Understanding the Strategies behind Wal-Mart 'Neighborhood' Market—How It Is Used and Why

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In this paper we study the factors underlying the pattern of store openings for Wal-Mart Neighborhood Market(or Wal-Mart Market), Wal-Mart's newest store format. The previous literature has identified three major groups of variables that affect the openings of retail establishments: demographics, competitive conditions(including from both K-Mart's and Wal-Mart's stores), and transportation costs via the distance distribution centers. We estimate the effects of these variables on the openings of Wal-Mart discount stores, Supercenters, and Markets and thereby gain insight into strategic uses of different store formats by Wal-Mart. We found that not all store formats are created equal—a certain demographics prefer Wal-Mart discount stores(e.g., Hispanics), while others prefer Wal-Mart Supercenters(e.g., whites, Hispanics); younger population and females also prefer these store formats. But we did not find any strong evidence that Wal-Mart Markets are favored by any subgroup of population. While a Wal-Mart discount store and a Supercenter compete with each other to a large extent, a Wal-Mart Market complements(and is complemented by) Wal-Mart discount stores and Supercenters. The findings suggest that Wal-Mart might have different strategic uses for its store formats and are consistent with the statement made by one Wal-Mart CEO on the positioning of Wal-Mart Market in the market: While Wal-Mart is aggressively expanding its discount-store and Supercenter format nationwide, it seems to deploy Wal-Mart Markets format sparingly to selective areas to complement its discount stores and Supercenters and fulfill consumer needs left by the other two formats. The findings also suggest the following policy implications regarding the Korean retailing: Super Supermarkets(SMM) might benefit from both agglomeration economies(e.g., from sharing local market knowledge among the same chain's stores in nearby markets) and economies of density(i.e., from cost savings in distribution or operation spread across the same chain's stores); the results depict a dire situation for traditional markets, which simply put together many independent and different varieties of stores in one location; the stores in traditional markets are less likely share local market knowledge due to idiosyncratic consumer needs across their product categories, and they are also unlikely to benefit from savings in common costs; hence SSMs are likely to expand their reach and influence over the traditional markets.

Key Words: Wal-Mart; Chain Stores; Store Formats; Retail Strategy

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I. Introduction

In 1998 Wal-Mart opened its first "Wal-Mart Neighborhood Market"—or in short, "Wal-Mart Market"—in Bentonville, Arkansas. Wal-Mart Market differs from Wal-Mart's other(more popular) store formats: Wal-Mart discount store and Supercenter. A typical Wal-Mart Market is relatively modest in size —roughly 40,000 square feet—about 70-75% smaller than a typical Wal-Mart Supercenter. And it focuses mainly on groceries(and some convenience items) with an attached pharmacy, while Wal-Mart discount stores and Supercenters sell a full line of general merchandise(and in case of the latter along with a full line of grocery items).

The diffusion of Wal-Mart Markets shows a strikingly different pattern from those of Wal-Mart discount stores and Supercenters. Consider, for example, the diffusion of Wal-Mart Supercenters. There were only nine Supercenters throughout the United States in 1990. In just over a decade, this number jumped up to nearly thirteen hundreds—a rate of about one hundred openings per year —and(perhaps more impressively) to all over the United States.[1] On the other hand, Wal-Mart Markets have spread rather slowly since 1998 and mostly to the Southern states. Wal-Mart's 2013 Annual Report shows that there are still less than three hundred Wal-Mart Markets in the United States; that is less than twenty store openings per year.

Why does the pattern of store openings look so different for Wal-Mart Markets than for Wal-Mart Supercenters? One might think that Wal-Mart had run out of space to build many stores by 1998. But a glance at the data rebuts this argument: Wal-Mart has built more Supercenters since then to nearly thirty two hundred stores in the United States by 2013. On the contrary, it might have been easier for Wal-Mart to build more Markets. For example, by 2000 Wal-Mart had already built close to fifty distribution centers throughout the country, which lowers distribution costs for newly-built Wal-Mart Markets. Then is it perhaps that a Wal-Mart Market substitutes— in other words, siphons sales away from—a Wal-Mart Supercenter? This might explain the lagging store openings for the former— Wal-Mart is protecting its flagship stores. But one can as easily think of an opposite scenario—Wal-Mart is using its Markets to complement its discount stores or Supercenters; for example, it might be placing Markets (albeit sparsely) where converting discount stores into Supercenters is difficult(perhaps due to local regulatory restrictions).

Recently, Wal-Mart's U.S. president and CEO Bill Simon said of the expansion of Wal-

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1) Wal-Mart Annual Report, various years (http://stock.walmart.com/annual-reports)

Mart Neighborhood Markets[2] : "Our small store expansion, in addition to providing customers access to a wide variety of products, including fresh, pharmacy and fuel, will help us usher in the next generation of retail." He further explained the role of the Neighborhood Market format in comparison to its Supercenter format: "In addition to providing best-in-class one-stop shopping at supercenters, we believe that accelerating our small store expansion will allow customers to choose where and when to shop based on their needs. Our small store expansion will also strengthen our market share and create greater efficiencies in our supply chain through a tethered approach that uses supercenters as a supply chain base, links our resources and provides a unique and connected customer experience." This statement seems to support the premise of this research that Wal-Mart has unique strategic uses for its different store formats. It also suggests that Wal-Mart might be placing its Markets to complement its discount stores or Supercenters.

