

The effects of the rapid rise of Supermarkets on South Korea Retail^{*}

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First Draft

Abstract

This paper quantifies the effects of the rise of supermarkets on South Korea retail at the county level. From 2009, the employment of supermarkets has been higher than the employment of other superstores. From 2007, the business revenue of supermarkets has been greater than the business revenue of department stores. Although the effects of Walmart and Target have been actively research in United States, there is a lack of research on supermarkets in South Korea. The research aims to estimate the effect of an entry of supermarket on employment of retail and small stores where sell foods, beverages, and tobacco. Also, the research focuses on the effect of a market share of supermarkets that are incorporated company on the net exit. Using regression approach with panel data, the research finds that an entry of supermarket that is incorporated company increases the employment of retail and small stores right after the entry, but the entry decreases retail employment by 2.485 after two years, and 6.799 after four years. With the net exit model, I find that if the market share of supermarkets that are incorporated company increases by one percent, net exit decreases by -0.446 percent.

^{*}Python code and the newest version of the paper are available on <http://EconJHL.com/>

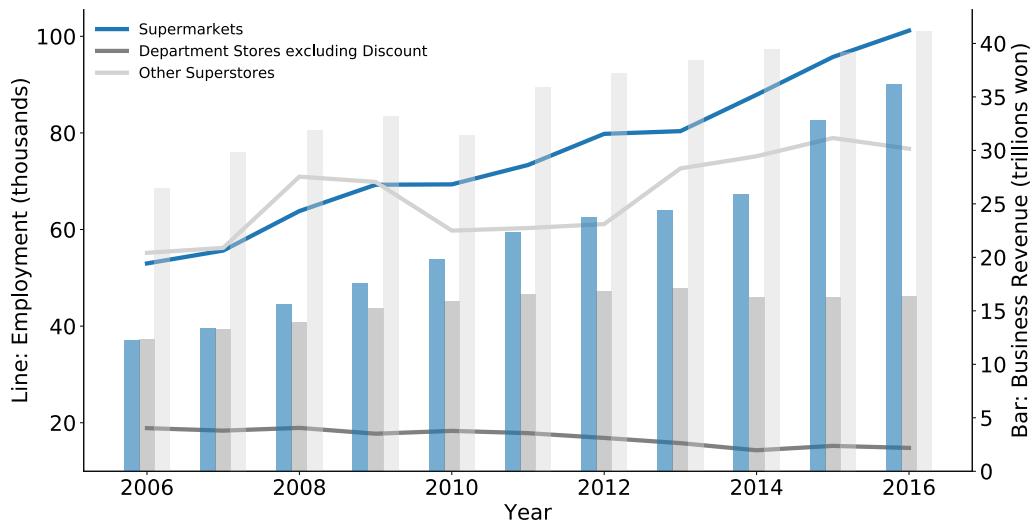
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1 Introduction

In South Korea, the employment and business revenue of supermarkets have rapidly grown from 2007. The effects of superstores such as Walmart and Target have been actively researched in United States. Basker (2005) estimates the effects of Walmart expansion on labor market using five leads and six lags structure modeling, and finds that the Walmart entry increases retail employment and decreases wholesale employment [1]. Also, Hortaçsu and Syverson (2015) estimate the effects of warehouse clubs on retail sectors and find that the number of department stores largely decreases when the number of warehouse clubs largely increases [2]. However, I need to research the rapid rise of South Korean supermarkets because this phenomenon is different from the case of Walmart. First, Walmart is a non-specialized superstore, but supermarkets of South Korea are stores with food, beverages predominating. Second, Walmart supercenters are with sizes from $6,410 \text{ m}^2$ to $24,155 \text{ m}^2$ (from $69,000 \text{ ft}^2$ to $260,000 \text{ ft}^2$) (Walmart, 2020, [9]), but supermarkets of South Korea are with sizes from 165 m^2 to $3,000 \text{ m}^2$ (from $1,776 \text{ ft}^2$ to $32,292 \text{ ft}^2$) (Statistics Korea, 2007, [5]). The research aims to estimate the effect of an entry of supermarket on employment of retail and small stores where sell foods, beverages, and tobacco. Also, the research focuses on the effect of supermarkets that are incorporated company and the effect of a change in market share of supermarkets on net exit. In a part of analysis, I find that an entry of supermarket increases five jobs of small stores after three years of the entry, but decreases five jobs back after four years of the entry.

