THE EFFECT OF ENTRY BY WAL-MART SUPERCENTERS ON RETAIL GROCERY CONCENTRATION

Bobby J. Martens[a,*], Frank Dooley[b], and Sounghun Kim[c]

[a] Bobby J. Martens is an assistant professor of logistics and supply chain management, College of Business and Institute for Food Safety and Security; Iowa State University.
[b] Frank Dooley is a professor, Department of Agricultural Economics, Purdue University.
[c] Sounghun Kim is a Ph.D. candidate, Department of Agricultural Economics- Purdue University.

[*] Telephone: 515-294-5007; Email: martens1@iastate.edu, Address: Iowa State University, 2340 Gerdin Business Building, Ames, IA 50010.

Selected Paper prepared for presentation at the
2006 America Agricultural Economics Association Annual Meeting, Long Beach, CA

ABSTRACT

The U.S. retail grocery industry shifted from an industry dominated by small grocers serving local markets to one characterized by large retailers present in international markets. Average retail grocery concentration as measured by CR4 increased from 17.8 in 1982 to 43.0 in 1999 (U.S. Census Bureau, 1982; Trade Dimensions *Marketing Guidebook*, 2000). Wal-Mart's tremendous growth is the catalyst to this change. Although Wal-Mart has been studied from multiple perspectives, little is known about Wal-Mart's effect on market concentration. Understanding Wal-Mart's influence on market concentration is important because an extensive literature shows a pattern linking retail grocery market concentration to increases in retail grocery prices.

The objective of this analysis is to evaluate the effects of de novo entry by Wal-Mart Supercenters on retail grocery concentration (CR4). Using a panel dataset complied from Trade Dimensions *Marketing Guidebook* and *Market Scope* publications, the effect of Wal-Mart Supercenters on changes in retail grocery concentration was estimated. The results show that existing Wal-Mart Supercenter operations and entry by Wal-Mart Supercenters significantly increase the rate of change in retail grocery concentration as measured by CR4.

INTRODUCTION

During the past two decades, the U.S. retail grocery industry has seen a contraction of small "Mom and Pop" retailers,[1] mergers and acquisitions among large retailers, and the emergence of a new, large supercenters stores (Wal-Mart, Target, K-

[1] The number of small supermarkets decreased by 15.5 percent from 1999 to 2002 (U.S. Bureau of Census, 2005).

Mart) (Kaufman, 2002). In addition, average retail grocery concentration as measured by CR4 increased from 17.8 in 1982 to 43.0 in 1999 (U.S. Census Bureau, 1982; Trade Dimensions *Marketing Guidebook*, 2000).[2] Grocery shifted from an industry dominated by small grocers serving local markets to one characterized by large retailers present in international markets. The growth of Wal-Mart Supercenters is explained by many factors, including supply chain management and logistics strategies which drastically lower costs compared with traditional grocers, fewer weekly trips to supermarkets by consumers, and evolving store formats. These larger retailers enjoy a lower cost structure, combined with expertise in marketing, store design, and shelf space allocations.

Concerns have arisen that large grocers are using these advantages to reduce consumer access to local groceries (Blanchard and Lyson, 2002), increase retailer market power (Foer, 1999), and discourage competition (FTC Report, 2001). Wal-Mart is often at the heart of the media's reporting of the grocery industry's changes, due in part to its rapid growth and size.[3]

Wal-Mart's tremendous growth is the catalyst to this change. In 1987 Wal-Mart did not sell a full line of groceries. By 2002, the company surpassed Kroger Foods to become the largest retail grocer in the United States. This rapid growth is expected to continue, with one prediction that Wal-Mart will control 35 percent of the U.S. retail grocery sales for many consumer products by 2010 (Clarke, 2005). Although Wal-Mart has been studied from multiple perspectives, little is known about Wal-Mart's effect on

---

[2] CR4 is the market share of the top 4 retail grocery firms. CR4 in the grocery marketing areas (GMAs) used in this study increased 6 points from 1999 to 2002, from 59.8 to 65.8 (Trade Dimensions, 1999-2000 and 2002-2003).

[3] A few of the hundreds of newspaper articles, radio commentaries, television documentaries, and news stories include National Public Radio's series "Is Wal-Mart Good for America?" (Smith, 2004), *The Los Angeles Times'* Pulitzer Prize winning series of articles on Wal-Mart (Cleeland and Goldman, 2003), and *The Economist's* "How Big Can It Grow" article (2004). These reports, although often based on inferential analysis and anecdotes, identify important changes occurring in the grocery industry.

market concentration. Understanding Wal-Mart's influence on market concentration is important because an extensive literature shows a pattern linking retail grocery market concentration to increases in retail grocery prices.

Yu and Connor (2002) note that only the banking and airline industries have received more empirical price-concentration analysis than the retail grocery industry. Of the many published price-concentration studies in the grocery industry (Marion et al., 1979; Lamm, 1981; Cotterill, 1986; Kaufman and Handy, 1989; Weiss, 1989; Anderson, 1990; Newmark, 1990; Cotterill and Harper, 1995; Binkley and Connor, 1998; Cotterill, 1999), only two (Kaufman and Handy, 1989 and Newmark, 1990) did not find a positive relationship between market concentration and price. Moreover, the findings in both of those studies have been refuted by Cotterill (1993) and Yu and Connor (2002). Since high concentration levels increase retail grocery prices, understanding the determinants of retail grocery concentration is important.