In this paper we sort out factors that explain the pattern of Wal-Mart Market openings. Three sets of factors are included: 1. demo graphics, including age, race, population, 2. business conditions, including the number of other stores(both K-Mart's and Wal-Mart's), and 3. costs of operation and distribution(a proxy of which includes, for example, the distance to Wal-Mart's distribution centers). By doing so, we aim to answer the following questions: Does a certain subgroup of population make it more likely to locate a Wal-Mart Market nearby? Can a Wal-Mart Market complement(or be complemented) by a Wal-Mart discount store(or a Wal-Mart Supercenter)? Or how important is the efficiency of operation(or cost savings) relative to the positive effect of clustering com plementary Wal-Mart stores? We also compare and contrast the strategies in opening Wal-Mart discount stores, Supercenters, and Markets.

The data are information on K-Mart's and Wal-Mart's stores across seventeen Southern states(as classified by the U.S. Census Bureau) in 2006. By this time Wal-Mart had a bit over one hundred Markets, seventy five of which (about 70%) were in the South.(The same area contains about three hundred Wal-Mart discount stores and twelve hundred Wal-Mart Supercenters.) Wal-Mart also had seventy eight distribution centers; thirty five of them are for food distribution. In addition, we have demographic information for each census tract in the seventeen states. These variables allow us to tease out various forces at play in forming the pattern of Wal-Mart's store openings.

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2) Wal-Mart U.S. accelerates small store growth, Feb. 20, 2014.
  (http://news.walmart.com/news-archive/2014/02/20/walmart-us-accelerates-small-store-growth)

Wal-Mart's choice of how many and what types of stores to operate is modeled using a trivariate probit/ordered probit model. In the model we define possible locations for Wal-Mart's stores as population-weighted centroids of census tracts(one of the smallest geographic unit for which the U.S. Census Bureau provides demographic data). The seventeen Southern states in the data contain over twenty thousand census tracts. Furthermore, Wal-Mart can open multiple units in a single location—so Wal-Mart's decision variable is 3-tuple of ordered quantities. This combination makes it pragmatically infeasible to apply a standard entry model found in industrial organization to this problem. We follow the approach taken by Holmes(2011) in studying the diffusion of Wal-Mart's stores by abstracting away from competition from K-Mart (although the number of K-Mart's stores is included among the set of explanatory variables). This approach is justified given that K-Mart lost much of its market power—after their bankruptcy in 2002, followed by a major round of store closures—leaving Wal- Mart as a sole, dominant player in the industry.

Our estimates indicate that Wal-Mart discount stores and Wal-Mart Supercenters seem to be substitutes while Wal-Mart Markets seem to complement both Wal-Mart discount stores and Supercenters. In other words, a Wal-Mart discount store siphons sales away from a Wal-Mart Supercenter and vice versa, while a Wal-Mart Market has a positive effect on Wal-Mart discount stores and Supercenters. This result, in turn, indicates that Wal-Mart might be using its three store formats for distinct purposes. Wal-Mart seems to be focused on expanding its discount-store and Supercenter formats(especially the latter), but it uses the Market format to complement the other types(as suggested in the statement by Bill Simon). One way to achieve this is to use a Wal-Mart Market to complement a Wal-Mart discount store—which is without the grocery department—thus yielding agglomeration economies that benefit both of these stores.(Note that a Wal-Mart discount store also has a positive effect on the openings of Wal-Mart Markets.) The result also shows that transportation costs matter: the entry propensities of Wal-Mart discount stores, Supercenters, and Markets all decline as the distance to distribution centers goes up. In particular, a Wal-Mart discounter store suffers more farther away from its ordinary distribution center, while a Wal-Mart Supercenter and a Wal-Mart Market do so away from its food distribution center, which confirms to our intuition. Consistent with earlier findings, we found that the composition of population (e.g., age, race) is also an important factor that influences the openings of these stores.

Our paper is a contribution to the growing literature on agglomeration economies(Ellison and Glaeser 1999; Ellison, Glaeser and Kerr

2010; Holmes and Stevens 2002; Rosenthal and Strange 2010; Waldfogel 2010). Waldfogel (2010) shows that a certain demographics of population tend to promote clustering of a particular type of stores, for they prefer similar products. He found that age and race are important factors in provision of a certain stores in the neighborhood. Ellison, Glaeser and Kerr(2010) test Marshall's theories of industrial organization, confirming that transportation costs play an important role in coagglomeration patterns of industries. But these papers do not deal with store openings of multi-unit, multi-format retailers. Papers that study this problem—as will be shown just below—are still quite scarce.

