Determinants of Goodwill in Retail Properties in Seoul

Seung-Young Jeong, PhD
Dankook University
Seoul, Korea
Email: jkj0519@hotmail.com

and

Jinu Kim, PhD
School of the Built Environment
The University of New South Wales
Sydney, Australia
Email: J.Kim@unsw.edu.au

Paper to be submitted to
16th Pacific Rim Real Estate Society Conference
Wellington, New Zealand
24-27 January 2010

Determinants of Goodwill in Retail Properties in Seoul

Abstract

This paper empirically models the determinants of Goodwill using Structural Equation Modeling. It employs a two-stage model that estimates Goodwill in a stage one using the regression model and then includes predicted in a stage two demand model investigating endogenous and exogenous determinants of Goodwill. The data includes information on premium rents for 522 retail trade area in Seoul, South Korea. The major findings are as follows: Firstly, there is a high correlation between Goodwill and retail rents from utilizing the retail property. It reveals that the higher the Goodwill has the higher the retail rent in commercial area of Seoul. Secondly, Goodwill is influenced by the retail rental price factor, Low-Income Population and Low-Density Housing. The analysis shows that economic factors within the retail traded-area have highly affected Goodwill at the statistically significant level with the reliable model in Seoul city.

Keywords: Goodwill, retail property, Structural Equation Modeling

1. Introduction

These days, investors are increasingly interested in profitable real estate in the Korean real estate market. Retail real estate is such an item, and investors or developers who value the nature of cash flow are becoming more interested in turning rental business and retail real estate into financial products. The change in the nature of real estate investment implies that real estate is indeed an investment item like other financial products, so investors or developers need to check the risk of investing in real estate market. That is, one needs an index in order to come up with an objective investment decision, and the amount of goodwill will become ever more important as an index for measuring the profitability of retail real estate when leasing becomes more prevalent in Korean real estate market in the future.

Goodwill in retail real estate is decided locally and individually based on the retail environment of the retail trade area where the target customers exist, so the economic power of retail trade area greatly affects in the amount of goodwill. The change in the

economic power of retail trade area results in the increase or decrease in retail rental, prompts new retail trade areas or marts to compete against the existing commercial establishment, and brings changes in the consumers' standing. Changes in public transportation, introduction of large wholesale or retail stores, introduction or transfer of public agencies or big businesses, and increase in income and accompanying change in consumption pattern are some of the factors which may bring changes to market power. The start of city restructuring and diversification of consumer taste have resulted in the intense and complex usage of land in Seoul, thereby increasing the economic power of commercial trade area.

Despite the importance of the economic power of retail trade area, researches on concrete factors which affect the economic power of retail trade area have been neglected thus far. Depending on the individual background of retail rental, predicting the operation and resale profits and coming up with a strategy have become an important issue. Thus, this study will discuss variables that affect the goodwill of individual store and their importance by utilizing data on retail real estate in Seoul.

2. Trend of research

Because it is hard to obtain rental data in retail real estate, and retail real estate requires more complex professional knowledge than residential real estate, there have not been many studies how retail real estate goes about setting its goodwill. Studies that deal with factors which affect commercial rental price were geared towards how spatial factors of retail real estate affected rental price until 1980s, but they have progressed to investigating how non-spatial factors, such as the nature of consumers or image of shopping centers, affect the rental price since 1990s.

According to studies on rental price or retail real estate, stores located in a huge shopping mall is more competitive than stores located in a small shopping center (Eton & Lipsepy; 1982, Mulligan;1983); and Ghosh (1986) reports that landowners or low-level retailers benefit from the availability of multi-purpose shopping. Moreover, the lease term, percentage rent, or name value of franchise affect the rental value of each store (Benjamin, Boyle & Sirmans; 1990); and the size or age of shopping center or nature of anchor tenants may decide the rental price as well. (Sirmans & Guidry; 1993) Also, stores which are traditionally known to draw a sizable volume of traffic often end

up paying less for rent. (The Center for Advanced Land Use Studies; 1975 & Anderson; 1985)

Many studies used the rental price of retail real estate and nature of the market or economic power of the primary retail trade area as an explanatory variable, but studies which deal with variables on the economic power of retail trade area are extremely limited. The buying power of retail trade area is known to be important in determining the amount of retail sales and setting rental price (Ingene and Lusch; 1980, Okoruwa et al.; 1994); and the image of anchor tenants or characteristics of the population are some of the variables that reflect the economic power of the retail trade area. (William and Marvin L; 2001)

3. The research model and data

3.1. Theoretical model and variables

3.1.1. Theoretical model

In this study, a retail trade area means a spatial and local area, and includes all the concepts which oversee the most practical place of trading for consumers as well as businesses. In general, the retail trade area is determined by the nature of stores, physical obstacles, competitions within the location, driving distance, and other elements. According to the Central Place Theory, high-level goods and service industry influences low-level goods and service industry. A high-level goods and service industry often affects the goodwill of retail real estate for an area close to the industry.

In addition, the special image of retail real estate or anchor tenants, or the economic power of retail trade area may increase the amount of sales in retail real estate, and the increase will be reflected in goodwill of retail real estate. The model also explains the recent accumulation of retail stores at the center of a shopping district, and the crowding phenomenon which allows the consumers to visit many stores in single visit, thereby saving the cost of traveling, but the phenomenon differs in scale and pattern depending on the local characteristics. (Dipasqual Wheaton; 1996)

The accumulation of retail stores arises depending on the hierarchy or kind of retail products, such as convenience goods or shopping goods. (McDonald; 1999) The

structure or characteristic of retail trade area always changes. In general, the structure or characteristic of retail trade area changing according to the physical conditions, such as type of residence, or road construction, or investment in new buildings. Factors describing the characteristics of retail trade area include the size, shape, local population, nature of the population (age, gender, income, and so on), potential expense, degree of market penetration, degree of market dominance, absorption power of client, approachability of store, and transportation. Factors determining the economic power of retail trade area include the price of real estate, population, housing, industry, and real estate development. The index describing the economic power of retail trade area include the number of population, household, population density, population spread according to age, population increase rate, weekly population index, income, and buying power for each product.

The economic forces of such retail trade area differs depending on the type of real estate, so it is using the index for the economic power of retail trade area for residence, where the index includes the rate of home ownership, single housing, apartment, duplex housing, and other types of housing. Moreover, the economic power index of retail trade area related to industry includes the number of businesses, number of employees, spread of employees per industry, increase of sales amount in wholesale and retail businesses, and degree of concentration within 1 ㎢ for wholesale, retail, and restaurant businesses. The economic power index of retail trade area related to the real estate price includes monthly rent of store, deposit money for the rent of house, and rental price of office. Lastly, the economic power index of commercial power related to real estate development includes the viability of the area to turn it into a commercial area next to a subway station, commercial area through rezoning, part of land planning, business building, administrative town, residential and commercial building, project of expanding or repairing a road, and redevelopment project.