Contrary to the findings of traditional retail grocery concentration-price literature, Wal-Mart entry is associated with reduced retail grocery prices, not increasing prices. There has been research evaluating whether efficiency gains associated with large stores offset the higher mark-ups resulting from increased market concentration in the retail grocery industry. Dobson and Waterson (1997) found that higher mark-ups are offset by discounts arising from greater efficiency. They conclude that the effects from changes in market structure depend on the relationship between market power and scale economies. Aalto-Setala (2002) evaluated increasing returns, concentration, and market power in the Finnish retail grocery industry. "There is no need to constrain directly the growth of larger stores (in Finland) from an anti-trust perspective as long as there is sufficient

competition" (Aalto-Setala, 2002). Therefore, although cost efficiencies from scale economies appear to off-set at least part of the mark-up resulting from increased market concentration, competition remains important.

In the US, the Robinson-Patman Act, which is concerned with large buyers harming smaller buyers by eliciting large discounts from suppliers, adds to the importance of understanding market concentration in the grocery industry. The reality of or even the consideration of enforcement of the Robinson-Patman Act began in 1999 when the American Antitrust Agency (AAI) and Wakefern Food Corporation petitioned the Federal Trade Commission to recognize that retail grocery concentration is high enough to trigger the use of the Robinson-Patman Act. As of 2006, the Robinson-Patman Act has not been used to discourage modern retail concentration levels.

Understanding the primary causes of retail grocery market concentration is important because of the strong relationship between concentration and price. The popular media often blames Wal-Mart for putting small grocery retailers out of business, but a literature review found no studies that clearly link Wal-Mart and market concentration. Therefore, the objective of this analysis is to evaluate the effects of de novo entry by Wal-Mart Supercenters on retail grocery concentration (CR4).

This work is unique because it is the first known study to evaluate the determinants of changes in market concentration in the retail grocery industry, although such studies are rather common in the manufacturing sectors. One key aspect of a retail grocery concentration study that differs from a manufacturing concentration study is market scope or geographical market size. While the retail grocery market concentration for the entire US may not be considered high, local markets are typically much more

concentrated. "Local market concentration measures the ability of supermarkets to exercise market power and raise retail price" (Cotterill, 1999).[4]

LITERATURE

Relevant literature includes theory from location literature and empirical works from the market concentration and retail grocery industry literature.[5] First, the only study found in a literature search evaluating Wal-Mart's effects on retail grocery concentration will be discussed. Franklin (2001) evaluated Wal-Mart's effects on supermarket concentration by examining the largest 100 metropolitan statistical areas (MSAs) using Trade Dimension's *Market Scope* data.

Franklin's first step was to discuss descriptive statistics based the *Market Scope* data. From the descriptive statistics, Franklin concluded that "Wal-Mart Supercenter entry had little impact on food seller concentration in 19 major metropolitan areas between 1993 and 1998." In addition, Franklin concluded that Wal-Mart entry into a MSA initially results in a decrease in CR4 followed either by competitor retaliation (increasing concentration), an exodus of fringe firms (increasing concentration), or nothing (decreasing concentration).

Then Franklin estimated univariate and multivariate econometric models to determine whether Wal-Mart entry and market share are related to median household income, metropolitan size as measured by total population, or time since Wal-Mart entered a MSA. Both a univariate and a multivariate logit model suggested a negative

---

[4] Cotterill went on to discuss how four firm concentration levels (CR4) changed from 1992 to 1998. In California, CR4 increased from 50.1 to 69.8 percent, while in Florida the local CR4 levels increased from 77.7 to 87.7 percent. Cotterill attributes much of this increase in concentration to mergers and acquisitions by large grocery retailers.

[5] The market concentration studies primarily relate to the manufacturing sectors. Therefore, those sectors will be reviewed, noting that not all aspects of the studies will be related to retail concentration.

relationship between median household income and Wal-Mart's presence.[6] Finally, Franklin used two univariate and one multivariate ordinary least squares models to conclude that a negative relationship exists between median household income and Wal-Mart's market share and that a positive relationship exists between the time since entering a MSA and Wal-Mart's market share.[7]

Franklin's work begins to evaluate the effects of Wal-Mart on retail grocery concentration, but three key differences exist between Franklin's work and this research. First, Franklin's data are expanded from 19 MSAs to contiguous grocery marketing areas (GMAs) containing both metropolitan and non-metropolitan areas. Second, by drawing upon additional theory, additional explanatory variables are added to evaluate the effects of de novo entry by Wal-Mart Supercenters on the change in retail grocery concentration. Third, the empirical model gives econometric coefficients specifically describing how both existing operation of and new entry by Wal-Mart Supercenters affects changes in retail grocery concentration. A discussion of the theory and empirical works used to develop our model follows.

Location Theory

Location theory explains the geographical concentration of firms on the basis of competition and economic efficiency.[8] Location theory brings together three related strands of literature, neo-classical theory (NCT), new trade theory (NTT) and new economic geography (NEG). In NCT, location determinants are technological

---

[6] Two variables were used in the multivariate logit model; median household income and total MSA population. A univariate logit model was used to evaluate the effect of total MSA population on Wal-Mart presence, but the result was insignificant.

[7] Three variables were used in the multivariate OLS model; median household income, total MSA population, and time since Wal-Mart entry into the MSA.

[8] Geographical concentration is defined as the number of firms within a defined geographic area, not as the concentration of market share (Krugman, 1980).

differences, natural resource endowments, and factor endowments and intensities (Brulhart, 1998). In NTT, additional determinants of location include the degree of plant-level increasing returns and the size of the home market, and NEG extends the first two strands by adding externalities and additional trade costs measures as determinants.

