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The Effect of Wal-Mart Supercenters on Grocery Prices in New England

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Keywords: Wal-Mart, Supermarket Competition, Grocery Prices, National Brands, Private Labels

JEL Classification: D21, D43, L11, L13, L81

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Abstract

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The discount retailer Wal-Mart has been a popular topic of discussion and debate for more than a decade. Much of the recent controversy surrounding Wal-Mart in the economic literature and the popular press has focused on food retailing. Wal-Mart's meteoric rise to dominance in the U.S. food retailing has motivated efforts to understand the effects of Supercenter stores on consumers, competitors, and the economy in general. The primary objective of this study is to estimate the competitive effect of Wal-Mart Supercenters on prices at conventional supermarkets, i.e., the extent to which Supercenters bring about a decrease in their rivals' price. Additionally, we estimate price differences between Supercenters and conventional stores to determine the savings realized by shopping at Supercenters. We examine these two objectives separately for national brands and private labels to determine whether Supercenters impact differently the two labels.

Supercenters are Wal-Mart stores that offer entire lines of groceries in addition to all of the usual wares found at conventional Wal-Mart stores. Wal-Mart became the largest food retailer in the United States in 2003, largely through the expansion of Supercenters, and is currently the leading grocer worldwide (Progressive Grocer, 2005). By the end of 2003 there were 1,376 Supercenters in the United States, with over 1,000 more planned for construction by 2008 (Bianco and Zellner, 2003). Much of the Supercenter expansion is projected to take place in regions such as New England and California, where Wal-Mart is newer and has a smaller presence compared to the South and Midwest, where the firm originated.

Supercenters are the subject of as much, if not more, controversy than conventional Wal-Mart stores. A glance at news headlines on any given day reveals that Wal-Mart is confronting opposition from citizens and local governments in many of the locations where it chooses to erect Supercenters. The public outcry is spurred partly from Wal-Mart's low wages and

substandard health care benefits to its non-unionized employees. Family-supporting jobs are lost when employee-unionized rivals go out of business due to Wal-Mart's entry (Daykin, 2006). For that reason, opposition in California has been particularly strong. Wal-Mart's announcement that it would open 40 Supercenters in this state led to a four-month strike of grocery unions in 2003 to protest the cuts made in labor expenses by rival chains to compete. In 2004, residents of a suburb of Los Angeles protested and voted against the construction of a Supercenter citing low wages paid to employees and Wal-Mart's refusal to allow labor unions (Zwiebach, 2004; Hudson and McWilliams, 2006). In the U.S. Northeast and in urban areas, the outcry also stems from the store image. The construction of a store in Miami was blocked on the grounds that "its sprawling, suburban aesthetics and low-end appeal didn't conform to the city's architectural and social vision for the project" (Hudson and McWilliams, 2006).

Despite the ongoing controversy and the growing importance of Supercenters in all aspects of food retailing, the economic literature remains relatively scarce on the economic impact of Wal-Mart Supercenters. This is partly due to the absence of a data source; Wal-Mart does not participate in any of the public data collection services.

Franklin (2001) examined the impact of Wal-Mart Supercenters on market concentration in the 100 largest U.S. metropolitan areas in 1993 and 1999. He found that Supercenters have no significant effect on supermarket concentration. However, the market share obtained by Supercenters increases with time and is inversely proportional to the income of the local consumers in metropolitan areas.

While there is no evidence in the literature that Supercenters are responsible for the closing of supermarkets, Supercenters have been found to have a negative effect on the sales of conventional supermarkets. Capps and Griffin (1998) estimated that Wal-Mart Supercenters

were directly responsible for a 21 percent reduction in sales for a regional chain of supermarkets in the Dallas/Fort Worth area of Texas. The combined effect of Supercenters and Wal-Mart's wholesale outlet, Sam's Club Stores, on supermarkets amounts to a loss of \$15 to \$17 billion in sales from supermarkets nationwide in 2001 (*USA Today*, cited by Jones, 2004).

Wal-Mart Supercenters follow a different pricing strategy than most supermarkets. This may affect how supermarkets compete in price when a Supercenter is present. All Wal-Mart stores use Everyday Low Pricing (EDLP), meaning that all products are marked up by the same percentage regardless of the price at which they were acquired (Vance and Scott, 1994). Sales, promotions, and advertising do not play heavily into the practice of EDLP. Most supermarkets, by contrast, employ High-Low Pricing (HLP), whereby most products are given a high markup but a percentage of goods, changing on a regular basis, are put on promotion. In many cases, promotional items are sold at a loss to the store with the intent to increase customer traffic. Using a game theoretical approach, Jones (2004) demonstrated that EDLP is profitable for Supercenters because it creates a stark difference in prices from supermarkets. Moreover, supermarkets would be more profitable if they switched to EDLP when competing with Supercenters. Supporting this notion, many of the largest supermarket chains in the nation are gradually lowering their prices and decreasing the frequency and size of promotions at some of their locations (Adamy, 2005).

With the EDLP strategy and its countervailing market power towards manufacturers (Dobson and Waterson, 1999; Chen, 2003; Wilke, 2004), Wal-Mart sets prices lower than its competitors. According to a 2002 UBS Warburg study, Wal-Mart Supercenters' prices are, on average, 14 percent lower than competing supermarkets (Bianco and Zellner, 2004). Studies surveyed by Hausman and Leibtag (2005) show Wal-Mart prices to be 8 to 27 percent lower than large supermarket chains.

To date however, the impact of Wal-Mart Supercenters on prices at conventional supermarkets has not been explored much in the literature, with the exceptions of the studies by Woo et al. (2001) and indirectly, Hausman and Leibtag (2005). Woo et al. monitored prices at conventional supermarkets both before and after the entry of a Wal-Mart Supercenter in the Athens, Georgia area. Their results showed that supermarkets lowered their prices significantly prior to the Supercenter's entry, but that prices gradually rose back to their original levels following entry. The only supermarkets showing lasting effects from the Supercenter entry were those with the highest prices at the beginning of the study. Hausman and Leibtag used an ACNielsen household panel data for 1998-2001 to study the consumer welfare impact of Wal-Mart in the U.S. food market by estimating the compensating variation. The compensating variation is broken into two parts: a variety effect from having access to a new outlet, and an indirect price effect associated with the decrease in price from existing outlet. They estimate the variety effect to be 20.2 percent of food expenditure, and the indirect price effect to be 4.8 percent of food expenditure. Thus, they find a substantial benefit for households who have the choice to shop at Supercenters, i.e., a total welfare effect of 25 percent of food expenditure.