Based on the basic theory in the formation of a retail trade area, this study has considered the average monthly rent or deposit of the retail real estate within the retail trade area, population of the retail trade area, the number or types of housing within the retail trade area, and the number, types, or members of businesses within the retail trade area to determine the goodwill of retail real estate per 3.3 ㎡. The average goodwill of retail trade area according to this model is the function of effective buying power, where the effective buying power is determined by the size of population and income within the retail trade area.

$$GOODWILL_{ji}=(POP_j, HOUSE_j, INDUSTRY_j) \quad (1)$$

This study intends to propose in details the economic variables of trade area which affect the goodwill of retail real estate. This study used a multiple-regression analysis (the ordinary least squares) to examine the relationship between the goodwill of retail real estate in Seoul and the various descriptive variables.

3.1.2. Definition of Factors

Main Factors directly or indirectly related to the equation (1) above have following definitions. Factors related to the economic power or goodwill of trade area are many when they are viewed macroscopically or microscopically, but this study limited them to four areas as below:

(1) The monthly rent or deposit of retail trade area

The center has high land price, so the price of housing, deposit for renting housing, rental price of office, and rental price of retail real estate are set at higher price. Higher average deposit and goodwill for retail real estate within retail trade area lead to higher rental price per 3.3 ㎡. Among them, the average goodwill of retail trade area represents the present and future economic power index of retail trade area, so this study included deposit and monthly rent as important variables.

Goodwill is also interpreted as the index which reflects the present and future possibility of the relevant retail trade area. Goodwill means the amount being paid by new tenant to the existing tenant for certain rights attached to the business, facilities, or ground being transferred. There is goodwill for business, facility, or ground, but they are all added into one when dealing with retail real estate.

Firstly, goodwill for business arises from the successful efforts of present tenant to enliven the business of the store or commercial area, and it awards the tenant for the build-up of royal clients, reputation of the store, and the sole right to a franchise and resulting superior standing in the market. Secondly, goodwill for facility is formed when the existing tenant asks for the cost for the facility she invested, such as interior, sign, or equipment, at the start of her business from new tenant who happens to engage in the same type of business as the existing tenant. Thirdly, goodwill for ground is reward for good business due to the store location. Lastly, other goodwill includes the

amount new tenant pays to the existing tenant for any other rights besides business, facility, or site.

(2) Population

Population is the basic unit of demand for goods or services. The demand here means the valid demand for goods or services, and it is included in this study as a major variable because the object among the population is determined by the types of goods or services. Fixed and floating population is directly related to the amount of sale in retail real estate. Thus, the valuation of retail real estate is proportionally related to the number of people passing through the area. That is, the concentration of population or change in the background population determines the value of the consumption center. Also, the increase of population and accompanying changes in environments are very important in consumption activities. Variables representing income, such as occupation, education level, and spending, are important variables which affect the retail sales of store. Especially, the characteristics of population within commercial trade area represent the quality of commercial trade area. In this respect, in the consumer market of food or clothing, the total population size is an important index which determines the volume of demand for the products.

(3) Housing

Housing takes up an important part of national economy. Housing is a part of stock, a fixed capital, and it takes up a portion of political means in creating wealth. Housing is closely related to the industry of locale. Like a luxury vehicle, housing is also a symbol of prestige one occupies in the society. A large portion of individual wealth is spent on the purchase or maintenance of housing, and the state or type of possession of housing directly or indirectly represents the social position or income level of the resident. The type of ownership, size of possession, and location of the residence are used as variables representing the income of individual along with the source and amount of income and occupation. Thus, this study used the resident of apartment and ownership of housing as well as the average amount of vehicle and residential tax as proxy variables to represent the income level of the area.

(4) Industry

The source of demand for real estate is a part of the business activity in the area. Changes in hiring practice of economically active population for each industry greatly affect the market, and they are followed by changes in the consumption patterns. That is, people working in the secondary or tertiary industry maintain the westernized life style, so they contribute greatly in increasing the demand for consumer goods including durable consumer goods. In this case, department stores with the concentration of sales businesses or discount stores with restaurants will suitably cater to the population as well as the food court, entertainment district, hotel, cram school, or theater.

3.2. Data

The data set used for this study consists of 50,000 data for retail real estate rental in Seoul Metropolitan Area and the 2002 Annual Statistics Report of Seoul. Goodwill per 3.3 ㎡ was assigned as a response variable, and items of population, industry, and housing were assigned as explanatory variables. The monthly rent, deposit, and goodwill per 3.3 ㎡ in Seoul area came from the monthly rental of retail real estate properties, which were on the market from December 1st of 2004 to December 31st of the same year. The explanatory variables chosen were deposit per 3.3 ㎡, monthly rent per 3.3 ㎡, an area of the size, population density, total population size, gender ratio, median age, the number of household, own housing, leased housing, housing with monthly rent, single housing, number of housing, apartment, duplex housing, the rate of home ownership, number of businesses, number of employees, number of manufacturers, number of employees in manufacturing industry, number of businesses in the tertiary industry, number of people in the tertiary industry, number of businesses in service industry, number of wholesalers or retailers, number of restaurants or hotels, number of IT businesses, number of cultural businesses, number of welfare recipients, number of registered vehicles, and number of people receiving governmental preference. The data which were used in this study are transformed logarithmically and summarized in the Appendix 1.

4. Extraction of Variables

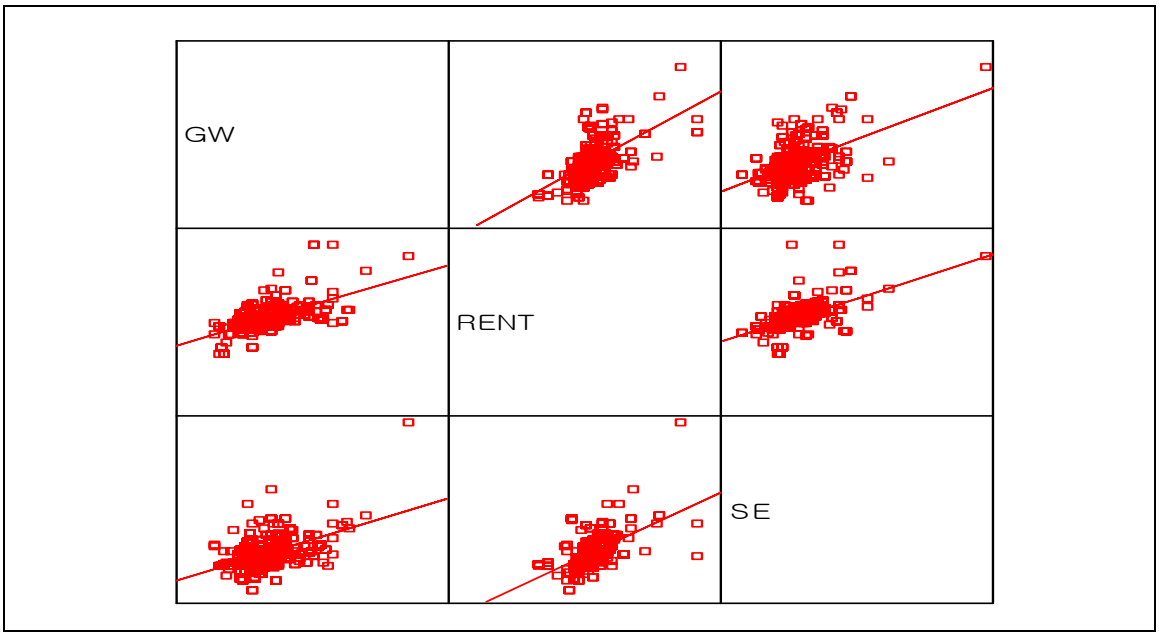
This study centered on the commercial establishments along the road among retail real estate in Seoul, and the multiple-regression analysis was utilized. The research model went through (1) the correlation analysis of variables, (2) verification of multi-

collinearity, and (3) selection of variables to extract variables which are related to the economic power of commercial trade area.