The economic benefits described by location theory do not necessarily mean that locating next to a competitor is advantageous. Economic theory would suggest that competition exists when two parties compete for the same set of resources and that additional room for entry exists in a growing market. Therefore, heterogeneity in founding rates, not low failure rates, maybe the drivers of agglomeration (Sorenson and Audia, 2000). This is important when explaining changes in retailing and localized markets.

Empirical Manufacturing Concentration Studies

Concentration studies from the manufacturing sector include several variables common to agglomeration and location theory. In general, early concentration studies often examined the determinants of concentration levels, but more recent studies recognize the importance of explaining the drivers of change in market concentration. Therefore, change in retail concentration is most often used as the dependent variable (Curry and George, 1983).

Curry and George (1983) identified variables that predicted change in market concentration in seventeen studies between 1960 and 1980. Table 1 compares the variables identified by Curry and George with the variables important to agglomeration and location theory. In the manufacturing concentration and concentration-price studies, initial concentration and industry growth were identified as the most important variables

influencing concentration, which is consistent with agglomeration and location theory. An important variable in the concentration research not present in the agglomeration and location theory is the concept of entry barriers, which is often difficult to measure (Curry and George, 1983). Entry barriers are certainly important to manufacturing industries, but are less important to retailing because it is more difficult for retailers to hold excess capacity and easier for retailers to enter markets because of their typically lower fixed cost structure.

Table 1: Key Independent Variables for Location and Concentration Analyses

Variable	Location Theory	Manufacturing Concentration
Initial Concentration / Beginning location density	Hannan and Freeman, 1977	Curry and George, 1983; Rogers, 2001; Connor et al., 1996
Initial market size	Krugman, 1980, 1981	Curry and George, 1983; Rogers, 2000; Connor et al., 1996
Market growth	Hannan and Freeman, 1977	Curry and George, 1983; Levy, 1985; Connor et al., 1996
Trade costs	Fujita, Krugman, and Venables, 1999	
Proximity to Resources	Brulhart, 1998; Harris, 1954	
Change in Number of Firms		Curry and George, 1983; Rogers, 2001

SPECIFICATION AND DATA

Past works evaluated in the literature review were the basis for specifying a model to determine the effects of de novo entry by Wal-Mart supercenter stores on retail grocery concentration. Variables included in our models include those variables used in previous studies, and variables that tie directly back to agglomeration and location theory. Therefore, the following model was specified.

$$\Delta CR4_{i,t-(t-1)} = \beta_o + \beta_1(CR4_{i,t-1}) + \beta_2(CP_{i,t-1}) + B_3(\Delta CP_{i,t-(t-1)}) + \beta_4(Year_i) + \beta_5(PInd) + \beta_6(DC_{i,t-1}) + \beta_7(Pdn_{i,t-1}) + \beta_8(\Delta Pdn_{i,t-(t-1)}) + \beta_9(\ln Sales) + \beta_{10}(WM_{i,t-1}) + \beta_{11}(\Delta WM_{i,t-(t-1)}) + \varepsilon_{i,t} \quad (1)$$

where:

$\Delta CR4_{i,t-(t-1)}$ is the change in four firm concentration (CR4) in GMA *i* from *t – 1* to *t*.

$CR4_{i,t-1}$ is the initial concentration level in year *t-1* and GMA *i*.

$CP_{i,t-1}$ is the initial count of stores operated by the top two firms in year *t-1* and GMA *i*.

$\Delta CP_{i,t-(t-1)}$ is the change in the count of stores operated by the top two firms in GMA *i*, between *t* and *t – 1*.

$Year_i$ is a dummy variable for each year *t* = 1999, 2000, 2001.

$Pind_{i,t-1}$ is percent of total grocery stores classified as independent in year *t-1* and GMA *i*.

$DC_{i,t-1}$ is the total number of grocery distribution centers in year *t – 1* and GMA *i*.

$Pdn_{i,t-1}$ is the initial population density in GMA *i*.

$\Delta Pdn_{i,t-(t-1)}$ is the change in population density in GMA *i*, between *t* and *t – 1*.

$Log(Sales_{i,t-1})$ is the total grocery sales in year *t-1* and GMA *i*.

$\Delta WM_{i,t-(t-1)}$ is the change in number of Wal-Mart Supercenters in GMA *i* from *t-1* to *t*.

$WM_{i,t-1}$ is the initial count of Wal-Mart Supercenter stores in GMA *i*.

Five years of data from 32 grocery marketing areas were available and collected from Trade Dimensions Marketing Guidebook and Market Scope (2000 – 2004). The

spatial unit is a grocery marketing area (GMA), defined and monitored by Trade Dimensions on the basis of distribution center locations, transportation flows, and physical boundaries. Over time, GMA boundaries change because grocery retailing changes. The geographical size of each of the 50 GMAs vary, but most are approximately the size of an average U.S. state. Although GMAs follow county boundaries, they do not follow state boundaries.

Of the fifty total GMAs, seventeen East and West coast GMAs underwent some type of boundary change between 1999 and 2003. In addition, the "Fargo GMA" data contained inconsistencies, so it was excluded from the data set. Therefore, 32 of the fifty GMAs had usable data for the years 1999 through 2003. Figure 1 shows the GMAs used in the dataset (shaded areas). Earlier data were not available because Trade Dimensions Marketing Guidebook did not publish GMA level market share data for all retailers before 1999. After annual changes were calculated, four years of observations remained for each of the 32 GMAs.

