seem to discount price more for private-label products as compared to branded products. As expected, prices at merging firms are higher than at non-merging firms.

Table 4 presents results from using shelf-price as the dependent variable. Estimates are very similar to those in table 3. However, the merger dummy coefficient is slightly larger in the specification in table 4 suggesting that mergers may have affected TPR activity, a topic addressed in the next section.

8. Merger Effects: Promotion

Temporary price reductions ("sales") are frequently observed in retail grocery markets, but there are many theoretical motivations for their occurrence. Some consider the primary driving force to be price discrimination between (at least) two customer types. The first type is least price sensitive because of, for example, high search costs or high inventory costs. The second is more price sensitive with opposite characteristics as the first group. Retailers discriminate between groups by offering TPRs to attract the more price sensitive customers, but charge a higher (regular) price to other customers with low price sensitivity. Varian (1980) is the seminal article modeling TPRs as a price discrimination method between informed and uniformed consumers and showing that firms may randomly change prices in every period and the informed consumers purchase from the low price seller. Pesendorfer (2002) shows evidence that

Table 4. Shelf price regression

	All products		Private Label		Nationally Branded	
National Share	-1.685***	-1.685***	-2.03***	-2.033***	-1.598***	-1.598***
	(0.4238)	(0.4238)	(0.5430)	(0.5410)	(0.4315)	(0.4315)
Merge=1	3.7758**	3.5636*	6.0979***	7.6203**	3.6566**	3.4660*
	(1.4166)	(1.8920)	(2.2143)	(3.0775)	(1.4247)	(1.8809)
Trend	0.0409**	0.0403***	0.0439**	0.0484***	0.0378**	0.0372***
	(0.0142)	(0.0126)	(0.0201)	(0.0175)	(0.0140)	(0.0125)
Merge x Trend	-0.0046		0.0326		-0.0041	
	(0.0178)		(0.0283)		(0.0175)	
Average Store Size	-0.2115**	-0.2111**	-0.805***	-0.808***	-0.2106**	-0.2103**
	(0.0932)	(0.0931)	(0.1916)	(0.1907)	(0.0941)	(0.0940)
Discount Store=1	-5.673**	-5.678***	-10.15***	-10.12***	-5.798***	-5.803***
	(2.0043)	(2.0031)	(2.7350)	(2.7486)	(2.1133)	(2.1122)
Rent	0.3648	0.3595	1.0897	1.1250	0.4094	0.4047
	(0.6997)	(0.6920)	(0.9634)	(0.9627)	(0.7066)	(0.7001)
Total Income	0.0039***	0.0039***	0.0012	0.0011	0.0039***	0.0039***
	(0.0006)	(0.0006)	(0.0008)	(0.0008)	(0.0006)	(0.0006)
HH head age	0.2720	0.2725	0.0110	0.0050	0.3033	0.3037
	(0.1876)	(0.1873)	(0.2166)	(0.2141)	(0.1965)	(0.1963)
PCT w/o kids	-0.0735	-0.0733	-0.0380	-0.0389	-0.0802	-0.0800
	(0.0611)	(0.0612)	(0.0648)	(0.0653)	(0.0648)	(0.0648)
Average income	0.1511**	0.1511**	0.1204*	0.1211*	0.1559**	0.1559**
	(0.0585)	(0.0585)	(0.0652)	(0.0659)	(0.0610)	(0.0610)
African Amer. Pct.	-0.178***	-0.178***	-0.197***	-0.200***	-0.1490**	-0.1486**
	(0.0627)	(0.0625)	(0.0652)	(0.0647)	(0.0643)	(0.0641)
Walmart Share	-0.0668	-0.0658	-0.2125	-0.2198	-0.0730	-0.0721
	(0.1056)	(0.1060)	(0.1926)	(0.1946)	(0.1058)	(0.1061)
Own Share	0.0671	0.0668	0.1551**	0.1568**	0.0745	0.0743
	(0.0477)	(0.0475)	(0.0625)	(0.0624)	(0.0490)	(0.0488)
Merge Firm=1	5.5330***	5.5733***\	0.3595	0.0710	5.5356**	5.5718***
	(2.0672)	(2.0255)	(3.1385)	(3.0606)	(2.0686)	(2.0303)
Constant	84.39***	84.38***	90.43***	90.60***	83.35***	83.35***
	(8.8203)	(8.7980)	(10.9591)	(10.9462)	(9.2077)	(9.1877)
Observations	18,876	18,876	18,093	18,093	18,876	18,876
R-squared	.5749	.5749	.3492	.3476	.5608	.5608