4.1. Analysis of relationship between variables

In order to establish the research model for this study, a bi-variate scatter plot was analyzed to investigate whether the goodwill of retail real estate had the standard distribution and to study the correlation coefficient between elements that determined the goodwill. The result was a plot which showed the elements which determined the goodwill of retail real estate in Seoul area.

Figure 1: Scatter plot matrix of response variables and major explanatory variables



Note : * gw : unit goodwill, ** rent : unit monthly rent, *** se : unit deposit

The dealings of retail real estate in Korea mainly consist of monthly rent plus deposit and goodwill. In general, the amount of monthly rent of retail real estate is inversely proportional to the deposit with respect to the whole lease amount, and the Figure 1 shows the relationship between unit goodwill and unit deposit or unit monthly rental to be linear.

If the two elements were to share an equal amount per 3.3 ㎡ in goodwill, they would spread out around the y = x line. However, the data points of monthly rent per 3.3 ㎡

and deposit per 3.3 ㎡ are located in the area where y ≥ x, so one can see that the monthly rental carries greater weight than the deposit. Moreover, the data points of monthly rent per 3.3 ㎡ and goodwill per 3.3 ㎡ are located in the area where y ≤ x, so one can see that the goodwill carries greater weight than the monthly rent. Similarly the data points of deposit per 3.3 ㎡ and goodwill per 3.3 ㎡ are located in the area where y ≤ x, so one can see that the goodwill carries greater weight than the deposit. According to the scatter plot, there exists a linear relationship between the goodwill per 3.3 ㎡ and monthly rent per 3.3 ㎡, the monthly rent per 3.3 ㎡ and deposit per 3.3 ㎡, or the deposit per 3.3 ㎡ and goodwill per 3.3 ㎡, but outliers are also found as well. Especially there is a clear linear relationship between the monthly rent per 3.3 ㎡ and goodwill per 3.3 ㎡.

Moreover, the bell-shaped goodwill is normally distributed as one can observe that the data points are linearly located. (Refer to the Appendix 4.) The data becomes less dense near both ends of the normal probability plot, the lower points are located below the main trend, and the higher points are located above the main trend. Based on the analysis above, the rent of retail real estate in Seoul area is calculated by adding the goodwill, monthly rent, deposit, and maintenance fee, and one can discover the existence of a positive linear relationship between the elements.

4.2. Multi-collinearity

This study also analyzed the multi-collinearity. When the multi-collinearity was reviewed based on variable inflation factor, there existed a very large multiple-collinearity between total population size, male, number of households, household with home ownership, household with leased housing, household with monthly rent, household with the rate of other types of housing, number of housing, ratio of single housing/apartment/duplex housing, number of businesses, number of workers, number of manufacturers, number of employees in manufacturing industry, number of businesses in the tertiary industry, number of people in the tertiary industry, number of businesses in service industry, number of wholesalers or retailers, number of restaurants or hotels, the recipient of governmental preference, and number of registered vehicles. In order to investigate the multi-collinearity, this study used a principal component analysis. From the result of the SAS output, it was statistically significant to choose the four major components because seven of the components had an eigenvalue greater than 1 and the sixth component had an eigenvalue close to 1. (Refer to the Appendix 2.)

4.3. Extraction of significant variable

Before deciding significant variables, proper number of variables which make up the scaled-down model was selected through the plot which represents Mallows' C_p and adjusted coefficient of determination ($adjR^2$). According to Mallows' C_p, a scaled-down model with more than 2 but less than 13 variables was preferred, whereas according to the adjusted coefficient of determination ($adjR^2$) standard, selection of 13 variables was preferred. (Refer to the Appendices 5 & 6)

This is a process deciding *P* number of explanatory variables among 36 variables which are expected to affect the goodwill of retail real estate. Through five methods of selecting variables, parameters were measured among the 36 correlation variables which are directly related to retail real estate.

Among them only the variables representing the deposit per 3.3 ㎡, monthly rent per 3.3 ㎡, household with weekly or daily rent, the rate of other types of housing, rate of home ownership, gender ratio, median age, number of apartment, single household, number of single housing had reliability higher than 95%. Variables selected by forward selection were the deposit per 3.3 ㎡, monthly rent per 3.3 ㎡, household with weekly or daily rent, the rate of other types of housing, rate of home ownership, gender ratio, median age, number of apartment, single household and according to the adjusted coefficient of determination ($adjR^2$) standard, a scaled-down model with step(s) more than 2 but less than 13 is(are) preferred. However, there is not much difference among the 4 models. Variables eliminated by backward elimination method were ratio of leased housing, gender ratio, number of employees in manufacturing

The result from analyzing the final regression model using the stepwise regression method is summarized in the Table 1. For the major variables, steps 1 and 2 selected deposit per 3.3 ㎡ and monthly rent per 3.3 ㎡ as in the forward selection method, step 3 the household with weekly or daily rent selected, step 4 selected the rate of other types of housing, step 5 selected rate of home ownership, step 6 selected the gender ratio, step 7 selected median age, step 8 selected number of apartment, step 9 selected single household, and step 10 selected the number of single housing. 11^{th} step selected number of employees in manufacturing, 12^{th} step selected population density, and 13^{th} step selected leasing housing. Based on the past studies and stepwise selection of variable, this study was able to build the optimal regression model like the Table 2. The stepwise selection of variable was right for this occasion because the value of F_0 was

higher than values obtained from other variable selection methods. However, one must be warned that none can assure the optimal regression equation, or there could be more than two equations.

Table 1: Stepwise regression method

Step	Variables	Partial R-Square	R-Square	$C_{(P)}$	F_0	Sig.
1	the deposit per 3.3 ㎡	0.3880	0.388	87.34	328.98	0.0001
2	monthly rent per 3.3 ㎡	0.0246	0.412	65.05	21.69	0.001
3	household with weekly or daily rent	0.0145	0.427	52.68	13.13	0.0003
4	the rate of other types of housing	0.0085	0.435	46.25	7.81	0.0054
5	rate of home ownership	0.0084	0.444	39.96	7.77	0.0055
6	gender ratio	0.0065	0.450	35.56	6.06	0.0141
7	median age	0.0043	0.454	33.27	4.09	0.0438
8	number of apartment	0.0053	0.460	30.05	5.01	0.0256
9	single household	0.0043	0.464	27.80	4.11	0.0431
10	number of single housing	0.0034	0.467	26.43	3.27	0.0711
11	number of employees in manufacturing	0.0034	0.471	25.04	3.30	0.0698
12	population density	0.0031	0.474	24.01	2.96	0.0857
13	leasing housing	0.0022	0.476	23.83	2.14	0.1443

Table 2: Result of variable selection using stepwise regression method

variable	Sig.	variable	Sig.
Monthly rent per 3.3 ㎡	0.0001	gender ratio	0.0141
the deposit per 3.3 ㎡	0.0001	median age	0.0438
housing with weekly or daily rent	0.0003	number of apartment	0.0256
the rate of other types of housing	0.0054	single household	0.0431
rate of home ownership	0.0055		

When the statistic of 13 explanatory variables is investigated, *P*-values of all the variables except number of single housing, number of employees in manufacturing, population density, population density and leased household, the rate of duplex housing are below 0.05, thereby making them significant above 95%. In addition, the adjusted coefficient of determination ($adjR^2$) which denotes the explanatory power of the optimal regression model was 0.4766, which was rather high when compared to the results from previous studies.