This study contributes to the literature on the economic impact of Wal-Mart Supercenters and is unique in four respects. First, we estimate both the competitive effect of Supercenters on prices of competitors and the discount realized by shopping at a Supercenter, by grocery department. Second, given that Wal-Mart does not participate in any of the public data collection services, we use a unique data set consisting of prices collected directly off the shelves of the stores sampled. Third, we focus on the effect of Supercenters in the states of New England (Connecticut, Massachusetts, and Rhode Island), a new region of expansion for Supercenters and also a region that is both wealthier and more densely populated than the U.S. South and

Midwest, where Supercenters originated. Fourth, we conduct separate analyses for national brand and private label products. National brand products are obtained from national distributors and therefore are identical across all stores. National brand products are more heavily advertised and are more popular among higher income shoppers. Private label products, alternatively, are produced through a form of vertical coordination and are heterogeneous across different chains. Despite having higher markups, they are universally cheaper than their national brand substitutes and appeal to lower income shoppers.¹ Examining separately national brands and private labels enables us to shed some light on the impact of Supercenters on the national brand/private label margin and on strategic efforts by supermarkets to maintain consumer loyalty.

Data

Because Wal-Mart does not participate in any public data collection services, it was necessary to gather primary price data. The data were gathered from 18 stores throughout the states of Massachusetts, Connecticut, and Rhode Island. The selection of the 18 stores was made by the following criteria: six of the stores are Wal-Mart Supercenters, another six are the largest supermarkets, in terms of floor size, found within five miles of each of the Supercenters. Henceforth, these stores are referred to as “competing stores.” The final six stores are used as comparison stores to the six supermarkets competing with Wal-Mart Supercenters, and they will be referred to as “comparison stores.” Using data from the 2000 Census as well as the 2004 *Trade Dimensions* Retail Data Directory, we selected stores that shared many similarities with the six competing supermarkets in terms of size, market conditions, and demographics.²

The 54 products sampled in this study were selected from a larger list compiled by Cotterill (1999a) and span the six major supermarket departments: grocery, dairy, frozen food, health and

¹ For a review of the literature on national brand and private label products, see Bergès-Sennou, Bontems, and Réquillart (2004).

² See Appendix A for information on the stores sampled and their location.

beauty aids (HBAs), meat, and produce.³ The products were selected in proportion to departmental shares of sales calculated by Cotterill (1999a) in order to represent a typical consumer's market basket. This explains, for example, why more goods were sampled from the grocery department than from the dairy department. In every department the selection of products was divided evenly between national brand and private label goods, with the exception of the produce department, in which only national brand goods were available. Taking into account that private label products differ across different supermarket chains, we used data from *Consumer Reports* to select products that do not vary much in quality among manufacturers.

The prices of the products were recorded directly off the shelves of the 18 stores. Figure 1 reports the average price of the national brand and private label market baskets for the three store categories. Only the non-promotional prices were recorded when a sampled product was on promotion. Data gathering was performed within a three-week period in October 2004 to avoid any time-series trends in the data.

Figure 1 shows that for both national brand and private label products, the average price of the entire basket is lower at competing stores than at comparison stores. Moreover, Supercenters have the lowest average price for both market baskets and the average price difference between Supercenters and competing stores exceeds the average difference between competing and comparison stores.

Price Indexes and Model Formulation

To examine the impact of Wal-Mart Supercenters on the price of food products, we constructed price indexes by supermarket departments. Binkley and Connor (1998) have shown that fresh

³ See Appendix B for the complete market basket as well as the average price of each product at the 18 stores.