Possible implications from omitting the East and West coast GMAs should be discussed. First, the omitted GMAs are among the most populated areas of the U.S. Therefore, the GMAs included in the data set are on average more rural and might not representative a sample of the U.S. Second, the coastal GMAs have a lower CR4 level. Third, Wal-Mart operates fewer stores in the coastal GMAs, on average. Combined, the three implications of omitting the East and West coast GMAs may mean that this sample of GMAs does not geographically representative the entire U.S. But, even if the sample does not represent all of the omitted coastal GMAs, it represents parts of the more rural areas of the coasts such as parts of Virginia, New York, Maine, Vermont, Oregon, and

Washington. The sample also represents the majority of the U.S. land area and is useful to understand the effects of Wal-Mart Supercenters on retail grocery concentration, especially in the areas where most Wal-Mart Supercenters are located.

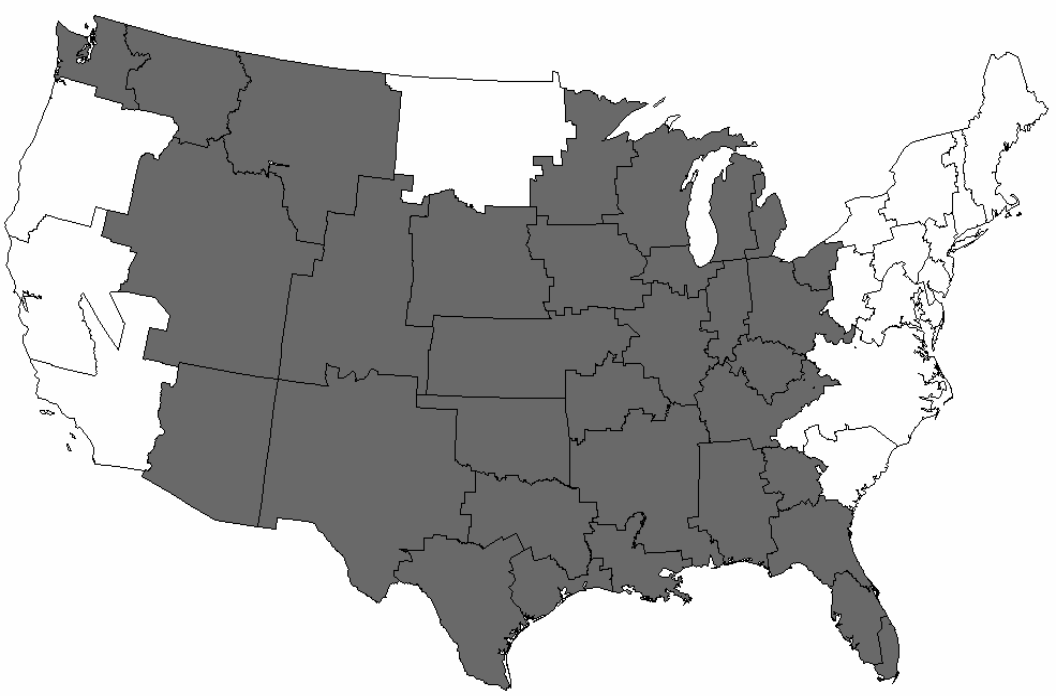

Figure 1: GMAs Included in the Dataset

The sample of 32 GMAs had an average CR4 level of 59.8, and the average change in CR4 was 1.1 from 1999 to 2003 (Table 2). The GMAs had an average of 18.8 initial Wal-Mart Supercenters, ranging from 0 in the Detroit GMA to 41 in the Tampa GMA, and, on average, 4.3 new Wal-Mart Supercenters were added to each GMA over the four years. The standard deviation of the change in Wal-Mart Supercenters was high; 3.9. The change in the number of Wal-Mart Supercenters ranged from zero in the Detroit GMA to eighteen in Memphis GMA.

Table 2: Descriptive Statistics for Grocery Industry, 1999 to 2003

	Grocery Sales	CR4	Δ CR4	Pop. Density	Δ Pop. Density
Mean	$9.0M	59.8	1.1	151.1	2.2
St. Dev.	3570478	13.1	2.8	168.3	8.4
	# Wal-Mart	Δ Wal-Mart	# Top 2 Competitors	Δ Top 2 Competitors	
Mean	18.8	4.3	18.8	4.3	
St. Dev.	17.1	3.9	17.1	3.9	

Source: Trade Dimensions Marketing Guidebook and Market Scope

When Wal-Mart Supercenters enter, competitors can respond by opening new stores to compete, by exiting and closing stores, or by doing nothing. The count of stores operated by the top two firms and the change in the count of the top two competitors were added to the model to describe the competitor reaction to Wal-Mart's entry. Annually, the top two competitors in each GMA open 4.3 new stores, on average (Table 2). This may suggest that competitors are either opening new stores or merging to as a reaction to Wal-Mart's entry.

Figure 2 shows the GMAs with the 50^{th} to 90^{th} percentile level of concentration in gray and 90^{th} to 100^{th} percentile of concentration in black. Visually, one can see that parts of Florida, Texas, and Arizona are the most concentrated areas, while concentration levels are mixed through the rest of the study area. Similarly, Figure 3 shows the change in concentration for the GMAs by percentile. Note that many of the white GMAs in Figure 2.2 ($<50^{th}$ percentile of CR4) are gray or black in Figure 3, showing that lesser concentrated GMAs are experiencing the greatest increases in concentration.