This study selected the adjusted coefficient of determination ($adjR^2$) as the standard in selecting major variables, and selected the final model after considering the Mean-Square-Error (MSE) and Mallows' C_p. In this case, the highest value of the adjusted

coefficient of determination (adjR^2) would be the most ideal, whereas the lowest value was preferred for the MSE or Mallows' C_p.

Table 3: Comparison of C_p, adjR^2, and MSE

VARIABLE	RE	RE SE	RE SE HW	RE SE HW HT	RE SE HT SH PD	RE SE HW HT GR SH	RE SE HW HT HO MA AP	RE SE HW HT HO MA AP SI	RE SE HW HT GR HO MA AP SI	RE SE HW HT HO MA AP SI SH PD	RE SE HW HT HO MA AP SI SH MU PD	RE SE HW HT GR HO MA, AP SI SH MU PD	RE SE HW HT GR HO MA, AP SI SH MU PD LH
P	1	2	3	4	5	6	7	8	9	10	11	12	13
C_p	75.84	54.01	41.92	35.64	29.50	24.91	22.29	19.38	17.73	15.70	14.41	14.13	14.00
Adj R^2	0.38	0.41	0.42	0.43	0.43	0.44	0.44	0.452	0.45	0.45	0.46	0.46	0.46
MSE	0.41	0.40	0.39	0.39	0.39	0.39	0.38	0.38	0.38	0.38	0.38	0.38	0.38

Note:
RE: monthly rent per 3.3 ㎡, **SE:** the deposit per 3.3 ㎡, **HW:** household with weekly or daily rent, **HT:** the rate of other types of housing, **HO:** rate of home ownership , **GR:** gender ratio, **MA:** median age **, AP:** number of apartment**, SI:** single household **, MU:** number of employees in manufacturing**, PD:** population density **, LH:** leasing housing, **SH**: number of single housing,

The Table 3 checks the Mallows' Cp, adjusted coefficient of determination (adjR^2), and MSE with the variables selected in a stepwise selection method, such as the monthly rent per 3.3 ㎡, deposit per 3.3 ㎡, household with weekly or daily rent, household with weekly or daily rent, rate of home ownership, gender ratio, median age, number of apartment, single household, number of employees in manufacturing, population density, leasing housing

As a result, the value of Mallows' Cp was the lowest in the 13th step, whereas the adjusted coefficient of determination (adjR^2) was the highest. Also, the value of mean square error (MSE) was the lowest in the 13th step. Based on the finding that the variable inflation factor (VIF) for each selected variable was less than 2, this study decided the final scaled-down model.

The constant for the regression equation was 8.368, and the regression coefficient for the Monthly rent was 0.49 in the Table 4. Also, *t*-value of the Monthly rent was 14.85, and the probability of significance was 5%, thereby rejecting H_0 from the hypotheses $H_0 : \beta = 0$, $H_1 : \beta = 0$, and $\alpha = 0.05$. This means that Monthly rent was the variable

that affected the goodwill the most. In addition, the *t*-value of deposit was 0.329, the significance probability was 1%, so H_0 was rejected with $\alpha = 0.05$.

Table 4: Analysis of variance (a) and Parameter Estimates (b)

(a) Analysis of variance

Source	DF	Sum of Mean	Squares Square	F Value	Pr > F
Model	13	68.15325	5.24256	35.51	<.0001
Error	507	74.85022	0.14763		
Corrected Total	520	143.00348			
	Root MSE	0.38423	R-Square	0.4766	
	Dependent Mean	4.85685	Adj R-Sq	0.4632	
	Coeff Var	7.91111			

(b) Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Prob > |t|	Variance Inflation
Intercept	1	8.368	2.709	3.09	<.0021	0
Monthly rent	1	0.494	0.033	14.85	<.0001	1.23724
The deposit per 3.3 ㎡	1	0.329	0.071	4.63	0.0001	1.23325
Household with weekly or daily rent	1	-0.085	0.041	-2.05	0.0412	2.87192
The rate of other types of housing	1	0.106	0.026	4.06	0.0001	2.36993
Gender ratio	1	-0.536	0.32	-1.64	0.100	1.14434
Rate of home ownership	1	0.320	0.096	3.32	0.001	3.99853
Median age	1	-1.380	0.54	-2.52	0.012	2.33378
Number of apartment	1	-0.047	0.015	-3.04	0.002	1.96177
Single household	1	0.122	0.055	2.21	0.027	2.23194
Number of Single housing	1	-0.039	0.025	-1.53	0.126	4.37745
Number of employees in manufacturing	1	-0.018	0.010	-1.81	0.071	1.04256
Population density	1	0.053	0.029	1.82	0.069	1.52197
Leasing housing	1	-0.149	0.102	-1.46	0.1443	2.31562

Moreover, with $\alpha = 0.05$ it was statistically significant for the regression coefficient of each variable representing household with weekly or daily rent *(t*-value: -2.05,

significance probability: 5%), the rate of other types of housing (*t*-value: 4.06, significance probability: 1%), gender ratio (*t*-value: -1.64, significance probability: 10%), rate of home ownership (t-value: 3.32, significance probability: 1%), median age (*t*-value: -2.52, significance probability: 1%), number of apartment (*t*-value: -3.04, significance probability: 1%), single household(*t*-value: 2.21, significance probability: 5%), Number of single housing(*t*-value: -1.53, significance probability: 10%), number of employees in manufacturing(*t*-value: -1.81, significance probability: 10%), population density(*t*-value: 1.82, significance probability: 10%) and leasing housing (*t*-value: -1.46, probability significance: 10%).

The Table 4, based on the parameter estimate of regression coefficient, tells that the regression equation.

$$ln\_\hat{y} = 8.36+0.4948\ X\ (ln\_RE) + 0.3293\ X\ (ln\_SE) - 0.0858\ X\ (ln\_HW) + 0.106\ X\ (ln\_HT) - 0.5364\ X\ (ln\_GR) + 0.3207\ X\ (ln\_HO) - 1.3807\ X\ (ln\_MA) - 0.0478\ X\ (ln\_AP) + 0.122\ X\ (ln\_SI) - 0.0395\ X\ (ln\_SH) - 0.0185\ X\ (ln\_MU) + 0.0531\ X\ (ln\_PD) - 0.1492\ X\ (ln\_LH). \quad (2)$$

where ; RE: monthly rent per 3.3 ㎡
SE: the deposit per 3.3 ㎡
HW: household with weekly or daily rent
HT: the other house
HO: rate of home ownership
GR: gender ratio
MA: median age
AP: number of apartment
SI: single household
MU: number of employees in manufacturing
PD: population density
LH: leasing housing
SH: number of single housing

Next, this study investigated the relative importance of variables in explaining Goodwill. Here, when the standard estimate was employed to find out the weight of each explanatory variable, the importance decreased among the variables according to the following order; monthly rent per 3.3 ㎡ (14.85), deposit per 3.3 ㎡ (4.65), the rate of other types of housing (4.06), rate of home ownership (3.32), number of apartment (-3.024.