We also build on the previous literature on Wal-Mart(Ailawadi, Zhang, Krishna and Kruger 2010; Basker 2005; Basker and Noel 2009; Ellickson, Houghton and Timmins 2013; Holmes 2011; Jia 2008). Holmes studies the diffusion of Wal-Mart discount stores and Supercenters. His focus is to show the role of distribution costs in Wal-Mart's store openings—one of the foci of this paper—but he does not tease out other factors of agglomeration economies, which could also result in clustering of(different types of) Wal-Mart's stores. Jia, on the other hand, assumes cross-market complementaries of Wal-Mart's stores and estimates its magnitude. On the contrary, Ellickson, Houghton and Timmins(2013) show the opposite results

that Wal-Mart's stores in the same MSAs tend to substitute one another rather than to complement. Our paper differs from these papers in the following ways: First, we examine the pattern of store openings for the new store format—Wal-Mart Neighborhood Market. Second, we use a much finer grid of possible locations for Wal-Mart's stores— census tracts—unlike Ellickson, Houghton and Timmins(2013) and Jia(2008) who use MSAs and counties as a geographic unit of location, respectively. Using a realistic definition of location is important in empirical studies; see Holmes and Lee(2010). Finally, we do not single out one factor of interest but rather include all relevant factors— identified by the previous research—and compare their relative importance.

The next section presents our econometric model—with additional details of variables used as explanatory variables—and section III introduces our data set. Results are in section IV and section V concludes.

Wal-Mart U.S. accelerates small store growth, Feb. 20, 2014.(http://news.walmart. com/news-archive/2014/02/20/walmart-us -accelerates-small-store-growth)

II. Model

To model Wal-Mart's problem, we firstneed to define a set of locations at which Wal-

Mart can operate stores. We use the population-weighted centroids of census tracts as possible locations. The earlier papers used counties(see Jia(2008)) and MSAs(see Ellickson, Houghton and Timmins (2013)) as a set of locations; however, Holmes and Lee(2010) show that a realistic definition of location should be employed in empirical studies; since census tracts are much smaller than counties—some counties contain thousands of census tracts(e.g., Los Angeles County)—they are less likely to subject to aggregation bias.

Wal-Mart's choice of how many and what types of stores to operate is a multivariate discrete-choice problem. Wal-Mart can opening multiple stores of any type at the same location; so Wal-Mart's choice is 3-tuple of ordered variables. Furthermore, choices of how many stores to operate at a given location for its three store formats are related; Jia found cross-store complementarities among nearby Wal-Mart's stores, whereas Ellikson, Houghton and Timmins(2013)showed the opposite result of cross-store substitutibilities among Wal-Mart's stores in the same market (i.e., MSAs). Note also that census tracts are much smaller than counties and MSAs, so even other Wal-Mart's stores in adjacent census tracts can complement or substitute Wal-Mart's stores at a given location.

Let U_t, V_t, and W_t denote the profit indices of Wal-Mart discount stores, Supercenters, and Markets in location t, respectively. Each of these profit indices can be decomposed into observed and unobserved factors: $U_t = x_t \alpha + \epsilon_t$, $V_t = y_t \beta + \mu_t$ and $W_t = z_t \gamma + \phi_t$. Here x_t, y_t, z_t may include the same set of variables. Since Wal-Mart's choice an ordered response, let the cutoffs for U_t, V_t, and W_t be denoted by a_1, a_2, b_1, b_2, b_3 and c_2, c_2 respectively, which assumes for the moment that the maximum numbers of Wal-Mart discount stores, Supercenters, and Markets in any census tract in our data are 2, 3, and 2 respectively.(Their exact numbers are determined in the data.)In other words, there are 1 Wal-Mart discount store, 3 Supercenters, and 0 Market in location t, if we have

$$a_1 < U_t < a_2, \quad b_3 < V_t, \quad W_t < c_{1,}$$

or 0 Wal-Mart discount store, 2 Supercenters, and 1 Market in location t, if we have

$$U_{t'} < a_1, \quad b_2 < V_{t'} < b_3, \quad c_1 < W_{t'} < c_{2.}$$

We now describe factors that explain the pattern of Wal-Mart Market openi0ngs: x_t, y_t, and z_t. Then we show how to combine the data with our model.

1. Specification of x_t, y_t, and z_t

Our specification of x_t, y_t, and z_t is guided by the findings in the earlier papers. The regressors included in the profit indices, U_t, V_t, and W_t, are divided into three groups:

(i) Demographics: Waldfogel(2010) shows that age, education, race, and income are important factors that influence which types of retail establishments are found in the neighborhood.

- POP, POPDEN: POP and POPDEN refer to population and population density, respectively; both of these variables serve as proxies for market size.

- WHITE, BLACK, HISPANIC: WHITE, BLACK, and HISPANIC refer to the proportions of white, black, and Hispanic population respectively, and MALE refers to the proportion of males in the population.