1.1 Supermarkets, Department Stores and other Superstores

Figure 1: Employment and Business Revenue by Industry Group, 2006-2016



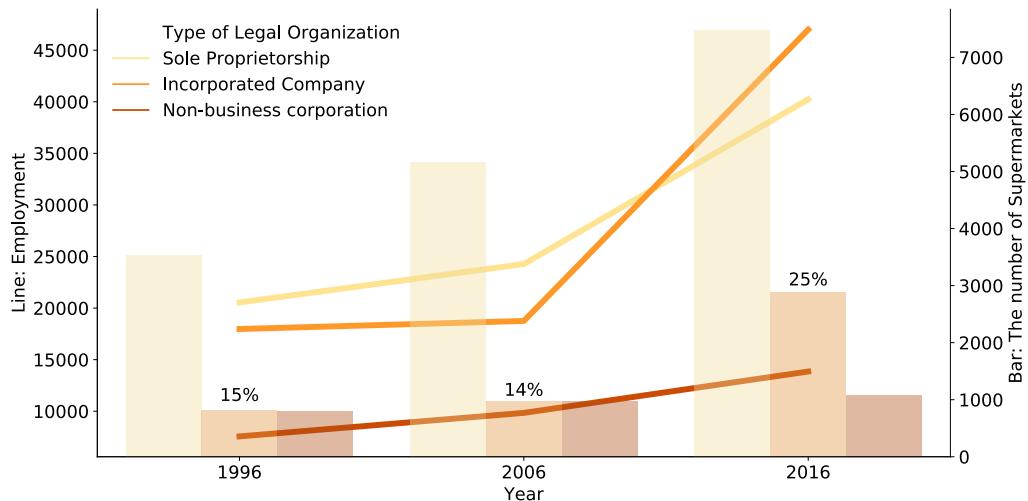
Notes: The left y-axis is the total number of employees (thousands) and the right y-axis is total business revenue (trillions won), while x-axis is year from 2006 to 2016. The lines indicate employment of each group and the bars indicate business revenue of each group. The currency of business revenue is won (₩) that is the official currency of South Korea (Dec. 8, 2020: \$1 = ₩1,085).

Source: Author's calculations from Service Industry Survey (Statistics Korea, 2006-2016, [6]).

Statistics Korea, National Statistical Office of South Korea, defines department stores as non-specialized superstores with sizes over $3,000 \text{ m}^2$ ($32,292 \text{ ft}^2$), and other superstores as non-specialized superstores with sizes over $3,000 \text{ m}^2$ ($32,292 \text{ ft}^2$) that are not department stores (Statistics Korea, 2007, [5]). Although Statistics Korea classifies discount departments stores separately from 2017, discount department stores were classified as other superstores before 2017 (Statistics Korea, 2017, [8]). Figure 1 shows the total employment and business revenue by three types of stores: supermarkets, department stores, and other superstores. The blue color indicates supermarkets, dark grey color indicates department stores, and light grey color indicates other superstores. From 2009, the employment of supermarkets has been higher than the employment of other superstores. From 2007, the business revenue of supermarkets has been greater than the business revenue of department stores. In 2016, the business revenue of supermarkets is 88 percentage of the business revenue of other superstores.

1.2 Supermarkets (incorporated company) Backgrounds

Figure 2: Employment and Business Revenue by the Type of Legal Organization, 1996, 2006, 2016



Notes: The left y-axis is the number of employees and the right y-axis is business revenue (trillions won), while x-axis is year. The lines indicate employment of each type of legal organization, and the bars indicate business revenue. The currency of business revenue is won (₩) that is the official currency of South Korea (Dec. 8, 2020: \$1 = ₩1,085).

Source: Author's calculations from Service Industry Survey (Statistics Korea, 1996-2016, [6]).