4.4. Verification of the Model

A regression analysis was performed to verify the appropriateness of the final model in the Equation 2. The regression analysis includes residual analysis, influence evaluation, and multi-collinearity, and this study verified by mainly relying on residual analysis while using influence evaluation and multi-collinearity to aid the main analysis. (See the appendix) Firstly, the value of Hat Diag H was not so large when the effect on the residual analysis was checked using influence as an option. Thus, this study concluded that the reliability of the regression analysis was found to be safe. Secondly, the independence of residue, homogeneity of variance, and normalization were investigated to review the appropriateness of the model using the chosen variables.

Table 5: Verification of Durbin-Watson

Dependent Variable: Y	
Durbin-Watson D	1.122
Number of Observations	521
1st Order Autocorrelation	0.438

The value of Durbin-Watson was obtained to discover the independent nature of residue. As the value is 1.122 in the Table 5, the independent nature of residue is also satisfied. In order to check the homogeneity of variable in residue, a residual plot was drawn. The residual plot displayed a distribution shape concentrated in certain area, and this is a phenomenon often found in data representing the value of real estate. Thus, we need to check the spatial distribution of reside in details later.

Figure 2: Residual Plot

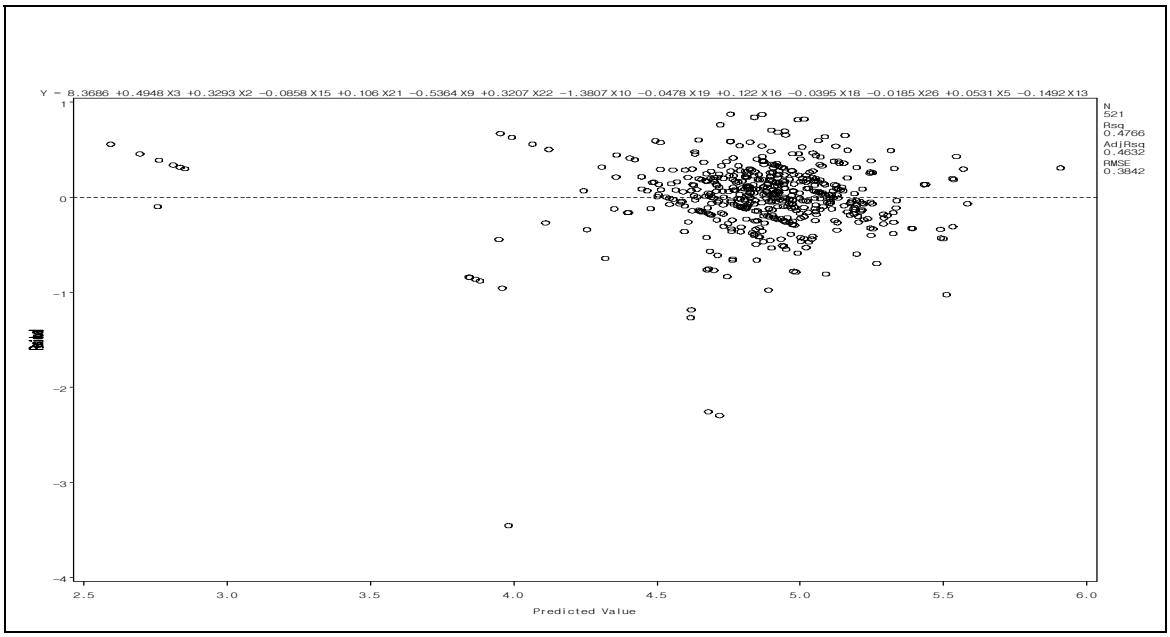
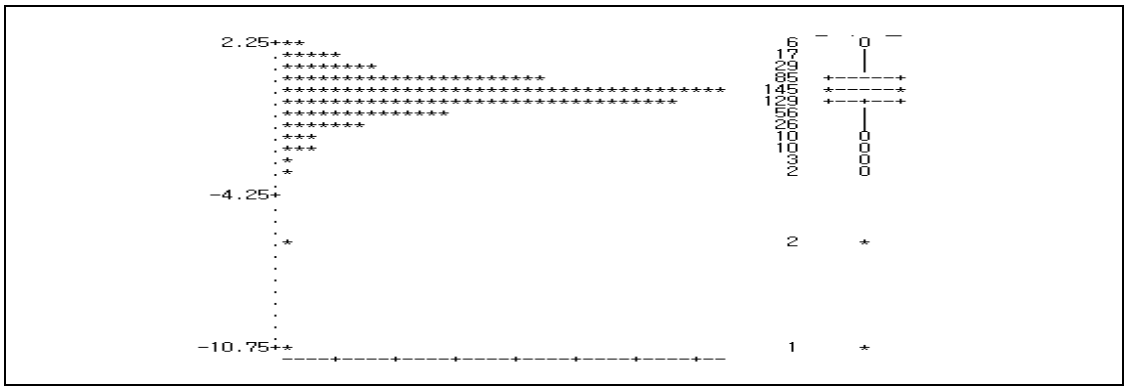
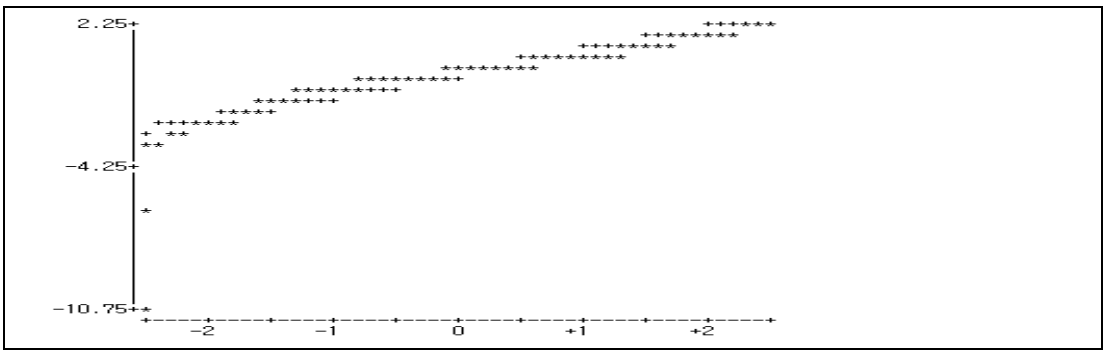


Figure 3: Histogram (a) and Normal probability of Residue (b)

(a) Histogram



(b) Normal probability of Residue



In addition, this study employed the histogram and normal probability to investigate the normalization of residue, and the residue had a shape close to a normal distribution, thereby satisfying normalization. (Refer to the Figures 2 and 3)