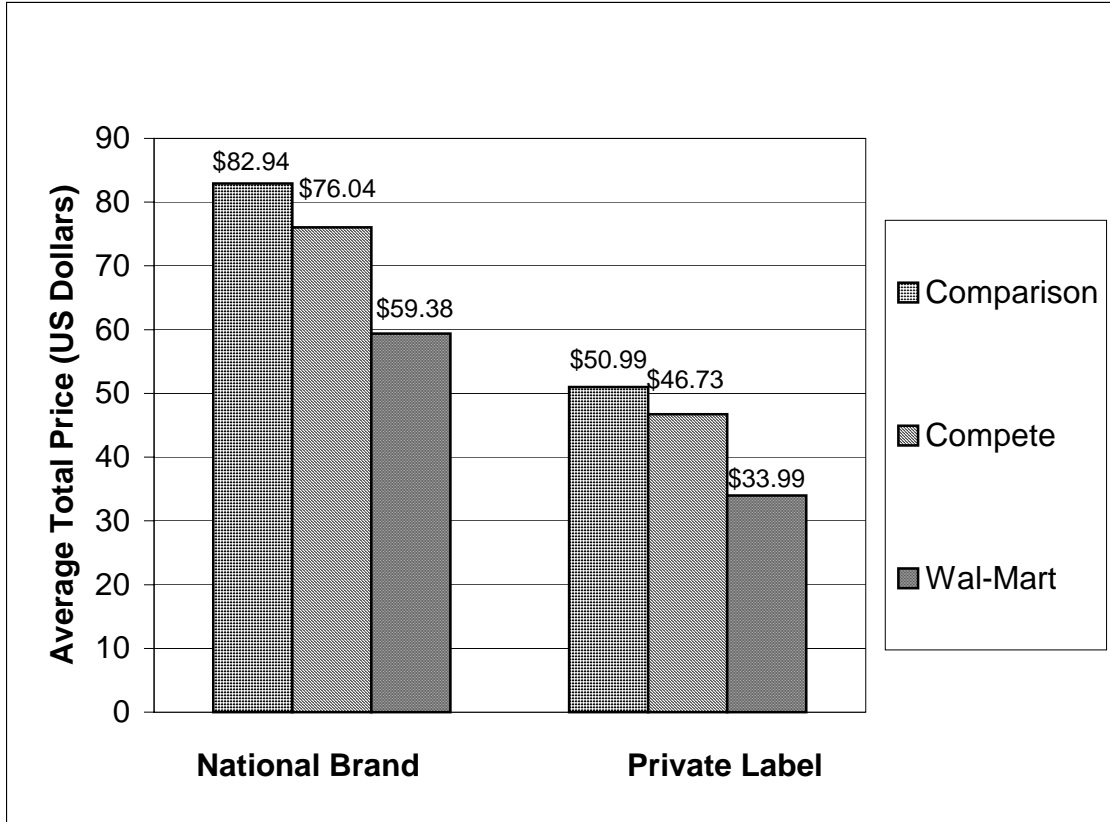


Figure 1: Average total price of the national brand (30 goods) and private label (24 goods) market baskets, by store category

goods (red meats, milk, and produce) are priced differently than packaged goods (products in the “dry grocery” and “health and beauty” department). Departmental price indexes were constructed using expenditure-weighted relative prices. Expenditure-weighted relative prices have been used in previous work examining supermarket prices (Cotterill, 1999b; Woo, et al., 2001, Yu and Connor, 2002). Weighting prices by expenditure allows for proper accounting of the different nature of market baskets as well as respects the patterns of consumption in the United States. Formally, the indexes are given by:

$$V_{ijk} = \frac{\sum_{m=1}^{M_j} W_{mj} P_{mijk}}{\sum_{m=1}^{M_j} W_{mj} P_{mij1}} \cdot 100$$

where V_{ijk} is the price index for brand i ($i = N$ for national brand or P for private label), department j , and store k . W_{mj} is the weight assigned to good m in department j and P_{mijk} is the relative price of good m of brand i in department j at store k . The relative prices P_{mijk} were obtained by standardizing each observed shelf price by the average price paid for the given product across all stores.⁴ Thus, the price index V_{ijk} is constructed as the weighted average price of the M_j goods of brand i in department j of store k , divided by the same expression for store 1 (the reference store) and multiplied by 100. The reference store is the Supercenter in Raynham, MA, for national brand indexes and the Supercenter in Jewett City, CT, for private label indexes. These stores were chosen because across departments they have the lowest average prices.

The weight W_{mj} is the expenditure on good m , found in the market basket of department j , relative to the total expenditure on all goods sampled in department j . It is calculated as

$$W_{mj} = \frac{\bar{P}_{mj} C_{mj}}{\sum_{m=1}^{M_j} \bar{P}_{mj} C_{mj}}$$

where \bar{P}_{mj} is the average price of good m in department j across all 18 stores sampled for this study and C_{mj} is the estimated per capita annual consumption of good m in department j in the United States in 2003 as measured by the Economic Research Service of the USDA.

Tables 1 and 2 display the descriptive statistics for the departmental price indexes. They reveal two trends in the price indexes. First, for all departments except for national brand meat, Supercenters have the lowest price indexes (least expensive) and comparison stores have the highest price indexes (most expensive). Second, the coefficient of variation statistics reveal that the Supercenters generally have the lowest price volatility while competing stores have the

⁴ Expressing prices in relative term eliminates the effect of package-size discrepancy across products.

Table 1: Summary statistics for expenditure-weighted national brand price indexes

	<i>Grocery</i>	<i>Dairy</i>	<i>Frozen Food</i>	<i>HBA</i>	<i>Meat</i>	<i>Produce</i>
	<u>Mean</u>					
Supercenters	102.62	100.36	108.03	107.76	100.76	111.47
Compete	126.67	137.10	145.97	133.25	139.26	141.52
Compare	143.19	168.76	159.64	141.03	132.89	159.50
	<u>Standard Deviation</u>					
Supercenters	1.58	0.28	8.24	5.87	1.39	5.92
Compete	12.56	21.24	22.44	11.76	2.21	19.40
Compare	7.60	6.35	15.91	11.72	12.60	11.23
	<u>Coefficient of Variation</u>					
Supercenters	1.54%	0.03%	7.63%	5.48%	1.38%	5.31%
Compete	9.92%	15.57%	15.37%	8.83%	1.58%	13.71%
Compare	5.31%	3.76%	9.97%	8.31%	9.48%	7.04%

Table 2: Summary statistics for expenditure-weighted private label price indexes

	<i>Grocery</i>	<i>Dairy</i>	<i>Frozen Food</i>	<i>HBA</i>	<i>Meat</i>
	<u>Mean</u>				
Supercenters	102.36	100.38	103.73	119.50	134.77
Compete	142.43	133.84	138.58	128.09	129.09
Compare	158.64	158.43	151.93	151.58	147.68
	<u>Standard Deviation</u>				
Supercenters	2.10	0.30	4.15	9.55	18.37
Compete	14.64	21.67	33.16	12.68	18.64
Compare	17.80	14.59	25.35	30.25	30.38
	<u>Coefficient of Variation</u>				
Supercenters	2.05%	0.30%	3.99%	7.99%	13.63%
Compete	10.28%	16.19%	23.93%	9.90%	14.44%
Compare	11.22%	9.21%	16.69%	19.95%	20.57%

highest price volatility. One possible explanation is that Supercenters reduce the ability of supermarkets to coordinate prices and promotional activities. Marion, Heimforth, and Bailey (1993) found this to be true in the context of heterogeneous competition among supermarkets and larger warehouse stores. In addition, stores competing with Wal-Mart have been found to engage in both price and non-price strategies (Khanna and Tice, 2000). Non-price strategies include improving service, image, or variety. Several of the competing supermarkets sampled for this study were recently renovated, with features such as gasoline stations, coffee shops, and bookstores. If competing stores use a greater number of strategic instruments to compete with

Supercenters than comparison stores, we may expect competing stores to have the greatest overall price variability among the store categories.