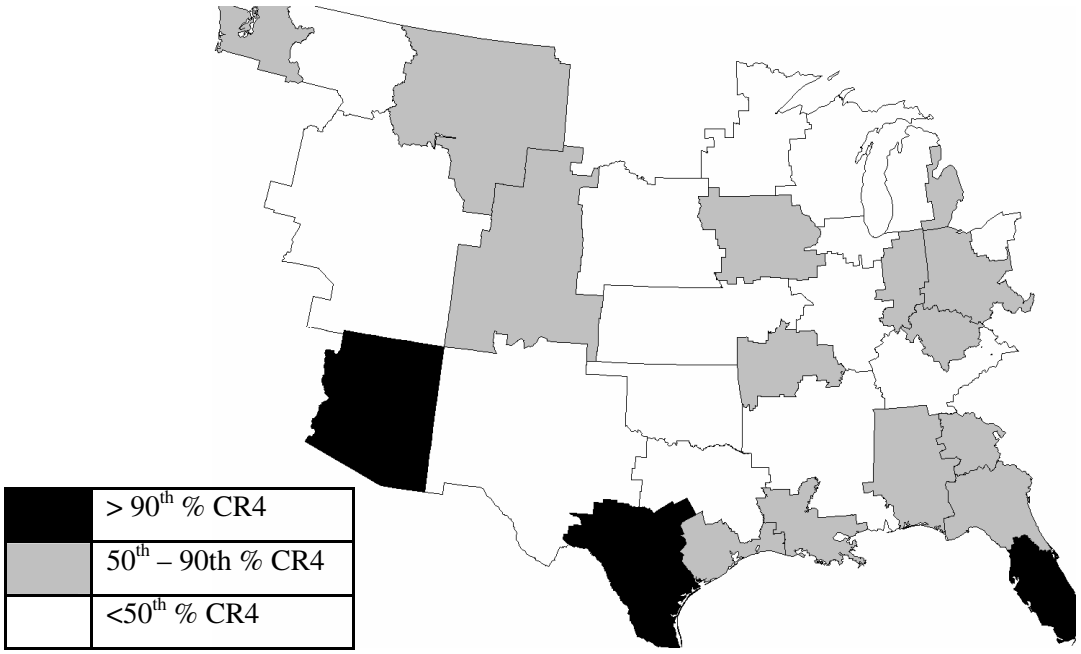

Figure 2: Percentile Map CR4 by GMA

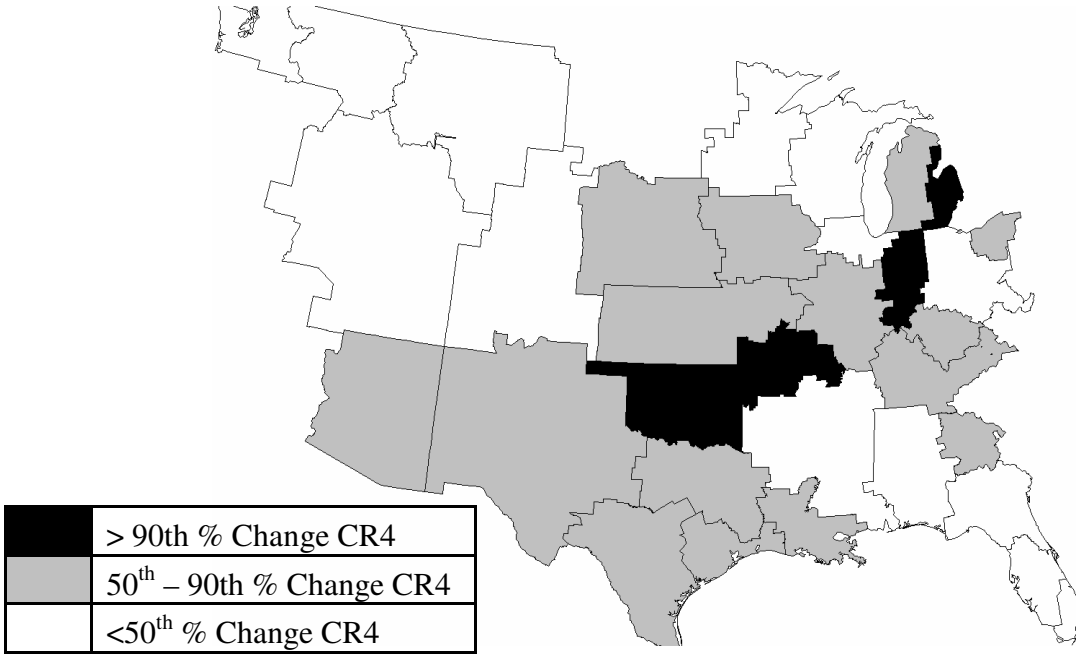

Figure 3: Percentile Map of ΔCR4 by GMA

MODEL AND RESULTS

The four years of data for the 32 GMAs were stacked to form a panel (a cross-section of observations over time) of 128 total observations. The panel has both a spatial dimension (GMAs) and a temporal (years) dimension. Two types of models used to evaluate panel data are fixed and random effects models, which Greene (2000) describes in detail. Ordinary Least Squares (OLS) is inappropriate because it assumes identical coefficients across every GMA in the sample. In the fixed effects model, slopes are constant and intercepts vary either by the cross-section (GMA), time, or both. To determine whether statistically significant differences exist across groups (e.g., GMAs), a *F* test is used to test for R^2 change. A paired *t* test between a reference point (usually first or last year) and the test value can be used to test for temporal effects. A random effects model is a regression with a random constant term or a mean value plus a random error. In a random effects model, some omitted variables may be constant over time and varying among GMAs while others are fixed between cases but varying over time.