*** p<0.01, ** p<0.05, * p<0.1

Standard errors in () robust to arbitrary within correlation and heteroskedasticty (clustering)

sales are not random as ketchup sales (TPRs) are dependent on the length of time since the last sale (TPRs). Demand for the low price builds over time and the probability of a sale (TPR) increases with the amount of time since the last TPR. Sobel (1984) models sales as a method of intertemporal price discrimination between high and low reservation price consumers. Sobel's model incorporates market structure and seems to imply that TPRs should decline in depth and frequency as a market becomes more

concentrated. Other models focus more on supply-side considerations. Chevalier et. al. (2003) and Lal and Matutes (1994) consider TPRs as forms of loss leader pricing. Aguiregabiria (1999) finds evidence that promotion decisions are largely determined by inventory stocks and fixed ordering costs. The probability of a sales promotion is positively related to inventory stock, and negatively related to fixed ordering cost. Higher inventory stocks increase the probability of a TPR, to clear inventory. Higher fixed ordering costs increase order size, inventory, and hence the probability of a TPR.

The primary interest in this paper is how mergers affect pricing decisions and TPRs. The literature on TPRs suggests two possible causal mechanisms. Aguirregabiria suggests the importance of inventory, and menu and fixed-ordering costs. Inventory levels and fixed-ordering costs are most important and are positively related to the frequency of TPRs. Larger chains need to hold lower inventory levels to maintain the equivalent stock-out probabilities of smaller firms (Mulligan, 1983). Holding lower inventories should require fewer TPRs. Larger chains may be able to negotiate for more favorable terms and experience lower ordering costs – again suggesting a decrease in TPRs. Similarly, Aguirregabiria suggests that markups are positively related to inventory levels, implying that TPR depth should decrease after a merger.

Alternatively, consumer behavior may change after a merger. If TPRs are methods of price discrimination, or if they are a way to implement a loss-leader strategy, mergers may affect optimal strategies. For example, mergers may affect retailers' brand identity and a stronger or weaker identity may affect optimal strategies (Raju, Srinivasan, and Lal, (1999) show that brands with strong identities will promote less frequently than brands with weak identities). Similarly, firms may find it less necessary to offer loss-leaders if their brands are stronger after a merger.

Sobel's model suggests a role for market concentration; TPR depth and frequency should decline with market increased concentration. But as noted, local market concentration is largely unaffected after chains merge, and promotion decisions are made at the local level.

The price model above is a price discrimination model, amended with variables to capture cost and market power effects. Therefore, the variables in the price regressions seem appropriate for promotion regressions.[16,17]

Table 5 shows the marginal effects from a fractional-logit regression using TPR depth as the dependent variable.[18]

Table 5: TPR Depth fractional logit marginal effects

	All products		Private label		Nationally Branded	
National Share	0.00050	0.00060	0.00009	0.000164	0.0006	0.00067
	(0.00079)	(0.00080)	(0.00081)	(0.00084)	(0.00085)	(0.0009)
Merge=1	0.005130	-0.00900*	0.008082	-0.00195**	0.004843	-0.0095*
	(0.00637)	(0.00506)	(0.00587)	(0.00486)	(0.00659)	(0.0053)
Trend	-0.000084*	-0.00012**	-0.000066	-0.000093	-0.000089*	-0.00012
	(0.00005)	(0.00005)	(0.00004)	(0.00005)	(0.00005)	(0.00006)
Merge x Trend	-0.0004***		-0.0002***		-0.00038***	
	(0.00010)		(0.00009)		(0.00010)	
Average Store Size	0.000276	0.000282	-0.000206	-0.000196	0.000281	0.00029
	(0.00024)	(0.00024)	(0.00032)	(0.00031)	(0.00025)	(0.00024)
Discount Store=1	-0.001626	-0.001819	-0.001053	-0.001151	-0.002016	-0.002207
	(0.00449)	(0.00465)	(0.00488)	(0.00499)	(0.00479)	(0.00494)
Rent	-0.0049***	-0.0051***	-0.0027**	-0.0028**	-0.005277***	-0.0054***
	(0.00172)	(0.00171)	(0.00130)	(0.00133)	(0.00186)	(0.00184)
Total Income	2.34E-06**	2.4E-06**	1.10E-06	1.17E-06	2.53E-06**	2.61E-1**
	(0.00000)	(0.00000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
HH head age	0.00053	0.000573	0.000772	0.000804	0.000519	0.000567
	(0.00036)	(0.00037)	(0.00051)	(0.00052)	(0.00038)	(0.00039)
PCT w/o kids	-0.000148	-0.00014	-0.000121	-0.000119	-0.000153	-0.00015
	(0.00013)	(0.00013)	(0.00015)	(0.00015)	(0.00014)	(0.00014)
Average income	0.000291**	0.00029**	0.00002	0.0000073	0.0003**	0.00030**
	(0.00011)	(0.00012)	(0.00017)	(0.00017)	(0.00012)	(0.00012)
African Amer. Pct.	-0.000062	-0.000034	-0.0004***	-0.0004***	0.000022	0.000052
	(0.00011)	(0.00012)	(0.00014)	(0.00014)	(0.00012)	(0.00012)
Walmart Share	0.000242	0.000307	0.000191	0.000247	0.000224	0.000289
	(0.00031)	(0.00032)	(0.00041)	(0.00042)	(0.00032)	(0.00033)
Own Share	-0.000189*	-0.00019*	-0.0004***	-0.0004***	-0.000159	-0.000163
	(0.00011)	(0.00011)	(0.00010)	(0.00011)	(0.00012)	(0.00012)
Merge Firm=1	0.01189***	0.013569	0.00978**	0.01113**	0.01157**	0.0132***
	(0.00441)	(0.00463)	(0.00446)	(0.00464)	(0.00461)	(0.00482)
Predicted Mean	0.03637	0.03690	0.03102	0.03127	0.03748	0.03802
Observations	18876	18876	18093	18093	18876	18876