The price indexes for all three store categories were pooled to enable a direct test of the effect of Wal-Mart Supercenters on supermarket prices. The resulting model can be expressed as:

$$(1) \quad V = \beta_0 + \beta_1 DAIRY + \beta_2 FROZEN + \beta_3 HBA + \beta_4 MEAT + \beta_5 PRODUCE \\ + \beta_6 COMPETE + \beta_7 COMPARE + \beta_8 COMPETEDAIRY \\ + \beta_9 COMPETEFROZ + \beta_{10} COMPETE HBA + \beta_{11} COMPETEMEAT \\ + \beta_{12} COMPETEPROD + \beta_{13} COMPDAIRY + \beta_{14} COMPFROZ \\ + \beta_{15} COMPHBA + \beta_{16} COMPMEAT + \beta_{17} COMPPROD + \delta X + u$$

where V represents the expenditure-weighted relative price indexes, as described above. *DAIRY*, *FROZEN*, *HBA* (health and beauty aids), *MEAT*, and *PRODUCE* are binary variables included to capture price differences across departments. Therefore, the reference category is grocery. *COMPETE* and *COMPARE* are binary variables that represent the different supermarket categories. *COMPETE* equals one if the supermarket is a store competing with the Supercenter, and zero otherwise. *COMPARE* equals one if the supermarket is a store located further away from a Supercenter and represents a comparison store, and zero otherwise. These variables are also interacted with the departmental binaries. We expect the results to indicate that Supercenters have the lowest average prices among all store categories and that the competing stores have lower average prices than the comparison stores. Hence the coefficients for *COMPETE* and *COMPARE* are anticipated to have positive signs, and the coefficient on *COMPARE* is expected to be greater in magnitude than the coefficient on *COMPETE*, to represent this pattern for the grocery department. Given the proper mapping of coefficients, we expect similar results to be realized for all departments.⁵

X represents a vector of variables consisting of demographics, store characteristics, and

⁵ For example, the expected price index value for the dairy department at competing stores is given by $\beta_0 + \beta_1 + \beta_6 + \beta_8$, while the expected price index for the dairy department at comparison stores is $\beta_0 + \beta_1 + \beta_7 + \beta_{13}$.

market conditions. These variables, stressed in importance by a survey of the literature on supermarket pricing and competition, measure income, population density, the distance to the nearest large competitor, store size, concentration, and the percentage of minorities in the local population. We describe these variables next.

INCOME is a binary variable equal to 1 if the city or town, associated with the index value, has a median household income greater than \$45,725, i.e., in the upper half of the data set. Given that consumers become less price sensitive as income increases (Hoch et al., 1995) we expect the coefficient to be positive. The binary nature of this variable is intended to reflect the average difference in prices between areas of “high income” versus “low income” in New England.⁶ Income data from the 2000 Census were used to generate this variable.

POPDENS represents population density and is expected to have a negative sign, as food retailers have greater incentive to compete when consumers can easily travel among stores (Lamm, 1981; Cotterill, 1986). Data on population and land area for the cities and towns were available from the 2000 Census.

Concentration data were not available at levels disaggregated enough for this study, and therefore two proxies are used in place of the conventional measurements of industry concentration, e.g., four-firm concentration ratio and the Herfindalh-Hirschman Index. *DTLC* is the distance, in miles, to the nearest supermarket or Supercenter. *CONCENTRATED* is a binary variable equal to one if the town or city associated with the price index has fewer than three large food retailers. Both of these coefficients are expected to be positive. The locations of the stores in each town or city were obtained from the *Trade Dimensions* 2004 Retail Data Directory and driving distances among stores were determined using the electronic service Mapquest.

⁶ Areas falling below the median income value in the data set are not necessarily low-income areas as defined by the U.S. Census Bureau.

SSIZE is the size of the store, in thousands of square feet. According to Binkley and Connor (1996, 1998), store size can affect prices in two opposite directions. Larger stores may enjoy economies of scale and thus charge lower prices. However, larger stores may also stock more items and provide more services, which contribute to raise costs and thus prices. Binkley and Connor (1998) argue that the second effect dominates for conventional retailers. The first effect most likely dominates for Wal-Mart. Thus, the expected sign on *SSIZE* is indeterminate for both national brands and private labels.⁷ Data on store size in square footage were available from *Trade Dimensions 2004 Retail Data Directory*.

BH is the percentage of blacks and Hispanics living in the associated town. Blacks and Hispanics are more sensitive to grocery prices (Hoch et al., 1995). Thus, this variable is expected to be negative. Demographic data were obtained from the 2000 Census.

Results and Discussion

Equation (1) was estimated separately for national brand and private label price indexes for ease of interpretation and readability. The results of the Generalized Least Squares (GLS) estimations are compiled in table 3. The models were estimated using GLS rather than Ordinary Least Squares (OLS) because preliminary regression results indicated heteroskedasticity resulting from different variances across departments. The models have high explanatory power, as evidenced by the models' F-statistics and the adjusted R^2 values. Diagnostics revealed no multicollinearity problem among the variables in the *X* vector. Consistent price data were not available for private label produce and therefore price indexes were not calculated for those goods.

⁷ Note that five of the 12 conventional retailers in our sample are relatively large supermarkets with store areas greater than 50 000 square feet. Those stores have amenities, such as coffee shop or deli area, which are typically not found in smaller stores.