- MEDAGE, AVEHHSZ: MEDAGE and AVEHHSZ refer to the median age and average household size of the population, respectively.

- VACANT: VACANT refers to the vacancy rate of housing units; albeit imperfectly, this variable measures the average wealth of the neighborhood.

(ii) Number of other stores: Jia(2008) and Ellickson, Houghton and Timmins(2013)

TABLE 1. Definition and Unit of Variables used in the Empirical Analysis

Variable	Definition(Unit)
POP	Population(in tens of thousands of persons)
POPDEN	Population density(in tens of thousands of persons per square meter)
WHITE	Proportion of white population(%)
BLACK	Proportion of black population(%)
HISPANIC	Proportion of Hispanic population(%)
MALE	Proportion of males(%)
MEDAGE	Median age of the population(in tens of years)
AVEHHSZ	Average household size of the population(%)
VACANT	Proportion of vacant houses(%)
NKMART	Number of K-Mart stores within five miles
NWALMART	Number of Wal-Mart discount stores within five miles
NSUPERW	Number of Wal-Mart Supercenters within five miles
NWMARKET	Number of Wal-Mart Markets within five miles
D2WALMARTDC	Distance to Wal-Mart's ordinary distribution centers(in hundreds of miles)
D2WALMARTFDC	Distance to Wal-Mart's food distribution centers(in hundreds of miles)

show that the number of other stores (including the stores of the same chain) affect entry and exit propensities of stores. To this endJia included the numbers of other stores in adjacent counties as explanatory variables and Ellickson, Houghton, and Timmins (2013) included the numbers of other stores in the same MSAs as explanatory variables.

- NKMART: NKMART refers to the number of K-Mart stores within five miles.[3][4] Although K-Mart had three store formats, Big K-Mart, K-Mart, Super K-Mart Center, most of its stores were Big K-Mart. So we do not distinguish between K-Mart's store formats.

- NWALMART, NSUPERW, NWMARKET: NWALMART, NSUPERW, and NWMARKET refer to the numbers of other Wal-Mart discount stores, Supercenters, and Markets within five miles, respectively. So for the case of a Wal-Mart discount store at a given location, NWALMART is the number of other Wal-Mart discount stores within five miles—not including itself—while NSUPERW and NWMARKET are just the numbers of Wal-Mart Supercenters and Markets within five miles[5].

(iii) Transportation costs: Ellison, Glaeser and Kerr(2010) show the importance of transportation costs in agglomeration of industries, while Holmes(2011) estimates the effect of distribution costs in the diffusion of Wal-Mart's stores.

- DIST2DC, DIST2FDC: DIST2DC and DIST2FDC refer to the distance to Wal-Mart's ordinary and food distribution centers, respectively; both of these variables measure distribution and transportation costs.

Table 1 summarizes the variables in terms of their definitions and units used in the empirical analysis to follow.

2. Estimation of α, β, and γ

To combine the data with our model, we need to impose some assumptions on the error terms: ϵ_t, μ_t, and ψ_t. We specify ϵ_t, μ_t, and ψ_t to be jointly normal with a correlation matrix ρ withunit variances by normalization. Then we have, for example,

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3) Clifton et al. (2013) report that consumers travel to convenience stores and supermarkets up to three to four miles via automobile. We chose a five-mile radius to measure the competitive effects of nearby stores based on this report.

4) We have also used a three-mile radius and found that our empirical results are robust to the choice of the distance and our interpretation still holds up.

5) I specifically mention "other" stores to indicate that when analyzing entry of a Wal-Mart discount stores in one location, for example, NWALMART excludes the focal store at that location.

Prob(NWALMART=1, NSUPERW=3, NMARKET=0)

$$=\text{Prob}(a_1 < U_t < a_2, \; b_3 < V_t, \; W_t < c_1)$$

$$=\text{Prob}(a_1 - x_t\alpha < \epsilon_t < a_2 - x_t\alpha, b_3 - y_t\beta < \mu_t, \psi_t < c_1 - z_t\gamma)$$

$$=\text{Prob}(\psi_t < c_1 - z_t\gamma)$$

$$\times\text{Prob}(b_3 - y_t\beta < \mu_t | \psi_t < c_1 - z_t\gamma)$$

$$\times\text{Prob}(a_1 - x_t\alpha < \epsilon_t < a_2 - x_t\alpha | b_3 - y_t\beta < \mu_t, \psi_t < c_1 - z_t\gamma)$$

The probabilities for other combinations are similarly derived. For the mathematical details of trivariate and multivariate ordered probit models—including their likelihood functions—readers are referred to Chapter 10 of Greene and Hensher(2009).

Since the probabilities for trivariate ordered probit models do not have a closed form, we use the widely used probit simulator called GHK(Geweke-Hajivassiliou-Keane). From a programming point of view, this simulation estimator is particularly complex, requiring iterative calculation of conditional probabilities — based on truncated normal distributions— for simulation draws. We also found it to be quite memory-expensive and time-consuming. So we have made a few adjustments to our model—using unique features of our data— which will be described shortly below. Readers are referred to Chapter 5 of Train (2003) for the details on the implementation of the probit simulator.