The Hausman specification test is used to determine whether the fixed or random effects model is most appropriate. If there is significant correlation between unobserved random effects and the regressors, the fixed effects model will be best because it allows for correlation between the independent variables and unobserved effect. If, however, there is no significant correlation between unobserved random effects and the regressors, the random effects model would be more powerful because time-constant factors can be included. In addition, the models will be tested for heteroskedasticity and autocorrelation using the Breusch-Pagan test and a test developed by Woodridge (2002), respectively.

Empirical Results

The panel data were run in both fixed and random effect models, and the Hausman test resulted in a P-value of 0.000. Therefore, the fixed effects model, which allows for correlation between the independent variables and unobserved effects, was used for the results shown in Table 3. The Breusch-Pagan and Woodridge (2002) tests found no causes of inefficiency from heteroskedasticity or autocorrelation. The F test shows that the fixed effect is the result of significantly statistical different GMAs.

Table 3: Results from the Fixed Effects Model on Change in Concentration

Group variable (i): GMA				No. of observations =		128
R^2 Within =	0.4314			Number of groups =		32
R^2 Between =	0.0404			sigma_u =		13.53
R^2 Overall =	0.0282			sigma_e =		2.19
Prob > F =	0.000			Rho (var. due to u_i)		0.97
F(13,83) = 4.84 that all u_i=0; Prob > F = 0.000						
	Coeff.	Std Err	t	P > |t|	[95% Conf. Interval]	
CR4	-0.5554	0.0958	-5.80	0.000	-0.746	-0.365
CP	0.0261	0.0250	1.04	0.301	-0.024	0.076
ΔCP	0.0431	0.0216	2.00	0.049	0.000	0.086
Y99	0.4477	1.1238	0.40	0.691	-1.788	2.683
Y00	-0.0082	0.8389	-0.01	0.992	-1.677	1.660
Y01	-0.9314	0.6500	-1.43	0.156	-2.224	0.361
PIND	-9.5768	6.5008	-1.47	0.144	-22.507	3.353
DC	0.0228	0.4088	0.06	0.956	-0.790	0.836
PDN	-0.0689	0.0453	-1.52	0.132	-0.159	0.021
CPDN	-0.0080	0.0527	-0.15	0.880	-0.113	0.097
Ln*SALES*	4.5939	4.6311	0.99	0.324	-4.617	13.805
WM	0.1343	0.0616	2.18	0.032	0.012	0.257
ΔWal	0.1621	0.0899	1.80	0.075	-0.017	0.341
F test that all u_i=0;		F(13,83) = 4.84			Prob > F = 0.000	

Four variables (*CR4, WM, ΔWM,* and *Δ*CP) had statistically significant relationship with the change in CR4. The result from *CR4* (the beginning level of CR4) was significant at the 1 percent level with a negative sign, as expected. In this study and in past manufacturing market concentration studies, higher initial market concentration means future changes in market concentration are smaller. This describes how the market is converging to a new, higher level of concentration.

Wal-Mart has a significant positive affect on the change in CR4, with the initial number of Wal-Mart supercenter stores (*WM*) variable significant at the 5 percent level and the change in the number of Wal-Mart Supercenter stores (*ΔWM*) variable significant at the 10 percent level. The *WM* coefficient was 0.1343, which, by itself, shows that the existing operation of an individual Wal-Mart Supercenter has a relatively small affect on the rate of market concentration change. However, Wal-Mart operates multiple stores in geographical areas which, combined, have a significant affect on the rate of market concentration change. For example, on average about 19 Wal-Mart Supercenters operated in each GMA annually, meaning the typical GMA would expect an increase in the change in CR4 of about 2.5 points annually due to the presence of Wal-Mart Supercenters (Table 4).

The coefficient for the change in the number of Wal-Mart Supercenters (*ΔWM*) is 0.1621. Annually, about 4 new Wal-Mart Supercenters entered the average GMA. Therefore, the average GMA experienced an increase in change in concentration of about 0.69 points due to Wal-Mart Supercenter expansion (Table 4). Individual GMAs experienced a greater expansion of Wal-Mart Supercenters. For example, in the Memphis GMA, the average annual effect of entry by Wal-Mart Supercenters was 2.19

Table 4: Effect of Wal-Mart and Competitor son Average Annual ΔCR4 (1999-2003)