Table 3: Regression Results

	Model A National Brands	Model B Private Labels
Intercept	113.476*** (7.430)	139.961*** (14.665)
DAIRY	-2.258 (6.609)	-1.976 (10.385)
FROZEN	5.412 (6.023)	1.373 (10.891)
HBA	4.814 (4.681)	17.135* (9.467)
MEAT	-1.851 (4.818)	32.404*** (9.464)
PRODUCE	8.852 (5.530)	
COMPETE	18.765*** (5.131)	27.897*** (10.722)
COMPARE	32.041*** (5.171)	41.297*** (10.796)
COMPETEDAIRY	12.684 (9.347)	-6.617 (14.687)
COMPETEFROZ	13.888 (8.518)	-5.224 (15.402)
COMPETEHB	1.764 (6.620)	-21.472** (13.388)
COMPETEMEAT	14.444** (6.813)	-45.749*** (13.384)
COMPETEPROD	5.992 (7.821)	
COMPDAIRY	27.828*** (9.347)	1.763 (14.687)
COMPFROZ	11.044 (8.518)	-8.090 (15.402)
COMPHBA	-6.974 (6.620)	-24.194* (13.388)
COMPMEAT	-8.447 (6.813)	-43.365*** (10.428)
COMPPROD	7.461 (7.821)	
INCOME	8.570*** (2.493)	21.743*** (4.826)
POPDENS	-0.638 (0.427)	-1.581* (0.826)
DTLC	0.627 (0.499)	0.887 (0.966)
SSIZE	-0.297*** (0.094)	-0.795*** (0.182)
CONCENTRATED	7.561*** (3.058)	1.031 (5.920)
BH	0.020 (0.132)	0.168 (0.256)
N	108	90
F	20.51***	6.81***
Adjusted R ²	0.81	0.57

***: Coefficient is significant at the .01 level. **: Coefficient is significant at the .05 level. *: Coefficient is significant at the .10 level. Standard errors are in parenthesis.

The demographics and market conditions all have expected signs, with the exception of *BH*, which is not statistically significant. *SSIZE* is negative and significant for both national brands and private labels indicating that larger stores have lower prices. The likely explanation for this result is that economies of scale enable large stores, such as Supercenters and large conventional supermarkets, to be more efficient and charge lower prices. The coefficients indicate that a 1000 square feet increase in store size results in an average decrease in price of .25 percent for national brands and a .88 percent decrease in price for private labels, when the coefficient is expressed as a percentage of the average value of the dependent variable.⁸

The coefficient on *INCOME* is positive and statistically significant for both brands. In percentage terms, the coefficients indicate that the price of national brands is seven percent higher, and the price of private labels is 24 percent higher in higher income locations in New England than in lower income locations.

In general, expressed as a percentage of the average value of the dependent variable, the effects of the demographics and market conditions on price are greater in magnitude for private label products than for the national brand products, except for the effect of market concentration (*CONCENTRATED*). This pattern supports the findings that supermarkets have greater control over private label prices as opposed to the national brand prices set by manufacturers (Mills, 1995) and that consumers who purchase private label goods are more price sensitive than those who primarily shop purchase national brands (Dhar and Hoch, 1997).

Tables 4 and 5 give the expected price index value for each department and store type, holding all demographics, market conditions, and store characteristics constant. Column 6 in each table is of particular interest. It reports the average price difference in percentage term between competing stores and comparison stores. Those percentages represent the estimated

⁸ The mean national brand departmental price index is 118.65 while the mean private label index is 90.69.

competitive effect of the presence of Wal-Mart Supercenters on the prices at conventional supermarkets.

Table 4: Expected expenditure-weighted relative price indexes by department for national brand goods. (Model A) ⁹

	(1): <i>Wal-Mart Supercenters</i>	(2): <i>Competing Stores</i>	(3): <i>Comparison Stores</i>	(4):(1)– (2) <i>% difference</i>	(5):(1) – (3) <i>% difference</i>	(6):(2) – (3) <i>% difference</i>
Grocery	113.476	132.241	145.517	-14.19***	-22.02***	-9.12***
Dairy	111.218	142.667	171.087	-22.04***	-34.99***	-16.61***
Frozen Food	118.888	151.541	161.973	-21.55***	-26.60***	-6.44
HBA	118.290	138.819	143.357	-14.79***	-17.49***	-3.16
Meat	111.625	144.834	135.219	-22.93***	-17.45***	7.11
Produce	122.328	147.085	161.830	-16.82***	-24.41***	-9.11**

***: Difference is significant at the .01 level **: Significant at the .05 level *: Significant at the .10 level

Table 5: Expected expenditure-weighted relative price indexes by department for private label goods. (Model B)

	(1): <i>Wal-Mart Supercenters</i>	(2): <i>Competing Stores</i>	(3): <i>Comparison Stores</i>	(4):(1)– (2) <i>% difference</i>	(5):(1) – (3) <i>% difference</i>	(6):(2) – (3) <i>% difference</i>
Grocery	139.961	167.858	181.258	-16.62***	-22.78***	-7.39
Dairy	137.985	159.265	181.045	-13.36***	-23.78***	-12.03**
Frozen Food	141.334	164.007	174.541	-13.82***	-19.03***	-6.04
HBA	157.096	163.521	174.199	-3.93	-9.82**	-6.13**
Meat	172.365	154.513	170.297	11.55**	1.21	-9.27*

***: Difference is significant at the .01 level. **: Significant at the .05 level. *: Significant at the .10 level.

A decrease in average prices is attributed to the presence of Supercenters in all departments except for national brand meat. This counterintuitive finding for the national brand of meat is not statistically significant. It may be attributed to a temporary pricing anomaly during the data collection time frame or a small sample size for meat.

For both national brand and private label products, the largest competitive effect of Supercenters occurs in the dairy department with estimated decreases in prices of 17 percent and 12 percent, respectively. Among national brand products, the grocery and produce departments are also significantly affected by the presence of Supercenters. Supercenters cause a nine percent

⁹ Joint tests of significance were performed for the appropriate binary and interaction terms. For example, for national brand dairy, we tested $H_0: \text{COMPETE} + \text{COMPETEDAIRY} = \text{COMPARE} + \text{COMPAREDAIRY}$.

decrease in the price of national brands of both grocery items and produce. Significant average price decreases are attributed to Supercenters for private label HBA and meat products. We are unable to conclude that the presence of Wal-Mart Supercenters has a statistically significant effect on the prices of frozen food items, regardless of the brand type. Finally, the grocery department for private label goods is not significantly impacted by the presence of Supercenters.