*** p<0.01, ** p<0.05, * p<0.1 Standard errors in () robust to arbitrary within correlation and heteroskedasticty (clustering)

[16] Several studies show that price promotions are more frequent during periods of peak demand. I experimented with including monthly dummy variable to control for demand shocks that correspond with holidays or other demand peaks. The results were qualitatively and quantitatively similar to those presented in the text.

[17] Berck, et. al. (2007) provide evidence that retailers, and not manufactures, control promotions. They also show that private-label items are frequently promoted, as are national brands.

[18] Coefficient estimates are available from the author upon request.

The predicted average depth is about 3.7 percent for branded products and 3.1 percent for private-label products. Few of the control variables are statistically significant. But, notable results include a positive coefficient for average household income for nationally branded products; stores in markets with higher-income households have slightly higher promotion depths. But, the coefficient is very small and suggests that a $10,000 increase in income increases promotion depth by about .3 percent. Own Share has a negative effect for all products and private-label; a 10 percent increase in local share implies a.02 and .4 percent decrease in promotion depth. The trend variable is negative, suggesting that promotion depth is declining, which likely explains some of the observed upward trend in net-prices. The Rent coefficient is negative and significant, suggesting that markets with higher fixed costs are associated with smaller average price promotions. African-American percent is negative in the private-label columns suggesting they are less influenced by TPRs. Even though markets with larger proportions of African-Americans receive smaller average TPRs, the price regressions suggest they pay lower prices, all else constant.

Turning to the merger variables, the national share coefficient is not statistically different from zero suggesting against Aguirregabiria's proposition that inventory levels and fixed ordering costs determine TPR depth. These factors should be related to chain size and there does not appear to be a relationship between size and promotion depth.

It appears that mergers reduced the average promotion depth because the merger dummy coefficient is negative when no Merge x Trend interaction variable is included, and when that variable is included it is negative and significant. At the conditional mean of merge-trend interaction (19.1 weeks), the effect is to decrease promotion depth by 0.718, 0.447, and 0.773 percent in the all, private label, and national brand columns, similar to the merger dummy coefficient (-.90, -.194, -.95 percent) when the Merge x Trend interaction is not included.

Table 6 shows the results from a fractional-logit regression using TPR frequency as the dependent variable. Predicted frequencies are about 18 percent, 17 percent, and 19 percent for all, private-label, and national brands. Coefficients for control variables are generally consistent with those in table 5. The merger coefficients suggest similar effects as they did in table 5 for TPR depth. The merger dummy

coefficient is negative and significant in the columns without the Merge x Trend interaction. The coefficient suggests a rather large decrease in the frequency of promotion ranging from -3.6 percent (private label) to -4.48 percent (nationally branded). Again, the Merger x Trend interaction is negative and significant suggesting the merger effects manifest over time. At the conditional mean, the Trend x Interaction coefficient implies a 2.875, 1.55, and 2.98 percent reduction in TPR frequency.

Taken together, the TPR depth and TPR frequency regressions suggest a change in promotion strategies after mergers. Most theories seem to suggest that TPRs should decline after a merger either because inventory stocks and fixed ordering costs decline, or because loss-leaders and price discrimination becomes less necessary after a merger. The results here suggest a post-merger decline in promotion depth and frequency. But there is no apparent relationship between the size of a supermarket chain and promotion frequency and depth, suggesting that changes in inventory costs or ordering costs are not the causal mechanism. Instead, these results are consistent with a reduction in loss leader or price discrimination behavior.