Supermarkets consist of three types of legal organization: sole proprietorship, incorporated company and non-business corporation. Figure 2 shows the employment and business revenue by the three types (Statistics Korea, 1996-2016, [6]). Yellow color indicates sole proprietorship, orange color indicates incorporated company, and brown color indicates non-business corporation. The market share and the employment of the incorporated type increase rapidly from 2006. In 2016, the market share of the incorporated type becomes 25 percentage, and the employment of the incorporated type is greater than the sole proprietorship type. From the figure, I could see there was rapid rise of the incorporated company type supermarkets.

2 Data

In South Korea, there are county and two county equivalents. I regard county equivalents as county (for detail information, see first section of Appendix). I use data from Census on Establishments 1996-2016 (Statistics Korea, [4]) which contain county code, industry classification code, and employment. The data is micro level data, for academic purpose only. In the research, the unit of observation is a county-year and I exclude Jeju Island and counties that have changed their area size, limiting the data set to the 209 counties (see second section of Appendix). Unfortunately, the census does not contain sales data before 2016.

2.1 Supermarkets that are Incorporated Company and Net Exit

For net exit, I use data on the number of establishments, from Census on Establishments 1996-2016 (Statistics Korea, [4]). Since the data is from 1996-2016 and the unit of observation is a county-year, the panel contains 4,389 observations. For summary statistics, see Table 3.

2.2 Supermarkets, Supermarkets that are Incorporated Company and Employment

For the establishments and employment of retail and stores of foods, beverages and tobacco, I use same data set of section 2.1. but I also use data on population, from Statistics of Urban Plan 1996-2016 (Statistics Korea, [7]). The population is annual data at county level and the unit of observation of population is 4,389.

Table 1: Summary Statistics

	N	Mean	Standard Deviation	Min	Max
Number of department store establishments	4,389	5.125	6.909	0	58
Number of other superstore establishments	4,389	28.198	22.930	0	150
Number of supermarkets establishments	4,389	0.359	0.832	0	7
Number of supermarkets that are incorporated company establishments	4,389	1.500	2.601	0	92
Employment of Retail	4,389	5,957,455	5,544,932	226	47,623
Employment of small stores of foods, beverages, and tobacco	4,389	683,2955	673,009	0	6,569
Population	4,389	190,181.1	155,700.4	9191	685,279

3 Methodology

The research is interested in three parts: the effect of a market share of supermarkets that are incorporated company on the net exit; the effect of the number of supermarkets on employment of retail and small retail stores; the effect of the number of supermarkets that are incorporated company on employment of retail and small retail stores.

A. Supermarkets that are Incorporated Company and Net Exit

For the estimation of the effect of a market share of supermarkets that are incorporated company on the net exit, I estimate the following equation, for county i in year t:

$$\log \Delta NetExit_{it} = \beta_0 + \sum_{z=1}^3 \beta_z \Delta Share_{izt} + \epsilon_{it}, \quad (1)$$

where ϵ_{it} is the error term; z is a set of stores:

$z \in \{DepartmentStores, otherSuperstores, SupermarketsThatAreIncorporatedCompany\}$; β_0 is the intercept; β_1 , β_2 , and β_3 respectively capture the effect of a change in the market share of department stores, other superstores, and supermarkets that are incorporated company on the change in net exit, and β_3 is the coefficient of interest. $\Delta Share_{izt}$ is a change in market shares of z, compared to previous year. I calculate the change in market shares using following equation, for county i in year t:

$$\Delta Share_{izt} = \frac{Number of Stores_{izt}}{Total Establishments_{it}} - \frac{Number of Stores_{iz,t-1}}{Total Establishments_{i,t-1}}, \quad (1.1)$$

where $Number of Stores_{izt}$ is the number of establishments of z; $Total Establishments_{it}$ is the sum of the number of establishments of all three stores; $t-1$ is the previous year. $\Delta NetExit_{it}$ is the change in number of establishments of three stores. I calculate the change in net exit using following equation, for county i in year t:

$$\log \Delta NetExit_{it} = \log \sum_{z=1}^3 Number of Stores_{izt} - \log \sum_{z=1}^3 Number of Stores_{iz,t-1}, \quad (1.2)$$

where $\sum_{z=1}^3 Number of Stores_{izt}$ is the sum of number of establishments of all three stores; $\sum_{z=1}^3 Number of Stores_{iz,t-1}$ is the sum of previous year's establishments of all three stores.