Column 4 of tables 4 and 5 depicts the average price differences between the Wal-Mart Supercenters and the conventional supermarkets with which they compete. These differences indicate to what extent Supercenter prices are lower than competing stores (column 4) and lower than comparison stores (column 5). With two exceptions, Supercenters prices are significantly lower, on average, than those of competing stores, and the differences are greater in magnitude than those calculated between competing and comparison stores. The two exceptional cases are private label HBA products, for which the estimated difference is insignificant, and private label meat, for which Supercenters have the highest average prices among all store categories. The HBA department is unique in this study, as it is comprised of products that are also available at many other store types, including pharmacies and other mass merchandisers. Therefore, greater overall price competition and lower average price differences between Supercenters and competing stores, relative to other departments, is expected for the HBA department. As mentioned previously, the results for the meat department call for further investigation.

Column 4 of table 4 indicates that Supercenters price their national brand products between 14 and 23 percent lower than competing supermarkets. The estimated national brand price differences between Supercenters and competing stores are generally larger than the corresponding private label differences, which vary between 13 and 17 percent (according to column 4 of table 5). The largest price differences are for national brand of dairy, frozen food,

and meat products, and private label grocery products. As expected, the price difference is larger between Supercenters and comparison stores. Supercenter prices are lower than comparison stores by 17 to 34 percent depending on the national brand department (column 5 of table 4), and by 9 to 24 percent for private label departments (column 5 of table 5). The largest price differences are for dairy products for both national brands and private labels.

Table 6 reports the average departmental shares of sales as determined by Cotterill (1999a). The average departmental price differences reported in tables 4 and 5 were weighted by these shares of sales. The results, reported in table 7, represent the average overall competitive effects of Supercenters on prices at conventional supermarkets. They correspond to the overall average price differences between competing and comparison stores. The estimates were calculated in two ways. With method 1, the weighted price difference was calculated using all of the percentage differences reported in tables 4 and 5. Method 2 utilizes only those effects that were found to be statistically significant.

Table 6: Departmental shares of sales

<i>Department</i>	<i>Share of Sales</i>
Grocery	46.07%
Dairy	7.99%
Frozen Food	7.05%
HBA	5.77%
Meat	14.52%
Produce	18.61%

Source: Cotterill (1999a)

Table 7: The estimated overall competitive effect of the presence of Supercenters, by model

<i>Model</i>	<i>Estimated Overall Effect of Wal-Mart</i>	
	Method 1	Method 2
A. National Brand	-6.83%*	-5.82%*
B. Private Label	-6.73%	-3.11%*

***: Difference is significant at the .01 level **: Significant at the .05 level *: Significant at the .10 level

The overall competitive effect of the presence of Supercenters on supermarket prices ranges

from a 5.82 to a 6.83 percent price decrease for national brand goods and a 3.11 to a 6.73 percent price decrease for private labels. Given that the private label estimate calculated using method 1 is statistically insignificant, our results show that the overall effect of Supercenters is greater for national brand products. National brand products are universally more expensive and more heavily promoted than their private label substitutes. Therefore this finding is in agreement with the ongoing trend of lower prices in conventional supermarkets as a response to Wal-Mart, as noted by Adamy (2005). Moreover, we may expect a lower competitive effect on private label prices because their heterogeneity relative to Wal-Mart private labels is such that the competition is not as strong for those goods as for national brands.

Applying the same weighting scheme to the average price differences between Supercenters and conventional supermarkets, table 8 reports the overall price differences by store category and brand type. Only statistically significant price differences were included in the calculations.

Table 8: The estimated overall price difference between Supercenters and supermarkets

<i>Model</i>	<i>Competing Stores</i>	<i>Comparison Stores</i>
A. National Brand Expenditure-Weighted	-17.13%***	-22.90%***
B. Private Label Expenditure-Weighted	-8.02%**	-14.30***

***: Difference is significant at the .01 level **: Significant at the .05 level *: Significant at the .10 level

On average, our results indicate that Supercenter prices are lower than prices at competing stores by 17 percent for national brand products and by eight percent for private labels. Supercenter prices are overall lower than comparison stores by 23 percent for national brands and 14 percent for private labels. The extent to which Supercenter prices are lower than conventional supermarket is consistent with the estimates available in studies surveyed by Hausman and Leibtag (2005), i.e., between 8 to 27 percent. The average price differences between Supercenters and supermarkets are greater (in percentage terms) for national brand products. One likely explanation of this difference between brands is the process through which

the food retailers obtain their wares. National brand products are purchased from national brand manufacturers and distributors. Dobson and Waterson (1999) and Chen (2003) have argued that Wal-Mart possesses market power to countervail that of manufacturer, which drives down the prices of the products purchased from suppliers. The supermarket chains of New England such as Stop n' Shop and IGA are too small to possess such power, resulting in a cost advantage for Wal-Mart Supercenters. Private label products, alternatively, are produced through a form of vertical integration and countervailing power plays less of a role in the process by which Wal-Mart obtains its *Great Value* product line.

The margin between brands has been a frequently visited topic in the literature on supermarket pricing (Bergès-Sennou, Bontems, and Réquillart, 2004). With Wal-Mart Supercenters taking an increasing importance in food retailing, it becomes relevant to question their effect on the national brand/private label margin. We can shed some light on this question. According to our results, Supercenters have a greater price impact on national brands than on private labels. Combining this result with the fact that national brands are more expensive than private labels suggests that Supercenters have for effect to reduce the national brand/private label margin in the supermarkets with which they compete.

Conclusion

Wal-Mart is introducing Supercenters at a fast pace in the United States, especially in regions such as New England and California where Wal-Mart has a smaller presence. The projected introduction of a Supercenter typically creates much controversy and debate concerning the economic impacts of the new store. In this article, we examine one aspect of the impact of introducing Supercenters, that is the effect on grocery prices. More specifically, we examine the competitive effect of Wal-Mart Supercenters on prices at conventional supermarkets in New

England. This effect was examined for the six major supermarket departments (dairy, frozen goods, health and beauty aids (HBA), meat, produce, and dry grocery) as well as both national brand and private label goods. We also examine the extent to which Wal-Mart's grocery prices are lower than those at conventional supermarkets. Thus, this article sheds some light on the pricing strategy of Wal-Mart Supercenters and the response of supermarkets when facing direct competition from a Supercenter.

