The Value of Investment of YIMBY & NIMBY facilities on Housing Market

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Abstract

Because of the positive utility of YIMBY facilities, there is higher housing price which house close to YIMBY facilities. On the other hand, there is lower housing price which house close to NIMBY facilities. Since the view of investment, when the housing price increasing, is there higher appreciation rate of housing price which house close to YIMBY & NIMBY facilities or not? The study test the change of appreciation rate both YIMBY & NIMBY by time, we find that the appreciation rate of MRT and large-scale park facilities are significantly higher than others. And the appreciation rate of funeral home are significantly lower than others.

Keyword: YIMBY, NIMBY, housing price, appreciation rate

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Introduction

There are so many facilities around cities. Some facilities would be positive utilities of housing service, some would be negative. Since Lancaster(1966) and Rosen(1974), the positive relationship of the utilities of housing service and property values was be established. The influence of property price in facilities has already be popular issue. The YIMBY(Yes In My Back Yard) is described to the positive facilities of property values and the NIMBY(Not In My Back Yard) is described to the negative.

Since early studies, most studies focused the NIMBY effects of the sociology or environment(Lin & Lin, 1993; Groothuis & Miller, 1994; Lee & Ho, 1996; Lee, 1997; Lin & Wang, 2005; Quah & Yong,2008). Michaels & Smith (1990) discussed the impacted of property value in hazardous waste sites. And Reichert(1997) think the property value that close to the poisonous zone would be reduce 5% to 15%. Tseng(1992) and Liao(1994) focused the impacted of property value of different facilities, but these studies just focused on one facility, not for many kind of facilities or YIMBY facilities.

There are many studies focused on YIMBY facilities. Most focused on the impacted of property value on the build or operation of MRT(Mass Rapid Transit) system(Hong & Lin, 1999; Lin & Hwang, 2004; Yang, 2007). Peng et al.(2009) found the impact scale of suburb stations are further than CBD and CBD fringe, but housing price appreciation rates in CBD are much higher than CBD fringe and suburbs during the real estate market recovery period. Lin(2004) found the marginal price of star school district would be much higher than others, and the marginal price of star junior high school district would be much higher than star elementary school district. Tseng(2008) tested the impact of housing land price on urban land consolidation and found there is positive externalities on land price after urban land consolidation. Yang & Su(2011) found the difference of impact of housing price in both NIMBY and YIMBY facilities. But there is only few studies both NIMBY and YIMBY facilities.

Because of the impact of property price, the property price of close to NIMBY would be lower and close to YIMBY would be higher. Then, should a investor buy a property close to NIMBY or YIMBY? Would the appreciation rate of property in NIMBY or YIMBY be better? This paper focus the appreciation rate of properties, it would test the difference of appreciation rate, and we hope to answer a question that should we invest the property in NIMBY/ YIMBY or not?

The Theory

The Models

The past several decades, it described the property pricing using an economic technique known as Hedonic Price method. Lancaster(1966) developed the utility theory to heterogeneity goods and proffered that utility is derived from the intrinsic characteristics of these goods. Lancaster argued that the many qualities of individual goods cannot be incorporated to analysis. Then, Rosen(1974) developed reduce form and point out that every characteristics of goods exist an implicit price or “hedonic price”. The value of heterogeneity goods can be incorporated by all characteristics hedonic price aggregated. The hedonic price model usually allow the multiple regression technique in which price of property price are regressed on measures of its characteristics. Regression coefficients can be interpreted as hedonic price, or willingness to pay for the property service.

Following the hedonic price method, the regression model used to empirically estimate attribute prices may be expressed as:

$$P=\beta_0+\sum\beta X+\sum\omega T+\sum\gamma H+\varepsilon \quad (1)$$

Where P represents property transaction price; X is the vector of structure and location attributes; T is the vector of time attributes; H is the vector of distance attributes of property close to NIMBY or YIMBY facilities; β_0 represents the constant term; and ε represents the stochastic disturbance term.

The regression technique is subject to several features. The estimators of the attributes are conditional mean, and the estimators are fix vectors. It means the relationship of P and other attributes is fixed. Because the relationship of P and other attributes may be non-linear, this paper refer the model of Yang & Su(2011), the model is to exercise the following process:

Step1: set two regression model as

$$Pi=\beta_0+\beta_1 H_i^3+\beta_2 H_i^2+\beta_3 H_i+\varepsilon_i \quad (2)$$

And

$$Pi=\alpha_0+\alpha_1 H_i+\varepsilon_i \quad (3)$$

Then, $\partial P/\partial H=3\beta_1 H^2+2\beta_2 H+\beta_3=\alpha_1$

For the F, it get two points of tangency as $(-2\beta_2\pm\sqrt{(4\beta_2^2-12\beta_1\beta_3)})/(6\beta_1)$

And set $K_1=(-2\beta_2-\sqrt{(4\beta_2^2-12\beta_1\beta_3)})/(6\beta_1)$, $K_2=(-2\beta_2+\sqrt{(4\beta_2^2-12\beta_1\beta_3)})/(6\beta_1)$