B. Supermarkets and Employment

For the estimation of the effect of number of supermarkets on the retail employment, I adopt retail employment model based on Bakser (2005, [1]) with minor changes. For county i in year t ,

$$\frac{retail_{it}}{population_{it}} = \alpha + \sum_k \beta_k county_k + \theta(L) \frac{SupermarketOpen_{it}}{population_{it}} + \epsilon_{it}, \quad (2)$$

where $retail_{it}$ is the retail employment (unit-root test: Table 2); $population_{it}$ is number of people; α is the intercept; $county_k$ is a county dummy variable; ϵ_{it} is the error term; $SupermarketOpen_{it}$ is number of supermarket establishments; $\theta(L)$ is a lag parameter with four leads and lags:

$$\theta(L) = \theta_1 F_4 + \theta_2 F_3 + \theta_3 F_2 + \theta_4 F_1 + \theta_5 + \theta_6 L_1 + \theta_7 L_2 + \theta_8 L_3 + \theta_9 L_4 \quad (2.1)$$

where F is the lead and L is the lag. I assume that an entry of supermarkets is not correlated with the county's employment level. For the estimation of the effect on employment of the foods, beverages and tobacco stores, I estimate equation (2) but replace $retail_{it}$ with $smallRetail_{it}$ which is employment of foods, beverages and tobacco stores (unit-root test: Table 2).

C. Supermarkets that are Incorporated Company and Employment

For the estimation of the effect of number of supermarkets that are incorporated company on employment of retail and foods, beverages and tobacco stores, I estimate the equation (2), but replace $SupermarketOpen_{it}$ with $SupermarketsICOpen_{it}$ which is the number of supermarkets that are incorporated company. The coefficients of interest, $\theta(L)$, capture the effect of an entry of supermarkets that are incorporated company on employment of retail and foods, beverages and tobacco stores with the lead and lag parameters.

Table 2: Unit-root Tests for Employment

	p-value of Levin-Lin-Chu Test	p-value of Harris-Tzavalis Test	p-value of Breitung Test
Retail	0.000	0.000	0.000
Small stores of foods, beverages, and tobacco	0.000	0.000	0.000

Notes: The data is strongly balanced. I use three tests to test unit-root for employment of retail and small retail stores.

4 Results

Table 3: Effects of a Change in Market Share on a Change in Net Exit

VARIABLES	Dependent Variable: Change in Net Exit		
	(1)	(2)	(3)
Change in market share of department stores	-1.771*** (0.364)	-1.608*** (0.543)	-2.354*** (0.481)
Change in market share of other supermarkets	0.582*** (0.491)	0.652*** (0.068)	-1.251*** (.0153)
Change in market share of supermarkets that are incorporated company	-0.032 (0.068)	0.145 (0.111)	-0.446*** (0.066)
Constant	0.046*** (0.004)	0.055*** (0.009)	0.0417*** (0.003)
N	4,132	1,843	2,289
Time: 1996-2016	Y	N	N
Time: 1996-2005	N	Y	N
Time: 2006-2016	N	N	Y

Notes: (1) is when the time period is 1996-2016; (2) is when the time period is 1996-2005; (3) is when the time period is 2006-2016; *p<0.1 **p<0.05, ***p<0.01

Table 3 shows the results of regression using equation (1) and the coefficient of interest is change in market share of supermarkets that are incorporated company. I separate the time period: 1996-2016, 1996-2005, and 2006-2016. The coefficients in column (1) and (2) are estimated, with time period 1996-2016 and 1996-2005. Although two variables, change in market share of department stores and other supermarkets, are statistically significant at 1 percentage level, the coefficient of interest is not statistically significant. The coefficients in column (3) are estimated with 2006-2016 time period. The coefficient of interest is -0.446 and it indicates that if the market share of supermarkets that are incorporated company changes by one percent, we expect net exit to change by -0.446 percent.