GMA Name	1999 CR4	Average Annual ΔCR4	Effect of Competitor Reaction on Average Annual ΔCR4	Effect of Wal-Mart on Average Annual ΔCR4 (1999-2003)		
				Existing Wal-Mart Supercenters (WM)	Wal-Mart Supercenter Store Entry (ΔWM)	Total Wal-Mart Effect (WM + ΔWM)
Albuquerque	48.6	1.18	-0.34	3.32	0.53	3.85
Atlanta	63.1	2.00	0.86	2.65	0.73	3.38
Billings	62.6	-0.18	-0.11	0.40	0.32	0.73
Chicago	61.7	-1.80	0.02	1.18	0.16	1.34
Cincinnati	58.9	0.83	-0.01	2.05	0.77	2.82
Cleveland	42.5	2.43	-0.26	0.97	0.16	1.14
Dallas	54.6	1.40	0.71	7.66	1.70	9.36
Denver	77.8	0.60	0.32	2.25	0.97	3.22
Des Moines	68.5	1.20	0.05	1.78	0.85	2.63
Detroit	51.3	3.20	0.03	0.10	0.08	0.18
Grand Rapids	39.5	2.83	0.08	0.20	0.45	0.65
Houston	62.7	1.28	0.29	2.75	1.46	4.21
Indianapolis	56.4	3.18	0.33	2.85	0.81	3.66
Jacksonville	75.4	-0.08	0.25	2.59	0.49	3.07
Kansas City	46.1	2.13	0.10	3.73	0.81	4.54
Louisville	66.2	1.68	0.05	2.42	0.65	3.07
Memphis	54.9	0.18	-0.16	8.76	2.19	10.95
Miami	88.2	-0.60	0.13	0.57	0.24	0.81
Milwaukee	32.4	-0.80	0.09	0.87	0.69	1.56
Minneapolis	43.3	-0.58	0.13	0.20	0.28	0.49
Nashville	53.4	1.98	-0.16	5.88	0.85	6.73
New Orleans	53.4	2.43	-0.58	3.89	0.45	4.34
Oklahoma	41.8	2.98	-0.25	4.53	1.05	5.59
Omaha	42.9	1.53	0.19	0.94	0.32	1.26
Phoenix	69.6	2.85	0.40	0.91	0.61	1.51
Salt Lake City	57.7	-0.33	0.00	0.97	1.09	2.07
San Antonio	79.8	1.50	0.14	3.19	0.77	3.96
Seattle	65.3	-0.60	0.44	0.03	0.12	0.16
Spokane	57.6	-1.50	0.12	0.13	0.20	0.34
Springfield	47.4	3.68	0.05	4.30	0.57	4.86
St. Louis	49.7	1.25	-0.09	4.73	0.73	5.46
Tampa	83.6	-0.13	0.33	4.13	1.09	5.22
Average	58.0	1.11	0.10	2.53	0.69	3.22

points, a high number considering that the mean change in concentration was only 1.11 points.

Finally, the change in the count of stores operated by the top two firms in each GMA (ΔCP) was negative and significant at the 5 percent level. Whether the top two competitors are expanding and merging due to Wal-Mart or not, their expansion and mergers are increasing the annual change in CR4 by 0.10 units, on average. The Atlanta GMA experienced the greatest average annual change in concentration due to ΔCP (0.86 units), while the average annual change in concentration in New Orleans fell by 0.58 units due to ΔCP.

Conclusions and Future Work

The effects of de novo entry by Wal-Mart supercenters on retail grocery concentration were evaluated for 32 relatively large GMAs, covering most of the United States. The results support the hypothesis that Wal-Mart is increasing retail grocery concentration. Existing Wal-Mart stores increased the change in concentration by 0.1343 points per store and entry by new Wal-Mart Supercenters further increased the change in concentration by 0.1621 points per store. In our sample, the regression results show the combined effects of existing Wal-Mart Supercenters and entry by Wal-Mart Supercenters increased concentration from 0.16 points in the Seattle GMA to 10.95 points in the Memphis GMA (Table 4).

Wal-Mart is on-target to open 370 new supercenters in 2006 and "plans to open more than 1,500 stores in the United States in the coming years (Associated Press, 2006). If the new 2006 stores are equally distributed between the 50 GMAs, each GMA would experience an increase in the change in CR4 of more than 1 point. However, the distribution of the new supercenters will likely not be equal across all GMAs. Wal-Mart will likely open 20 or more new supercenters in some GMAs, and none or few in other

GMAs. The 2006 store openings are few compared to Wal-Mart's future expansion plans of opening an average of 30 new stores in each GMA. Therefore, with Wal-Mart's future current expansion plans, the combined effects of Wal-Mart Supercenters will continue to increase retail grocery concentration levels, especially in geographical areas targeted by Wal-Mart for expansion. Even without factoring in competitor response, Wal-Mart will likely increase concentration by 10 points or more in some areas.

This study evaluates the effects of Wal-Mart Supercenters on concentration at the GMA level. However, retail grocery markets are much smaller Trade Dimension's GMAs. Within certain local markets, the effects of Wal-Mart Supercenters on grocery concentration could be much greater; especially true in small, rural towns. In order to understand the effects of entry by Wal-Mart Supercenters on grocery markets, future research should reduce the spatial scale of this study from the GMA level to a county or zip code level. By reducing the spatial scale, spatial effects could be incorporated into the modeling, and the effects of Wal-Mart could be evaluated separately between rural and urban areas. Finally, this study could be extended as additional years of data are published by Trade Dimensions. Additional years of data could be used to evaluate whether Wal-Mart is beginning to saturate any markets or whether any lag effects exist between Wal-Mart Supercenter entry and concentration changes. In addition, addition years of data could be used to better understand the effects of entry by Wal-Mart on competitors.

REFERENCES

Aalto-Setala, V. 2002. "The Effect of Concentration and Market Power on Food Prices: Evidence from Finland." *Journal of Retailing*. 78(3)207-16.

Associated Press, 2006. Retrieved from MSNBC site. http://www.msnbc.msn.com /id/11233081/.

Binkley, J.K., and J.M. Connor. 1998. "Market Competition and Metropolitan-area Food Prices." *Journal of Retailing.* 74:273-293.