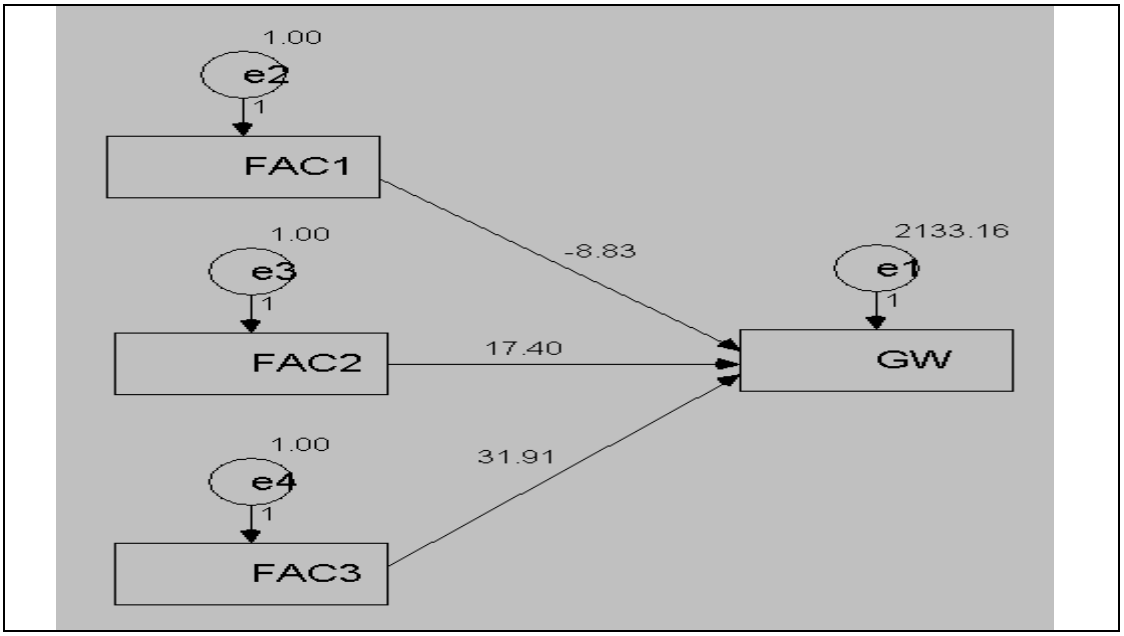
Thus, as in the earlier analysis, the function of goodwill within retail trade area is appropriate to have a goodwill decision model with variables representing the monthly rent per 3.3 ㎡, deposit per 3.3 ㎡, industry, housing, and population.

In choosing the variables, the adjusted coefficient of determination (adjR^2) was the highest when the number of variables was 13, and the mean square error was the lowest. The figures showing the independence of residue, homogeneity of variance, and normalization were satisfactory when they were checked with the most appropriate model built by the chosen variables, and this study confirmed that the goodwill of retail real estate is affected by the deposit per 3.3 ㎡, monthly rent per 3.3 ㎡, population, industry and housing.

4.5 Structural Equation Modelling

The Appendix 2 show that the first factor is clearly a Low-Density Housing factor, with very high loadings for ‘number of apartment’, ‘number of single housing’ and low loadings for all other variables. The second factor is clearly a Low-Income Population factor, with high loadings for ‘household with weekly or daily rent’ and ‘median age’. The third factor is clearly a retail rental price factor, with high loadings for ‘monthly rent’ and ‘deposit’.

Figure 4: Structural Equations Model



To illustrate multistage systems, assume that Goodwill is influenced by the low-density house, low-income population and retail rental price. The relationships among these variables can be depicted as in the Figure 4: In this diagram, the connecting lines indicate relationships between variables, and the arrows indicate the direction of causality for those relationships. The -8.83, 17.40 and 31.90 values are standardized regression coefficients that indicate the magnitude of each relationship.

5. Conclusion

This study described in details how certain variables related to the economic power of retail trade area affect the determination of goodwill in retail real estate. For the empirical model, this study established a data set utilizing the goodwill of retail real estate within Seoul and the Annual Statistical Report of Seoul. This study selected significant variables among 36 variables related to the economic power of retail trade area using Statistical Analysis. More precisely, this researcher used variables deciding the rent within retail trade area, such as the population, housing, and industry.

According to the analysis which determined factors affecting the goodwill of retail real estate, monthly rent per 3.3 ㎡, the deposit per 3.3 ㎡, the rate of other types of housing, gender ratio, rate of home ownership, median age, number of apartment, single household, number of single housing, number of employees in manufacturing, population density, leasing housing were proportionally related to the goodwill, whereas the household with weekly or daily rent, gender ratio, median age, number of apartment, number of single housing, number of employees in manufacturing and leasing house were inversely related to the goodwill. Especially, the monthly rent per 3.3 ㎡ and deposit per 3.3 ㎡ were found to be important explanatory variables in calculating the goodwill of retail real estate.

When this study observed the statistic of the optimal model based on the 13 explanatory variables, each *P*-value for every explanatory variable was found to be below 0.05, so the finding was significant with 95% reliability. Also, both the adjusted coefficient of determination (adjR_2) at 0.4632 and the value of *F* at 35.51 were rather high when compared to the results from previous studies.

The residual analysis, influence evaluation, and multi-collinearity analysis were performed as parts of the regression analysis, and the Durbin-Watson value of residue was found to be 1.122, thereby satisfying the independence of residue. Also, the distribution of residue was close to normal, so the result satisfied the normalization.

Goodwill is influenced by the retail rental price factor, Low-Income Population and Low-Density Housing. The analysis shows that economic factors within the retail traded-area have highly affected Goodwill at the statistically significant level with the reliable model in Seoul city

Other studies mostly confined themselves by discussing limited variables representing the economic power of retail trade area, such as the rent vacancy rate within the retail

trade area, competitive nature of the retail trade area, and number of household receiving governmental aid, but this study prides itself for building a retail goodwill decision model with more detailed data, such as the population, housing, and industry of retail trade area. Accordingly, this study, through an empirical analysis, has proved that the goodwill of retail real estate in Seoul is affected by the population, income, present state of industry, deposit, and monthly rent. Thus, this study has proven that one must consider the economic power of retail trade area when building a goodwill decision model for retail real estate. Moreover, this study finds it necessary to build variables and models for each type of retail trade area in the future.

Reference

Addae-Dapaah, K.; Yeo, C (1999), Percentage lease agreement as a shopping center management tool: a panacea for Singapore's retail industry woes? *Property management*, Vol. 17, No.1 , pp. 24-36.

Ball, M & Grilli, M (1997), 'UK commercial property investment: time-series characteristics and modelling strategies', Journal of Property Research, Vol. 14 pp.279-96.

Ball, M, Lizieri, C & MacGregor, B (1998), 'The Economics of Commercial Property Markets', Routledge, London

Barron, D W (1995), The Small-Store Tenant's Guide to Shopping Center Leases, *Real estate review*, Vol.24, No.4, p.29 .

Benjamin, J, Boyle, G & Sirmans, C (1990), 'Retail leasing: the determinants of shopping center rents', *AREUEA Journal*, Vol. 18, 1990, pp. 302 - 312.

Benjamin, J, Jud, D & Winkler, D, (1998), A simultaneous model and empirical test of the demand and supply of retail space, Journal of Real Estate Research, Vol. 16, pp.1-14.

Carter, C C (1995), Measuring the Benefits of Anchors to the Shopping Center , *Real estate review*, v.25, No.1, pp.52.

Champion, A (2001), 'A changing demographic regime and evolving polycentric urban regions: consequences for the size, composition and distribution of city populations', Urban Studies, Vol. 38 No.4, pp.657-77.