Figure 3: Supermarkets and Employment

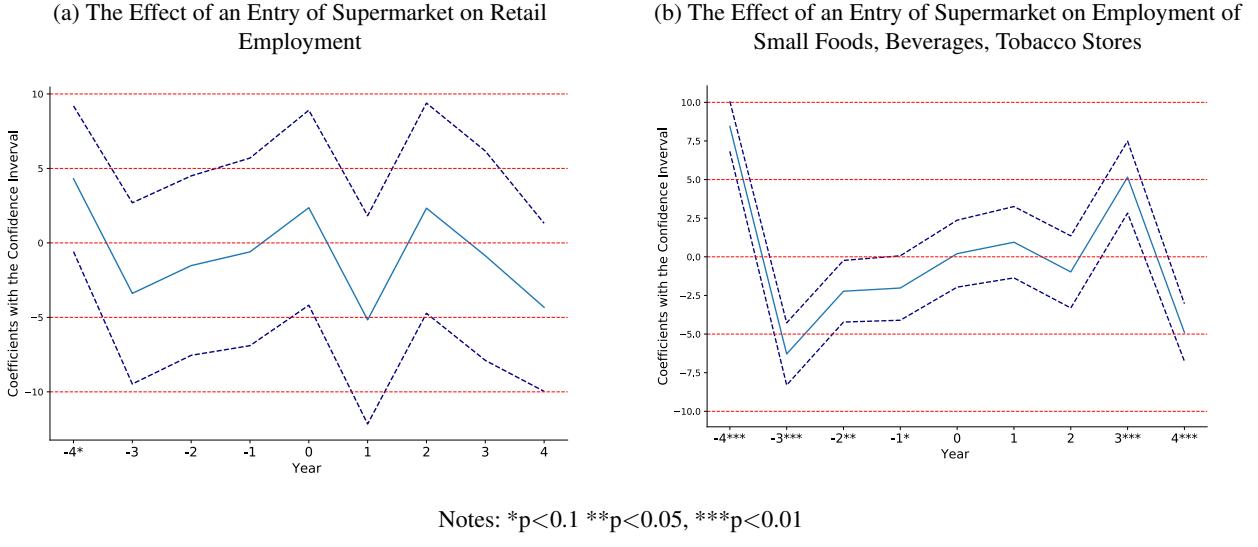


Figure 3 shows the coefficients of interest that are four lags and four leads parameters, and the dotted line is the confidence interval. The estimated effect of an entry of supermarket on retail employment is in (a). Since only fourth lag coefficient is statistically significant, I could not find the effect of an entry of supermarket on retail employment. In (b), I find that there is five jobs increase in employment of small foods, beverages, and tobacco stores after an entry of supermarket, but the effect disappears in the next year.