The primary findings of this study are as follows:

- 1) Wal-Mart Supercenters result in a decrease in grocery prices between six and seven percent for national brand goods at conventional supermarkets competing within a radius of five miles from the Supercenter. The associated decrease in the price of private label goods is between three and seven percent. These findings are in line with those in the literature, more specifically those of Hausman and Leibtag (2005) who found an indirect price effect of Wal-Mart of five percent of consumer expenditure. Given that national brand goods are more expensive, Supercenters lower the price margin between branded and unbranded goods.
- 2) The greatest impact of Wal-Mart Supercenters, in terms of price decreases, is in the grocery and dairy departments for both national brands and private labels. Lower prices are also observed for national brand produce, and private label HBA. Supercenters have no statistically significant effect on goods in the frozen food department.
- 3) Taking into account market concentration, other demographic variables, and store characteristics, Wal-Mart Supercenters price their national brand and private label products significantly lower than conventional supermarkets. The estimated average price difference between Supercenters and conventional supermarkets for national brand products ranges from 17 to 23 percent for competing stores and comparison stores, respectively. The

corresponding differences for private labels are lower, ranging from 8 to 14 percent.

The greater overall competitive effect of Supercenters on national brand than on private label prices may reflect a strategic effort by competing supermarkets to increase consumer traffic or maintain customer loyalty. Dhar and Hoch (1997) found that a common strategy for supermarkets to increase consumer traffic is to lower the price and improve promotions on national brands as well as carry a greater number and assortment of national brands. In a region such as New England, which is wealthy relative to the nation as a whole, consumer demand for national brand products is high and this strategy may be particularly effective.

An average American family, with a total household income between \$50,000 and \$70,000, spends \$1,411 per person annually on food intended for at-home consumption.¹⁰ This range encompasses many of the cities and towns sampled for this study, as well as much of New England. According to our results, a family living within five miles of a Wal-Mart Supercenter can expect to save between \$44 and \$97 per person annually by shopping exclusively at conventional supermarkets located within a five-mile radius from a Supercenter, allowing for the shopping basket to consist of some combination of national brand and private label products.¹¹

The annual savings for consumers shopping entirely at Supercenters are larger. The size of the savings depends on whether the alternative supermarket directly competes with a Supercenter or not. Consumers living within five miles of Supercenters can achieve estimated annual savings ranging from \$113 to \$241 per person annually, if they shop at Supercenters rather than at competing supermarkets. Shoppers willing to travel from cities and towns without Supercenters can save between \$201 and \$323 per person annually on grocery expenditures by shopping at

¹⁰ This value is from the 2001 ERS report *Food Spending in American Households*. The expenditure data used in the report are from 1997-1998, and the spending estimates are reported in 2004 dollars.

¹¹ The savings figures are calculated based on the range of price decrease estimates reported in table 7. The percentage price differences between competing and comparison supermarkets range from 3.11 percent to 6.83 percent across national brands and private labels.

Supercenters relative to conventional supermarkets.

The controversies surrounding Wal-Mart beg the question “Is Wal-Mart good for the economy?” This question can typically only be partially answered because so many economic factors must be considered. Wal-Mart’s effects on customers, employees, competitors, and distributors must all be taken into account. In this article, we focused on the retail price impact of Supercenters. Based on our empirical results, we conclude that Wal-Mart Supercenters have a positive welfare effect on price-sensitive consumers. Consumers who seek to purchase their groceries as inexpensively as possible benefit from the presence of Supercenters.

The results presented in this article suggest possible avenues for further research. In addition to the implications resulting from the regression analysis, the coefficient of variation (CV) pattern in the price indexes show that for nearly all departments and for both national brand and private label products, supermarkets competing with Supercenters have higher price variability than those located further away from the nearest Supercenter. This finding may reflect a reduction in the ability of supermarkets to coordinate promotional patterns. It may also reflect the presence of non-price competitive strategies in addition to standard price-cutting strategy. In fact, several of the competing supermarkets visited for data collection were recently renovated, featuring amenities such as gas stations, salons, or coffee shops. The CV pattern calls for an exploration of the strategies utilized by supermarkets when faced with competition from Supercenters. In general, more research is needed on the short-run and long-run price and non-price response of supermarkets to the entry of Wal-Mart Supercenters. Such research would enable a better understanding of the profitability and viability of the supermarket industry in the context of the rapid proliferation of Wal-Mart Supercenters.

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APPENDIX A: STORES SAMPLED AND THEIR CHARACTERISTICS

<i>Store</i>	<i>Type</i>	<i>Location</i>	<i>Population</i>	<i>Median Household Income (\$)</i>	<i>Store Size (sq. feet)</i>
Wal-Mart	Supercenter	North Windham, CT	38,680	30,155	55,000
Super Stop n' Shop	Competing	North Windham, CT	38,680	30,155	41,000
Super Stop n' Shop	Comparison	Vernon-Rockville, CT	35,771	44,510	37,000
Wal-Mart	Supercenter	Westerly, RI	22,966	44,613	57,000
Super Stop n' Shop	Competing	Westerly, RI	22,966	44,613	47,000
Super Stop n' Shop	Comparison	Seekonk, MA	13,425	56,364	51,000
Wal-Mart	Supercenter	Jewett City, CT	3,053	45,826	63,000
Better Value IGA	Competing	Jewett City, CT	3,053	45,826	22,000
Better Value IGA	Comparison	Plainfield, CT	14,619	42,851	15,000
Wal-Mart	Supercenter	Ware, MA	9,707	36,875	55,000
Big Y	Competing	Ware, MA	9,707	36,875	29,000
Big Y	Comparison	Stafford Springs, CT	11,307	52,699	35,000
Wal-Mart	Supercenter	Waterford, CT	19,152	56,047	66,000
Super Stop n' Shop	Competing	Waterford, CT	19,152	56,047	50,000
Super Stop n' Shop	Comparison	Fairhaven, MA	16,159	41,696	60,000
Wal-Mart	Supercenter	Raynham, MA	11,739	64,464	67,000
Super Stop n' Shop	Competing	Raynham, MA	11,739	64,464	67,000
Stop n' Shop	Comparison	Attleboro, MA	42,068	50,807	60,000