Eaton, B C & Richard, G L (1982), An Economic Theory of Central Places , *The Economic Journal*, Vol. 92, No. 365, pp. 56-72.

Eppli, M J & Shilling, J D (1995), Large-Scale Shopping Center Development Opportunities , *Land economics*, v.71, No.1, pp.35

Eppli, M J & Shilling, J. D.(1996), How Critical Is a Good Location to a Regional Shopping Center?, *The Journal of real estate research*, v.12, No.3, pp.459-468 .

Eppli, M J (1998), Value Allocation in Regional Shopping Centers, *The Appraisal journal*, Vol.66, No.2, pp.198-206

Gerbich, M (1998), An Empirical Analysis of the Determinants of Shopping Center Rentals, *The Journal of real estate research*, Vol.15, No.3, pp.283-296.

Gambill, M G (2000), SHOPPING CENTER BRANDING: DOES IT MAKE SENSE?, *Real estate issues*,Vol.25, No.1, pp.13-27

Ghosh, A (1986), The value of a mall and other insights from a revised central place model, *Journal of Retailing*, Vol. 62 pp.79-97.

Hardin, W, Wolverton, M & Carr, J (2002) 'An empirical analysis of community center rents', *Journal of Real Estate Research*, Vol 23, No 1/2 pp 163-179.

Hendershott, P, MacGregor, B & White, M (2002), 'Explaining real commercial rents using and error correction model with panel data', *Journal of Real Estate Finance and Economics*, Vol. 21 No.1/2, pp.59-87.

Herman, M Y (1997a), The Shopping Center Percentage Lease: Part 1, Use and Related Clauses, *Real estate review*, Vol.27, No.1, pp.48-53.

Herman, M Y (1997b), The Shopping Center Percentage Lease: Part 2, *Real estate review*, Vol.27, No.2, pp.58-61.

Herman, M Y (1997c), The Shopping Center Percentage Lease: Part 3 Enforcement, *Real estate review*, Vol.27, No.3, pp.25-28.

Jackson, C (2002) 'Classifying local retail property markets on the basis of rental growth rates', *Urban Studies*, Vol. 39 No.8, pp.1417-38.

Lassar, T (1995), 'Shopping Centers Can Be Good Neighbors', *Planning*, Vol.61, No.10, pp.14.

Miceli, T J, Sirmans, C F &Stake, D (1998), 'Optimal Competition and Allocation of Space in Shopping Centers', *The Journal of real estate research*, v.16, No.1, pp.113-126.

Mulligan, G F (1983), Consumer demand and multipurpose shopping behavior, Geographical Analysis, Vol. 15, No.1, 76-81.

Sirmans, C & Guidry, K (1993), 'The determinants of shopping center rents', The Journal of *Real Estate Research*, Vol. 8 No.1, pp.107-115.

Appendix 1: Definition of the Variables

	Label	Define Variable	Unit	Type of Variable
response variable	Gw	Goodwill per 3.3 ㎡	Ten thousand won/ 3.3 ㎡	Continuous data
explanatory variable	X2	Deposit per 3.3 ㎡	Ten thousand won / 3.3 ㎡	Continuous data
	X3	Monthly rent 3.3 ㎡	Ten thousand won / 3.3 ㎡	Continuous data
	x4	Area size	㎢	Continuous data
	x5	Population density	Person/㎡	Continuous data
	x6	Total population size	person	Continuous data
	x7	Man	person	Continuous data
	x8	Female	person	Continuous data
	x9	Gender ratio	%	Continuous data
	x10	Median age	age	Continuous data
	x11	Number of household	Household	Continuous data
	x12	Own housing	%	Continuous data
	x13	Leased housing	%	Continuous data
	x14	Housing with monthly rent	%	Continuous data
	x15	Others Household	%	Continuous data
	x16	Single housing	%	Continuous data
	x17	Number of housing	house	Continuous data
	x18	Detached dwelling	%	Continuous data
	x19	Apartment	%	Continuous data
	x20	The rate of duplex housing	%	Continuous data
	x21	The other house	%	Continuous data
	x22	The rate of home ownership	%	Continuous data
	x23	Number of businesses	Each	Continuous data
	x24	Number of employees	person	Continuous data
	x25	Number of manufacturers	Each	Continuous data
	x26	Number of employees in manufacturing industry	person	Continuous data
	x27	Number of businesses in the tertiary industry	Each	Continuous data
	x28	Number of people working in the tertiary industry	person	Continuous data
	x29	Number of businesses in service industry	Each	Continuous data

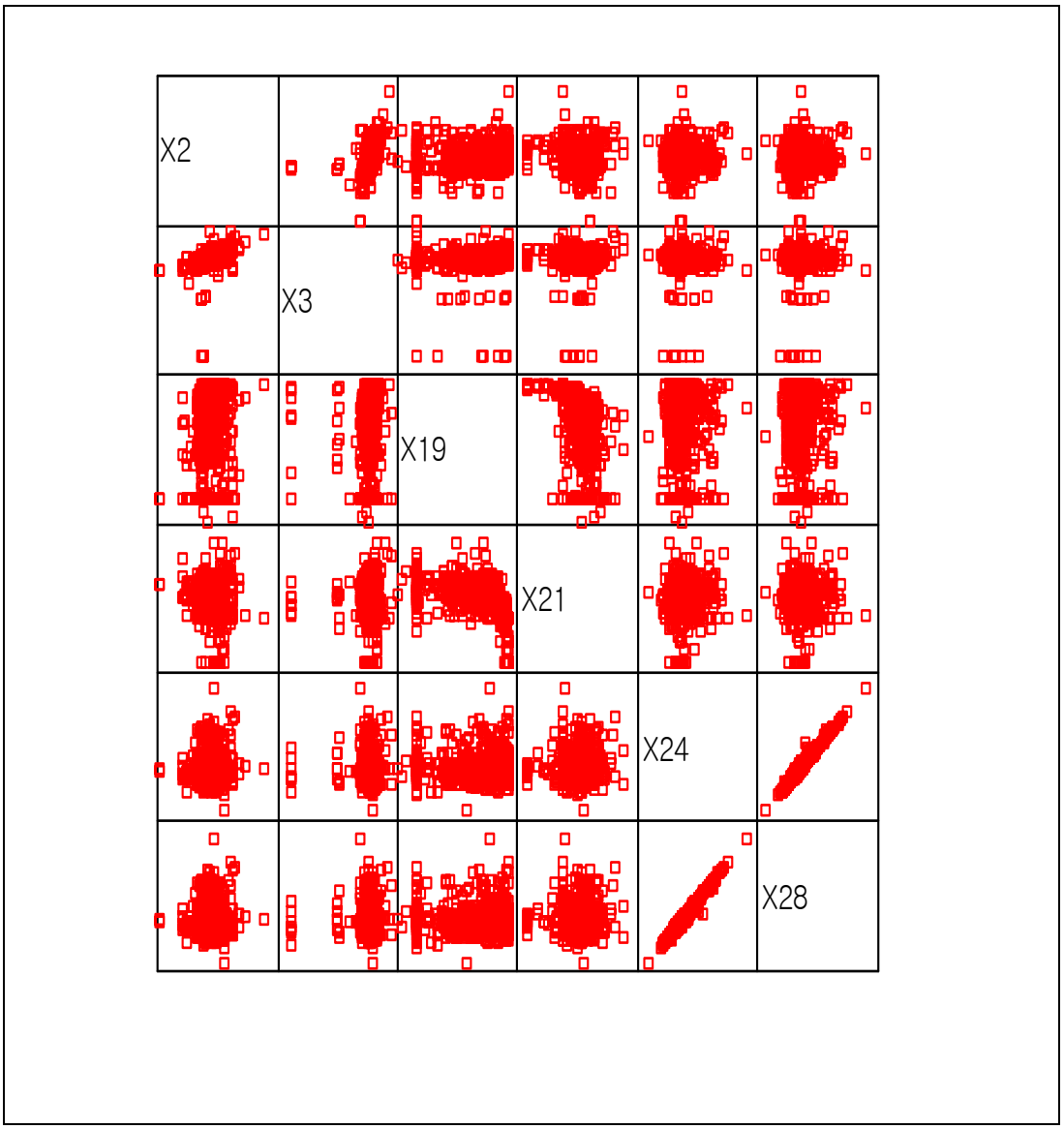
	x30	Number of wholesalers or retailers	Each	Continuous data
	x31	Number of restaurants and hotels	Each	Continuous data
	x32	Number of IT businesses	Each	Continuous data
	x33	Number of cultural businesses	Each	Continuous data
	x34	Number of welfare recipients	person	Continuous data
	x35	The number of governmental preference	person	Continuous data
	x36	Number of registered vehicles	Each	Continuous data