Figure 4: Supermarkets that are Incorporated Company and Employment

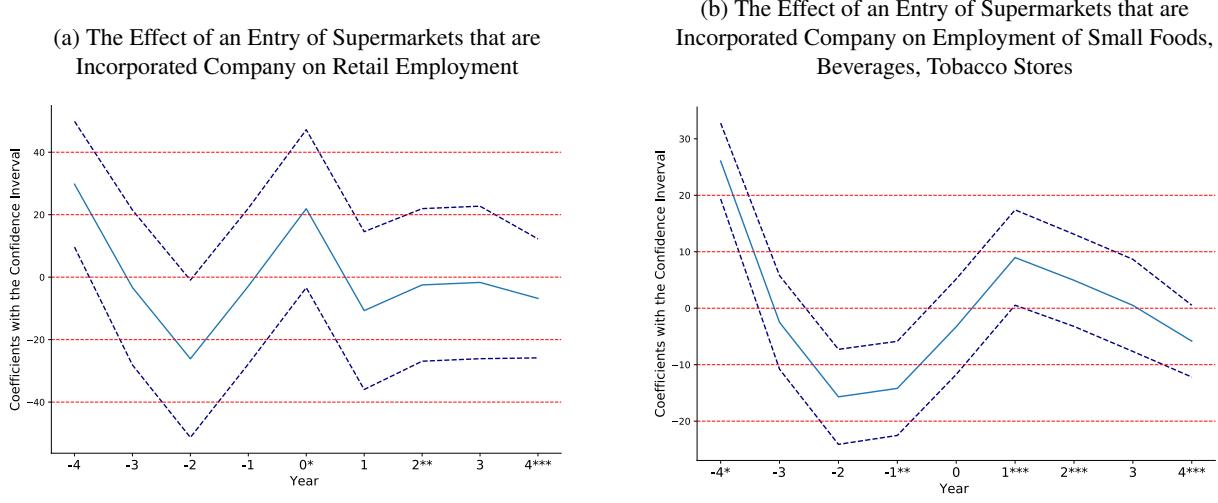


Figure 4 shows the results of estimation using equation (2) and coefficients of interest are four lags and four leads parameters. The dotted line is the confidence interval. The estimated effect of an entry of supermarket that are incorporated company on retail employment is in (a). I find that an entry of supermarket that is incorporated company decreases retail employment by 2.485 after two years, and 6.799 after four years. In

(b), I find that an entry of supermarkets that are incorporated company increases the employment of small stores after one year but it decreases employment of small stores by 5.826 after four years.

5 Conclusion

From the equation (1) and (2), I estimate the effects of a change in market share of supermarkets that are incorporated type on the net exit, and the effects of an entry of supermarkets on employment of retail and small stores. Also, I estimate the effects of an entry of supermarkets that are incorporated type on employment of retail and small stores. The results show that supermarkets that are incorporated company increase the employment of retail and small stores, but the entry decreases the employment of retail and small stores after two or four years.

The research question is how much the rapid rise of supermarkets affects the employment and net exit. I could find that there is an small increase in employment after the entry, but I use the assumption that an entry of supermarkets is not correlated with the county's employment level. For further research, I should consider a way that solves the endogeneity problems, and also find how many lag and lead parameters are appropriate.

References

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Appendix

A.1 Counties

Table A.1-1: County and County Equivalents of South Korea

	City	County	District	Total
N	61	82	90	233
Land Area (mi^2)	15,334	21,174	1,322	37,830
Population (thousands)	13,996	4,244	31,318	49,559
Land Area (mi^2) / N	251	258	15	162
Population (thousands) / N	391	54	277	228
Population Density (people per mi^2)	913	200	23,690	1,310
GRDP * (million won)**	815,093,735	158,263,022	720,238,445	1,243,378,544
GRDP per capita (million won)	24	26	22	23

* Gross Regional Domestic Product at current prices

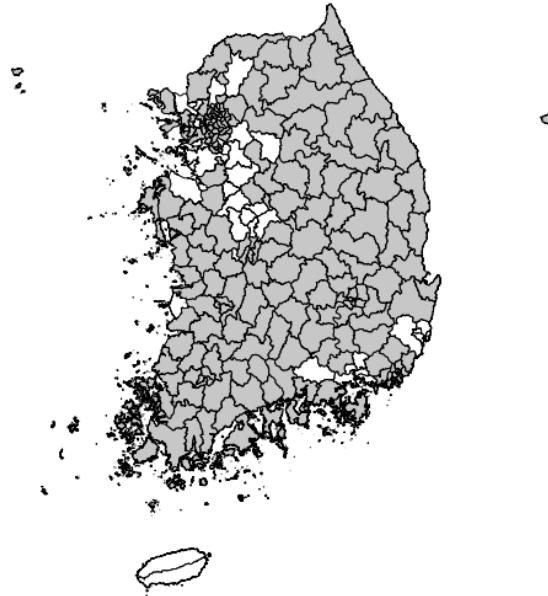
** won (₩) is the official currency of South Korea (Nov. 23, 2020: \$1 = ₩1,112)

Jeju Island and Sejong-si are excluded. All values are rounded to the nearest whole number.

Source: Author's calculations from Gross Regional Domestic Product, Census, and Statistics of Urban Plan (2016 Statistics Korea).

A.2 Counties that are included in the research

Figure A.2-1: Counties and County Equivalents that are Included in Analysis (Grey Color)



Choropleth map using shp file (SGIS, [3]).