9. Conclusion

I have used a scanner data set of supermarket prices to examine mergers between supermarket chains. Food retailing experienced a great deal of consolidation in the late 1990s. Increasingly under pressure from non-traditional food retailers, including mass merchandisers and club stores, some argue supermarkets have sought out sources for cost
reduction. Merging operations has been touted as a way for firms to exploit efficiencies to reduce costs, bolster bargaining power, and lower prices in order to better compete with food retailing upstarts.

I find that food prices are negatively correlated with a supermarket chain's share of the national food-retailing market. This finding supports the hypothesis that as supermarkets increase in national scale, they are able to negotiate more favorable terms from suppliers and pass cost reductions to consumers as lower prices. Some have contemplated the increasing influence of supermarkets in the food system as

they grow larger, due in large part to mergers between formerly competing chains (Li, Carman, and Sexton, 2005). The evidence here suggests a shifting of power from suppliers to retailing supermarkets.

Table 6: TPR Frequency fractional logit marginal effects

	All products		Private label		Nationally branded	
National Share	0.00272	0.00301	-0.00196	-0.00183	0.00327	0.0036
	(0.0033)	(0.0033)	(0.0037)	(0.0038)	(0.0035)	(0.0035)
Merge=1	0.01284	-0.04472**	-0.00413	-0.0364*	0.01486	-0.04481**
	(0.0255)	(0.0207)	(0.0265)	(0.0194)	(0.026)	(0.0214)
Trend	-0.0006***	-0.0007***	-0.00036*	-0.00045*	-0.0006***	-0.0007***
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Merge x Trend	-0.0015***		-0.00079**		-0.0015***	
	(0.0004)		(0.0004)		(0.0004)	
Average Store Size	0.00168	0.00169*	-0.00109	-0.00105	0.00161	0.00171
	(0.0011)	(0.0010)	(0.0011)	(0.0011)	(0.0011)	(0.0010)
Discount Store=1	0.0098	0.00911	0.00077	0.00049	0.00865	0.00796
	(0.0230)	(0.0234)	(0.0221)	(0.0223)	(0.0244)	(0.0249)
Rent	-0.0215***	-0.022***	-0.014***	-0.014***	-0.0226***	-0.0231***
	(0.0072)	(0.0073)	(0.0049)	(0.005)	(0.0078)	(0.0078)
Total Income	7.30E-06	7.64E-06	5.27E-06	5.50E-06	7.71E-06	8.02E-06
	(0.0000)	(0.00001)	(0.0000)	(0.0000)	(0.00001)	(0.00001)
HH head age	0.001	0.00127	0.00192	0.00201	0.00106	0.00123
	(0.0015)	(0.0015)	(0.0020)	(0.002)	(0.0016)	(0.0016)
PCT w/o kids	-0.00014	-0.00012	0.00015	0.00016	-0.00017	-0.00014
	(0.0005)	(0.0005)	(0.0006)	(0.0006)	(0.0006)	(0.0006)
Average income	0.00116**	0.00116**	0.00042	0.00039	0.00115**	0.0012**
	(0.0005)	(0.0005)	(0.0007)	(0.0007)	(0.0005)	(0.0005)
African Amer. Pct.	-0.0004	-0.00029	-0.0018***	-0.0018***	-0.0001	0.00003
	(0.0005)	(0.0005)	(0.0006)	(0.0006)	(0.0005)	(0.0005)
Walmart Share	0.00177	0.00203	0.00063	0.00077	0.00181	0.00207
	(0.0013)	(0.0014)	(0.0018)	(0.0018)	(0.0014)	(0.0014)
Own Share	-0.00088*	-0.00089*	-0.0017***	-0.0018***	-0.00073	-0.00074
	(0.0004)	(0.0005)	(0.0004)	(0.0004)	(0.0005)	(0.0005)
Merge Firm=1	0.06063***	0.06824***	0.06374***	0.06863***	0.05743***	0.06512***
	(0.0192)	(0.0199)	(0.0206)	(0.0214)	(0.0198)	(0.0205)
Predicted Mean	0.18224	0.18393	0.16532	0.16590	0.18611	0.18789
Observations	18876	18876	18093	18093	18876	18876

*** p<0.01, ** p<0.05, * p<0.10 Standard errors in () robust to arbitrary within correlation and heteroskedasticty (clustering)

The evidence also suggests that chains reduce promotions after merger, both in terms of depth and frequency. This is consistent with a chain capitalizing on a stronger brand image after a merger and changing their promotion strategy in response. Indeed, some chains changed the names of stores after a merger; acquired chains adopted the names of acquiring chains (Los Angeles Business Journal, 1999). Chains with stronger brand names are likely to find it less necessary to entice customers with loss-leader

strategies. I do not find support for the hypothesis that inventory stocks or fixed ordering costs affect TPRs. These factors should be lower at larger chains, but there is no evidence here that chain size affects TPRs.

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