Appendix 2: **Principal Component Analysis**

Factor Matrix[a]

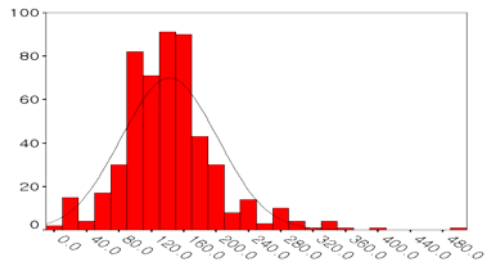
	Factor		
	1	2	3
X15	.469	.721	-.134
X21	.585	.552	3.721E-02
X22	-.779	.419	-.139
X9	.292	.107	-.376
X10	.110	.811	-.231
X19	-.881	.112	-1.38E-02
X16	.743	.219	.132
X18	.882	-9.54E-02	7.638E-02
X26	4.049E-02	.170	-.218
X5	-4.43E-02	-.572	.180
X13	.544	-.562	.281
X3	-.153	.500	.711
X2	-.202	.423	.674

Appendix 3: Correlation Matrix

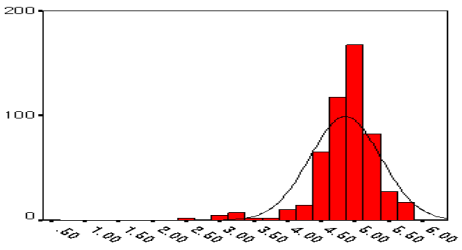


Appendix 4: Distribution of Variables

1) Goodwill

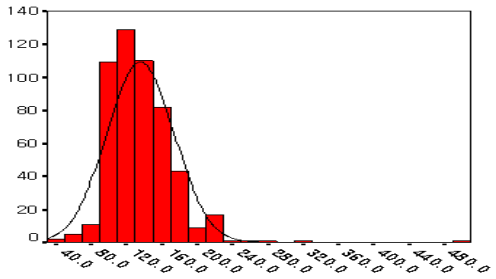


(a) Real Data

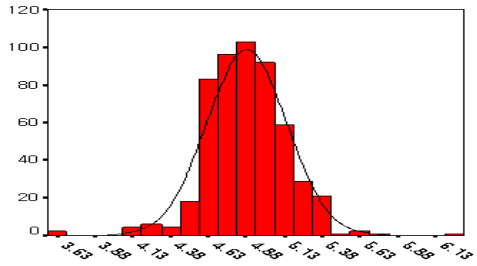


(b) Logged Real Data

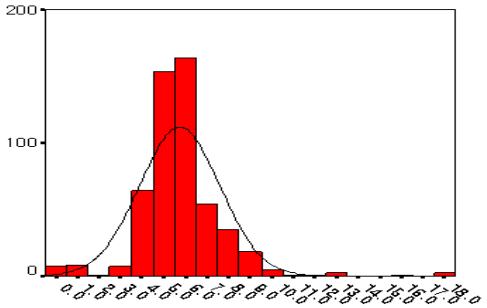
2) Deposit (Up) and Monthly rent (Down)



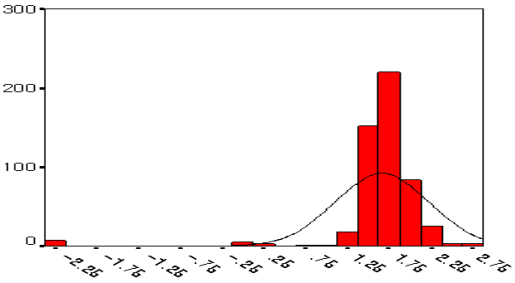
(a) Real Data



(b) Logged Real Data

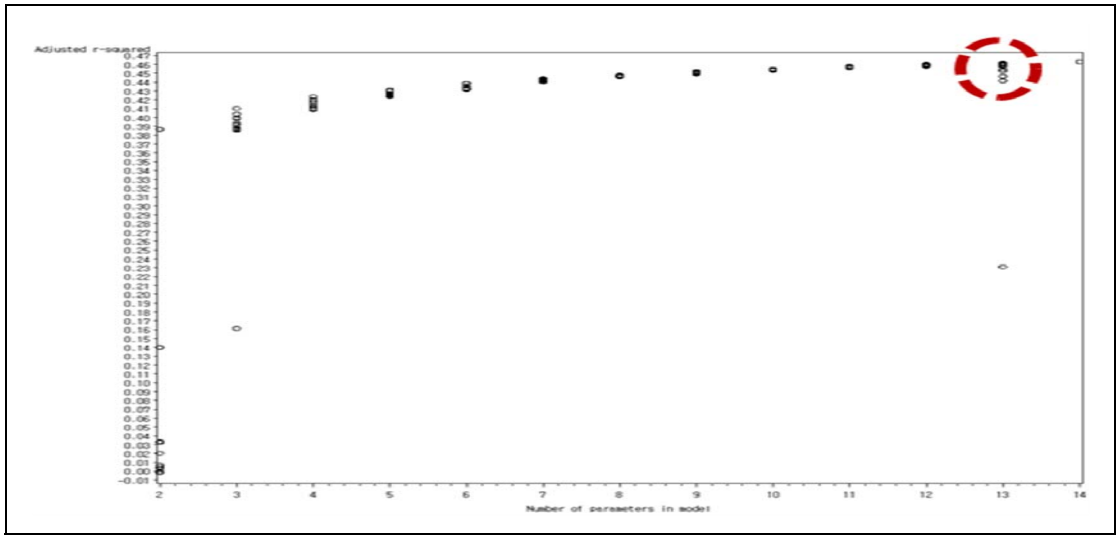


(a) Real Data



(b) Logged Real Data

Appendix 5: Selection of variable through the adjusted coefficient of determination



Appendix 6: $\mathbf{C_P}$