III. Data

The data are K-Mart's and Wal-Mart store openings as of the year 2006 in seventeen Southern states: Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia. In addition, Wal-Mart had forty three ordinary distribution centers and thirty five food distribution centers by 2006, scattered around the entire U.S. The data for store openings for K-Mart and Wal-Mart come from Trade Dimensions, a subsidiary of ACNielsen, and the data for Wal-Mart's distribution centers come from Thomas J. Holmes's website. (http://www.thomas-holmes.com/) The U.S. Census Bureau publishes the data for demographic information of census tracts. (http://www.census.gov)

There are a total of about twenty two thousand census tracts in the data. The population-weighted centroids of census tracts are possible locations for store openings for Wal-Mart. Among geographic units for which detailed demographic unit is available, census tracts are smallest in geographic scope, and hence it most suitable for our context, as geographic differentiation is an important factor in site selection for retail stores.

Table 2 shows the frequency table for the openings of Wal-Mart discount stores, Supercenters, and Markets in these locations. By 2006, it seems clear Wal-Mart had expanded its Supercenter format quite aggressively, while Wal-Mart Markets are still sparse. Note, in particular, that there is only one census tract where two or more Wal-Mart discount stores. The same is true for Wal-Mart Markets: Only one location contains two or more Wal-Market Markets.

The large number of possible locations in the data makes it computationally taxing to estimate parameters. So we have taken a relatively harmless shortcutof limiting the maximum number of Wal-Mart Markets to be one at any location. This trick lessens the size of memory and the length of time needed for computation substantially.

Table 3 shows summary statistics for the explanatory variables in the profit indices, x_t, y_t, and z_t, in the sample of locations in the data. We first look at the demographic information. It seems as though demographic information varies substantially across the sample of markets. POP, which measures market size(or the demand), ranges from none to about thirty thousand persons with an average of about forty six hundreds of persons. POPDEN also varies quite a bit; it averages about two thousand and four hundred persons, but its maximum is quite large; so we probably have very rural to very urban areas in the sample of locations.Racial composition of these areas(e.g., census tracts) is also very diverse: some areas are occupied by the entirely white population, while others are occupied by the entirely black or mostly Hispanic(99.2%) population. The same is true for the male-to-female ratio. The means of median income and average household

TABLE 2. Frequency table for counts of Wal-Mart discount stores, Supercenters, and Markets

Store counts at a location	Wal-Mart discount stores	Wal-Mart Supercenters	Wal-Mart Markets
0	21525	20599	21767
1	317	1242	74
2	0	1	1

size are thirty six years old and two and a half persons, respectively; their ranges are relatively much narrower. Vacancy rates of housing units are on average about 10%, and its variance is moderately large, indicating that some areas are wealthier than others.

Next we describe the competitive environment surrounding the sample of locations in the data. There is a healthy dose of competition: On average, there are about a 0.45 K-Mart's store, a 0.23 Wal-Mart discount store, a 0.74 Wal-Mart Supercenter, and a 0.13 Wal-Mart Market within five miles of these locations. These figures indicate clearly the waning presence of K-Mart in the American retail

landscape post its bankruptcy in 2002. Furthermore, it also seems clear that Wal-Mart has moved onto its new format— Supercenters—as the convenience of one-stop shopping has attracted more and more shoppers to the Supercenter format. On the other hand, Wal-Mart Market did not have a significant presence as of the 2006. Note, however, that there is substantial variation in NKMART, NWALMART, NSUPERW, and NWMARKET across the sample of locations. There are as many as six Wal-Mart Supercenters around one location, and—although there are much fewer Wal-Mart Markets in the United States—as many as four Wal-Mart

TABLE 3. Summary statistics for the sample of locations

Variable	Mean	Std. Dev.	Min	Max
POP	0.46	0.24	0	3.18
POPDEN	0.24	0.37	0	17.00
WHITE	0.71	0.27	0	1
BLACK	0.21	0.27	0	1
HISPANIC	0.10	0.19	0	0.99
MALE	0.49	0.04	0	1
MEDAGE	3.61	0.66	0	8.31
AVEHHSZ	2.57	0.41	0	6
VACANT	0.10	0.08	0	1
NKMART	0.45	0.73	0	5
NWALMART	0.23	0.51	0	4
NSUPERW	0.74	0.89	0	6
NWMARKET	0.13	0.49	0	4
D2WALMARTDC	0.84	0.53	0.01	3.88
D2WALMARTFDC	0.78	0.45	0.01	3.53

Markets around one location.