Blanchard, T., and T. Lyson. 2002. "Access to Low Cost Groceries in Nonmetropolitan Counties: Large Retailers and the Creation of Food Deserts." Proceedings Paper at the Measuring Rural Diversity Conference, Washington, D.C., November 21-22.

Brulhart, M. 1998. "Economic Geography, Industry Location, and Trade: The Evidence." *World Economy.* 21(6):775-801.

Clarke, K. 2005. *Twenty Trends for 2010: Retailing in an Age of Uncertainty*. A Special Report by *Retail Forward* available at www.retailforward.com.

Cleeland, N. and A. Goldman. 2003. "The Wal-Mart Effect." *Los Angles Times latimes.com.* November 23. Retrieved from http://www.latimes.com/business/la-walmart-sg,1,1534896.storygallery.

Connor, J.M., R. Rogers, and V. Bhagavan. 1996. "Concentration and Countervailing Power in the US Food Manufacturing Industries." *Review of Industrial Organization.* Vol.11(S):473-492.

Cotterill, R.W. 1986. "Market Power in the Retail Rood Industry: Evidence from Vermont." *Review of Economic Statistics*. 68:379-386.

Cotterill, R.W. Ed. 1993. "Competitive Strategy Analysis in the Food System." Boulder CO: Westview Press.

Cotterill, R.W. 1999. "Market Power and the Demsetz Quality Critique: An Evaluation of Food Retailing." *Agribusiness: An International Journal.* 15:101-118.

Cotterill, R.W. and D.C. Harper. 1995. "Market Power and the Demsetz Quality Critique: An Evaluation for Food Retailing." Res. Report No. 29. Storrs, CN: Food Marketing Policy Center, Univ. of Connecticut.

Curry, B. and K.D. George. 1983. "Industrial Concentration: A Survey." *Journal of Industrial Economics.* 31:203-255.

Dobson, P.W. and Waterson, M. 1997. "Countervailing Power and Consumer Prices." *Economic Journal*. 107:418-430.

Economist. 2004. "How Big Can it Grow?" April 15. Retrieved from http://www.economist.com/printedition/displayStory.cfm?Story_ID=2593089.

Federal Trade Commission. 2001. "*Report on the Federal Trade Commission Workshop on Slotting Allowances and Other Marketing Practices in the Grocery Industry*." Washington D.C.

Foer, A.A. 1999. Mergers in the Food Industry: Ahold/Pathmark. A letter to Robert Pitofsky, Chairman, Federal Trade Commission, June 18.

Franklin, A.W., 2001. "The Impact of Wal-Mart Supercenters on Supermarket Concentration in U.S. Metropolitan Areas." *Agribusiness.* 17(1):104-114.

Fujita, M., P. Krugman and A.J. Venables. 1999. *The Spatial Economy: Cities, Regions and International Trade.* Cambridge, MA: MIT Press.

Hannan, M.T., and J. Freeman. 1977. "The Population Ecology of Organizations." *American Journal of Sociology.* 82:929–64.

Harris, C.D. 1954. "The Market as a Factor in the Localization of Industry in the United States." *Annals of the Association of American Geographers.* 44:315-348.

Kaufman, P.R. 2002. "Food Retailing." *U.S. Food Marketing System.* Economic Research Service Agricultural Economic Report No. (AER811) 98:21-33.

Kaufman, P.R. and C.R. Handy. 1989. "Supermarket Prices and Price Differences: City, Firm, and Store-level Determinants." Technical Bulletin No. 1776. Washington, DC: Commodity Economics Division, Economic Research Service, U.S. Department of Agriculture.

Krugman, P.R. 1980. "Scale Economies, Product Differentiation, and the Pattern of Trade." *American Economic Review.* 70:950-959.

Krugman, P.R. 1981. "Intraindustry Specialization and the Gains from Trade." *Journal of Political Economy.* 5:959-73.

Levy, D. 1985. "Specifying the Dynamics of Industry Concentration." *Journal of Industrial Economics.* 34(1), September:55–68.

Marion, B.W. 1998. "Competition in Grocery Retailing: The Impact of a New Strategic Group on BLS Price Increases." *Review of Industrial Organization* 13:381-399.

Marion, B.W., W.F. Mueller, R.W. Cotterill, R.W., F.E. Geithman, and J.R. Schmelzer. 1979. "The Price and Profits Performance of Leading Food Chains." *American Journal of Agricultural Economics*. 61:420- 433.

Newmark, C.M. 1990. "A New Test of the Price-concentration Relationship in Grocery Retailing." *Economic Letters*. 33:369-373.

Rogers, R.T. 2001. "Structural Change in U.S. Food Manufacturing, 1958-1997." *Agribusiness: An International Journal.* 17: 3-32.

Smith, H. 2004. "Is Wal-Mart Good for America?" PBS.org. http://www.pbs.org/wgbh/pages/frontline/shows/walmart/secrets/.

Trade Dimensions. 1999-2000, 2002-2003. *Marketing Guidebook*, Interactive Market Systems, Inc.: Wilton, CT.

U.S. Census Bureau. Various Years. "County Business Patterns." Retrieved from http://www.census.gov /epcd/cbp/view/cbpview.html

Woolridge, J. 2002. *Economic Analysis of Cross-Section and Panel Data.* MIT Press, pp. 130, 279, 420-449.

Yu, C. and J.M. Connor. 2002. "The Price-concentration Relationship in Grocery Retailing: Retesting Newmark." *Agribusiness.* 18(4):413-426.