APPENDIX B: THE MARKET BASKET OF PRODUCTS

<i>Product</i>	<i>Department</i>	<i>Minimum Price (\$)</i>	<i>Maximum Price (\$)</i>	<i>Average Price (\$)</i>	<i>Standard Deviation (\$)</i>
Coca-Cola 2-Liter	Grocery	1.07	1.59	1.38	0.17
PL Cola 2-Liter	Grocery	0.50	0.99	0.66	0.16
Maxwell House Coffee (13 oz.)	Grocery	1.97	3.29	2.49	0.46
PL Coffee (13 oz.)	Grocery	1.67	2.69	2.03	0.37
Bumble Bee Tuna (6 oz.)	Grocery	1.12	1.59	1.38	0.17
PL Tuna (6 oz.)	Grocery	0.88	1.39	1.17	0.16
Cheerios (15 oz.)	Grocery	2.44	3.99	3.15	0.62
PL O-Shaped Cereal (15 oz.)	Grocery	1.50	2.88	2.02	0.47
Lays Potato Chips (12 oz.)	Grocery	1.99	2.99	2.66	0.48
PL Potato Chips (12 oz.)	Grocery	1.47	1.99	1.77	0.25
Kraft Mac n' Cheese (7.25 oz.)	Grocery	0.66	1.39	0.97	0.19
PL Mac n' Cheese (7.25 oz.)	Grocery	0.33	0.60	0.44	0.10
Prego Pasta Sauce (26 oz.)	Grocery	1.50	2.69	2.00	0.38
PL Pasta Sauce (26 oz.)	Grocery	1.00	1.59	1.29	0.23
Jif Creamy Peanut Butter (28 oz.)	Grocery	2.68	3.89	3.11	0.34
PL Creamy Peanut Butter (28 oz.)	Grocery	2.12	2.89	2.49	0.25
Del Monte Sliced Peaches (15.25 oz.)	Grocery	0.88	1.59	1.25	0.24
PL Sliced Peaches (15.25 oz.)	Grocery	0.78	1.29	0.99	0.18
Nabisco Chips Ahoy (16 oz.)	Grocery	2.50	4.15	3.21	0.59
PL Chocolate Chip Cookies (16 oz.)	Grocery	0.78	2.99	1.92	0.88
Heinz Ketchup (24 oz.)	Grocery	1.29	1.99	1.65	0.20
PL Ketchup (24 oz.)	Grocery	0.78	1.39	1.07	0.19
Bisquik Pancake Mix (40 oz.)	Grocery	2.23	3.19	2.72	0.35
PL Pancake Mix (40 oz.)	Grocery	1.15	2.49	1.79	0.45
Hood Milk 1% Milk (gallon)	Dairy	2.96	4.15	3.51	0.44
PL 1% Milk (gallon)	Dairy	2.37	3.75	2.94	0.47
Kraft American Singles (16 ct.)	Dairy	1.97	3.99	2.87	0.85
PL American Singles (16 ct.)	Dairy	1.77	3.35	2.47	0.65
Land o' Lakes Butter (1 lb.)	Dairy	3.24	4.77	4.03	0.67
PL Butter (1 lb.)	Dairy	2.50	3.99	3.08	0.55
Breyers Vanilla Ice Cream (1/2 gal.)	Frozen	3.24	6.57	4.70	1.08
PL Vanilla Ice Cream (1/2 gal.)	Frozen	2.50	5.49	3.41	1.02
Eggo Homestyle Waffles (10 ct.)	Frozen	1.50	2.37	1.85	0.32
PL Homestyle Waffles (10 ct.)	Frozen	1.00	1.99	1.28	0.35
Birdseye Frozen Broccoli (10 oz.)	Frozen	0.73	1.89	1.14	0.34
PL Frozen Broccoli (10 oz.)	Frozen	0.59	1.19	0.89	0.20
Q-Tips Cotton Swabs (500 ct.)	HBA	2.95	3.99	3.57	0.47
PL Cotton Swabs (500 ct.)	HBA	1.88	3.49	2.73	0.66
Dial Anti-Bacterial Soap (3 ct.)	HBA	1.62	2.65	2.06	0.32
PL Anti-Bacterial Soap (3 ct.)	HBA	1.47	1.99	1.58	0.19
Edge Shaving Gel (7 oz.)	HBA	1.78	3.89	2.65	0.50
PL Shaving Gel (7 oz.)	HBA	1.14	3.59	1.92	0.74
Purdue Chicken Drumsticks (1 lb.)	Meat	0.59	2.29	1.62	0.58
PL Chicken Drumsticks (1 lb.)	Meat	0.59	2.29	1.29	0.43
Perri Italian Sausage (1 lb.)	Meat	2.38	3.99	3.40	0.78

The basket of goods, continued

PL Italian Sausage (1 lb.)	Meat	2.22	4.59	2.96	0.64
Oscar Meyer Bacon (1 lb.)	Meat	4.87	5.49	4.98	0.14
PL Bacon (1 lb.)	Meat	1.98	4.99	3.29	0.61
Perfect Orchard	Produce	2.44	3.99	3.38	0.64
Red Delicious Apples (1 lb.)					
Russet Red Potatoes (1 lb.)	Produce	0.66	1.69	1.24	0.30
Bolthouse Farms Carrots (1 lb.)	Produce	0.58	1.99	0.83	0.47
Foxy Lettuce Head (head)	Produce	0.78	1.99	1.30	0.41
Chiquita Bananas (1 lb.)	Produce	0.38	0.69	0.55	0.11
Foxy Celery (1 lb.)	Produce	1.24	2.21	1.57	0.33