Finally, the mean distance to Wal-Mart's ordinary distribution center is seventy eight miles and eighty four miles. But some areas are as far as up to four hundred miles away from these units. Given the clustering pattern of Wal-Mart Supercenters and Markets, one natural question is: Does the cost savings from locating near distribution centers offset possible business-stealing among nearby Wal-Mart's stores? Or is there other forces that lead to agglomeration of Wal-Mart's stores on the top of efficiency in distribution? These questions are empirical in nature and lend the support to various competing hypotheses in industry agglomeration. In the next section we address these questions by combing the data with our model.

IV. Result

Table 4 presents the regression results for the trivariate ordered probit model in section II. Although our main goal is to understand the factors that underlie the pattern of store openings for Wal-Mart's new store format—Wal-Mart Market—we first discuss in detail the factors that underlie the patterns of store openings for Wal-Mart's old store formats—Wal-Mart discount stores and Supercenters. The comparison of the results for all three formats will allow us to infer how Wal-Mart

might be using multiple store formats for different strategic purposes.

1. Results for Wal-Mart discount stores

The second column of Table 4 presents the estimated effects on entry propensitiesof Wal-Mart discount stores of three groups of factors described above. POP has a significantly positive coefficient, indicating that all else equal larger markets tend to be more profitable. However, POPDEN—another measure of market size—has a significantly negative coefficient. This seems puzzling on the surface, but it can be explained by looking at Wal-Mart's retail strategy: Wal-Mart tends to build its big box stores—discount stores and Supercenters—in suburban and rural areas due to space and cheaperlabor costs and rents. The negative sign on POPDEN is simply the artifact of this location choice. (See Holmes(2011) who also mention this.) Wal-Mart discount stores seem to be located in the neighborhood where the proportions of Hispanic and female population are higher, but they are found less in poorer neighborhood (as indicated by the negative coefficient on VACANT).

One surprising result is that a Wal-Mart discount store's biggest competitor is other Wal-Mart discount stores and Supercenters. But K-Mart does not have a negative effect on the entry propensity of a Wal-Mart discount

store. Why is this so? One interpretation is that Wal-Mart discount stores and Supercenters are the closest substitutes for a Wal-Mart discount store.(The results are consistent with the findings in Ellickson, Houghton and Timmins(2013).) Note also that a Wal-Mart Supercenter has the more deterring effect on store opening of a Wal-Mart discount store than another Wal-Mart discount store does: The result is intuitively sensible, because a Wal-Mart Supercenter has everything that a Wal-Mart discount store has and more (grocery items). In stark contrast, a Wal-Mart Market is found to complement a Wal-Mart discount store in a robust way. So we conjecture that Wal-Mart might be using its Market format—albeit sparingly—in places where it might be difficult to convert its discount stores into Supercenters.

A Wal-Mart discount stores tends to enter markets closer to Wal-Mart's ordinary distribution center, as evidenced by the significantly negative coefficient of D2WALMARTDC. But the distance to its food distribution center does not have a significant effect, probably because Wal-Mart discount stores do not have a full grocery department within.

2. Results for Wal-Mart Supercenters

The third column of Table 4 presents the estimated effects on entry propensities of Wal-Mart Supercenters of three groups of factors described above. POP and POPDEN have significantly positive and negative coefficients, respectively, as before. A Wal-Mart Supercenter tends to enter markets where the proportions of white and Hispanic population are higher and where the proportions of females and younger population are higher. It also finds wealthier areas more lucrative, as seen in the negative coefficient of VACANT.

The result for competition tells a similar story as did for a Wal-Mart discount store, with a bit of twist in story. The biggest competitor of a Wal-Mart Supercenter is a Wal-Mart discount store; the effect of the latter is almost double the effect of former on the entry propensity of a Wal-Mart Supercenter. On the other hand, a Wal-Mart Market seems to complement a Wal-Mart Supercenter as it does for a Wal-Mart discount store. Together, these results tell a story wherein the new store format(Wal-Mart Market) is positioned such that it does not siphon sales away from the old formats(Wal-Mart discount store and Supercenter) but creates the synergy with them as much as possible.

Unlike before, a Wal-Mart Supercenter tends to enter markets closer to Wal-Mart's food distribution center, while the distance to its ordinary distribution center has a much, smaller effect. This result too is quite intuitive.

〈TABLE 4〉 Trivariate probit/ordered probit regression of Wal-Mart discount stores, Supercenters, and Markets

(a) Effects of explanatory variables

	Wal-Mart discount store (WALMART)	Wal-Mart Supercenter (SUPERW)	Wal-Mart Market (WMARKET)
POP	1.06** (0.07)	1.12** (0.06)	0.50** (0.14)
POPDEN	−0.53** (0.09)	−0.70** (0.08)	0.16† (0.10)
WHITE	−0.03 (0.27)	0.42† (0.23)	−0.14 (0.62)
BLACK	−0.10 (0.26)	0.29 (0.22)	−1.04 (0.65)
HISPANIC	0.82** (0.16)	0.90** (0.13)	−0.34 (0.39)
MALE	−2.39** (0.49)	−2.49** (0.39)	−0.43 (1.19)
MEDAGE	−0.02 (0.04)	−0.11** (0.03)	−0.20* (0.10)
AVEHHSZ	−0.51** (0.06)	−0.54** (0.05)	0.06 (0.13)
VACANT	−1.57** (0.30)	−1.49** (0.22)	−1.77 (1.16)
NKMART	0.18** (0.03)	0.14** (0.02)	−0.04 (0.07)
NWALMART	−0.80** (0.06)	−0.94** (0.03)	0.20* (0.08)
NSUPERW	−0.87** (0.03)	−0.47** (0.02)	0.22** (0.04)
NWMARKET	0.26** (0.05)	0.21** (0.03)	0.12* (0.05)
D2WALMARTDC	−0.08† (0.05)	−0.04 (0.03)	0.31** (0.11)
D2WALMARTFDC	−0.01 (0.04)	−0.06† (0.03)	−0.55** (0.14)
Cutoff for binary choice	0.87** (0.26)		−2.01** (0.56)
Cutoff for trinary choice (1)		−1.11** (0.22)	
Cutoff for trinary choice (2)		0.62* (0.27)	

(b) Correlation parametersand other statistics

Corr(WALMART,SUPERW) = 0.96** (0.00) , Corr(WALMART,WMARKET) = −0.26** (0 .11), Corr(SUPERW,WMARKET) = −0.26** (0 .10)

Log-likelihood = −5849.08, Number of observations = 21842, Prob 〉 chi2 = 0.00

Notes: Standard errors are in brackets. (**) significant at 1%. (*) significant at 5%. (＋) significant at 10%. The cutoff for binary choice is the negative of the constant that would appear in a regular probit regression.

3. Results for Wal-Mart Markets

The fourth column of Table 4 presents the estimated effects on entry propensities of Wal-Mart Markets of three groups of factors described above. Notice that both POP and POPDEN have significantly positive effects on entry propensities of a Wal-Mart Market. Since Wal-Mart's Market format takes up much less space than its discount-store and

Supercenter formats, it tends to be located closer to residential areas(as its original name "Wal-Mart Neighborhood Market" indicates). As a result, POPDEN has a more intuitive sign now, as more densely populated areas are likely to be more lucrative forWal-Mart Markets. Other demographic variables are mostly statistically insignificant except for BLACK and MEDAGE. Comparing with the earlier results, racial composition tends to affect the clustering of different types of retail establishments.

Not only a Wal-Mart Market complements a Wal-Mart discount store or a Supercenter, but it is also complemented by them. Combined with a Wal-Mart Market, a Wal-Mart discount store(albeit imperfectly) might satisfy the local needs for groceries as a Wal-Mart Supercenter does. With a Supercenter format, a Wal-Mart Market makes it easier for Wal-Mart to share local market knowledge (especially local market preference on food items) and coordinate its distribution system (through efficient logistics or placement of its food distribution centers).(This is what Jia(2008) refers to as "economies of density.") Given that Wal-Mart Markets even tend to complement each other, it seems as though Wal-Mart is using its new store format not for aggressive expansion but more to "fill some holes" in their business.Our findings are consistent with the statement made by Wal-Mart's CEO Bill Simon(quoted in the Introduction section).

Finally, the entry propensity of a Wal-Mart Market gets lower as it moves farther away from the food distribution center. The only puzzling result is that the entry propensity rises with the distance to the ordinary distribution center. The cause for this is not yet clear. Note also that the transportation cost doesnot seem to be a major concern in opening a Wal-Mart Market as it does for a Wal-Mart discount store or Supercenter. This can be seen in the ratio of the coefficient of D2WALMARTFDC to the coefficient of POP for a Wal-Mart Market with that for a Wal-Mart Supercenter. The former is considerably largerthan the latter; so if we observe a Wal-Mart Market then it is there despite relatively higher transportation costs. What it loses on transportation costs, it makes up with its synergistic effect with Wal-Mart discount stores or Supercenters.

We also report the predicted percentages of markets with Wal-Mart discount stores, Supercenters, and Markets(as a measure of the model fit): 3.84%, 6.62%, and 0.39%, respectively. Comparing with the actual percentages in Table 2(1.47%, 6.03%, and 0.34%), we see that the numbers are similar for Supercenters and Markets but somewhat off for discount stores. As we mention below, it is likely that the set of explanatory variables we use in the regression might not be sufficient to capture all the factors that

affect store openings of these stores.

V. Conclusion

In this paper we have studied the factors that explain the pattern of Wal-Mart Market openings—demographics, competitive conditions (including from both K-Mart's and Wal-Mart's stores), and transportation costs via the distance distribution centers. We found that a certain demographics prefer Wal-Mart discount stores, while others prefer Wal-Mart Supercenters; for example, Hispanics prefer Wal-Mart discount stores, and whites and Hispanics prefer Wal-Mart Supercenters. Younger population and females also prefer both of these store formats. On the other hand, we did not find any strong evidence that Wal-Mart Markets are favored by a certain demographics. While a Wal-Mart discount store and a Supercenter compete—more so than they do with a K-Mart store—a Wal-Mart Market completes and is complemented by Wal-Mart discount stores and Supercenters. Furthermore, there are agglomeration economies among nearby Wal-Mart Markets themselves. These findings can be attributed to the difference in strategic uses of its three store formats by Wal-Mart. While Wal-Mart uses its discount-store and Supercenter format to aggressively expand its store network nationwide, it seems to use the Market format mainly to strategically complement its existing stores and go after the needs of population that the two previous formats left unfulfilled. This conjecture is further confirmed by the willingness by Wal-Mart to open its Markets despite higher transportation costs it incur than for the other formats.

This study has implications that can be applied to other retail chains in forming an expansion strategy for their store networks. The retail landscape of Korea has become dominated by chain stores from convenience stores(e.g., Seven Eleven, By the Way, Family Mart) to supermarkets(E-Mart Every day, Home Plus, Kim's Club). Many of these retailers have extensive store networks across the country, making it more worrisome to add stores in the future as new stores may cannibalize the sales of old ones. How can these multiunit retailers minimize the diminishing (or even negative) marginal returns to adding new stores. This research suggests a possible remedy: Design of store formats that fulfill unmet customer needs but are still complementary to the existing stores.

At the same time, large store chains in Korea(or so-called Super Supermarkets(SSMs)) are likely to extend their influence over the traditional markets. Note that multiunit retailers are likely to benefit from both agglomeration economies(e.g., from sharing local market knowledge among the same chain's stores in nearby markets) and economies of density

(i.e., from cost savings in distribution or operation spread across the same chain's stores). On the other hand, the stores in traditional markets are not likely to share local market knowledge due to idiosyncratic consumer needs across their product categories, and they are unable to benefit from savings in common costs.

As other studies do, this study suffers from a set of drawbacks. First, store openings and closures by Wal-Mart might be affected by other financial, political, or local factors that are not contained in our data. Most notably, Wal-Mart is notorious for preventing its employees from becoming unionized. Although Wal-Mart's stores were rarely closed during the sample period, some have suggested that those rare store closures are Wal-Mart's retaliation against its employees forming a union. Wal-Mart Punishes Workers for Standing Up (http://www.americanrightsat work.org) Therefore, we should interpret the results of this study to shed light on how different store types of the same chain may interact with one another rather than to explain a complete set of factors that determine entry and exit of Wal-Mart's stores. Second, the model used in this study has some limitations as well. In particular, its implementation(or estimation) is quite computationally intensive(especially taxing on memory). But this drawback pose a practical difficulty but not a conceptual one.

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월마트 네이버후드 마켓 전략분석

안 대 용*

　본 논문은 월마트의 신종 상점인 '네이버후드 마켓'의 지역적 분포에 기여하는 요인들을 분석한다. 기존의 논문들은 인구통계적 요소, 경쟁적인 요소, 그리고 유통경비가 소매상의 시장진입에 영향을 준다고 인식하였다. 본 논문은 이러한 요소들이 월마트의 디스카운트 스토어, 수퍼센터, 네이버후드 마켓의 시장진입에 어떠한 영향을 미치는 지 보고, 그로 인하여 어떠한 요소들이 각기 다른 유형의 점포의 수익성에 영향을 미치는 지 알아본다. 논문의 결과가 보여주듯이 인구통계적 요소는 차별적으로 다른 상점유형의 수익성에 영향을 준다. 예를 들어 디스카운트 스토어는 히스페닉이 선호한다면, 수퍼센터는 백인, 히스페닉이 선호한다. 젊은 소비자층과 여성들도 이 상점유형들을 선호한다. 하지만 네이버후드 마켓을 특히 선호하는 인구통계적 집단은 없는 듯 하다. 월마트 디스카운트 스토어와 수퍼센터는 서로 경쟁하는 관계에 있는 데 반하여, 이 두 종류의 점포와 월마트 네이버후드 마켓은 상호보완적인 관계에 있다. 이러한 결과는 월마트 CEO가 밝힌 대로 월마트가 다른 유형의 점포들을 다른 전략적 목적을 가지고 포지셔닝하고 있다는 것과 일맥상통하다. 월마트가 수퍼센터를 시장점유를 목적으로 미국 전국에서 공격적으로 개점한 반면 네이버후드 마켓은 기존에 있는 디스카운트 스토어와 수퍼센터를 보완하는 목적으로 선별적 그리고 점진적으로 개점하였다. 본 연구의 결과는 국내 소매시장에 정책적으로 시사하는 바가 크다. 슈퍼 슈퍼마켓은 규모의 경제나 점포간 지식의 공유에 긍정적인 시너지를 창출할 수 있지만, 전통시장은 이에 비해 구조적으로 시너지를 창출할 수 없어 앞으로의 전망이 불투명하다.

주제어: 월마트, 연쇄점, 점포유형, 소매전략

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