Step2: set a particular separate-linear regression for the vector of F by (1) as

$$\boldsymbol{P}=\boldsymbol{\beta}_0+\sum_{i=1}^{n}\boldsymbol{\beta}_i\boldsymbol{X}_i+\sum_{l=1}^{l}\boldsymbol{\omega}_l\boldsymbol{T}_l+\sum_{j=1}^{m}\left[\boldsymbol{\alpha}_j\boldsymbol{H}_j+\boldsymbol{r}_{1j}\left(\boldsymbol{H}_j-\boldsymbol{K}_{1j}\right)\boldsymbol{D}_{1j}+\boldsymbol{r}_{2j}\left(\boldsymbol{H}_j-\boldsymbol{K}_{2j}\right)\boldsymbol{D}_{2j}\right] \quad (4)$$

Where D_{1j} and D_{2j} are dummy variables, if the distance of property to H_j is greater then K_{1j} and less than K_{2j}, then $D_{1j}=1$, and if the distance of property to H_j is greater than K_{2j}, then $D_{2j}=1$. αj, r1j, and r2j are represents the marginal price of Hj to property price by difference distance. If the relationship of Hj and property price is significantly, then at least one estimator is significantly different from zero with αj, r1j, and r2j.

For identify the different of appreciation rate of NIMBY or YIMBY, we will separate three group of data for every facilities. By the change of time variable, it can be describe and test the difference of appreciate rate.

The Data

Housing price data is from the database of Gigahouse Co., The Gigahouse is a web-service company of exist for sale and its transaction records is from 4 major broker companies. The market share of this database is up to 12% and is the largest database in Taiwan. We collected 2006 to 2nd quarter 2008 transaction data and limited to Taipei and apartment type. The apartment type is typical in Taipei and 85% share in the database of Taipei. There are 19,012 observations in Taipei and is 15% market share.

There are five YIMBY facilities, including MRT station, large-scale park, elementary or junior high school, department store. And there are 4 NIMBY facilities, including funeral home, temple, sewage treatment plants, power transmission stations. Table1 reports the detail description of nine facilities.

For the distance from a property to the nearest facilities, this paper used the x,y coordinates. First, it would be got one property i to all of the distance of the facilities by x,y coordinates with Pythagoream theorem. Second, it would be found the minimal of these

distance. For the MRT station, the coordinates of station is including different exit, so actually the distance is focus to the nearest exit of station.

Table1 Desription of YIMBY and NIMBY facilities

Facility	Description
MRT station	All 9 lines and 89 stations
Large-scale Park	greater then 5000M^2, 33 parks be selected
Elementary or junior high school	All 264 school be selected
Department store	22 store be selected
Funeral home	All 2 funeral home be selected
Temple	All registered 564 temples be selected
Sewage treatment plants	All 2 sewage treatment plants be selected
Power transmission stations	Including power tower, transmission station, all 294 stations be selected

Table 2 reports the points of tangency of all kind of facilities. Some facilities have no tangency, and it would be set to linear. And because there were one or two estimator was significantly different from zero in αj, r1j, and r2j. These facilities would be set to one tangency. Table 3 illustrates the structure, facilities, timing variables utilitized in the study.

Table2 The tangency of facilities

Facility	Tangency	Distance(M)	Facility	Tangency	Distance(M)
MRT station	Tangency1	1,078	Funeral home	Tangency1	3,620
	Tangency2	3,255		Tangency2	NA
Large-scale Park	Tangency1	1,301	Temple	Tangency1	441
	Tangency2	3,552		Tangency2	NA
Elementary or junior high school	Tangency1	400	Sewage treatment plants	Tangency1	4,485
	Tangency2	NA		Tangency2	NA
Department store	Tangency1	NA	Power transmission stations	Tangency1	2,103
	Tangency2	NA		Tangency2	NA

Table3 Description of Dependent and Independent Variables

Variables		Description
Dependent	Price	Nature log of transaction total price(NT x10000)

Variables		Description
Parcel characteristics	LOTSIZE	Building area in sq. meter
	LOTSIZE2	Sq. of building area
	AGE	Building age in year
	AGE2	Sq. of building age
	LSIZE	Land area in sq. meter
	FLOOR	The xth floor of house
	FLOOR2	The xth floor of house in sq.
	TFLOOR	Located on top-floor
	GARAGE	Equipped garage
	TYPE	If building with elevator, TYPE=1
	RDCLAS3	If the median price of street of property(SP) greater than 75th quantile of all price of street(SP_{75th}), RDCLAS3=1
	RDCLAS2	If SP_{75th} >SP> SP_{50th}, RDCLAS2=1
	RDCLAS1	If SP_{50th} >SP> SP_{25th}, RDCLAS1=1
Location characteristics	Zip100	Located in Zhongzheng district
	Zip103	Located in Datong district
	Zip104	Located in Zhongshan district
	Zip105	Located in Songshan district
	Zip106	Located in Daan district
	Zip108	Located in Wanhua district
	Zip110	Located in Xinyi district
	Zip111	Located in Shilin district
	Zip112	Located in Beitou district
	Zip114	Located in Neihu district
	Zip115	Located in Nangang district
	Zip116	Located in Wenshan district
Time Characteristics	T06Q1	Soled on first quarter 2006
	T06Q2	Soled on second quarter 2006
	T06Q3	Soled on third quarter 2006
	T06Q4	Soled on forth quarter 2006
	T07Q1	Soled on first quarter 2007
	T07Q2	Soled on second quarter 2007
	T07Q3	Soled on third quarter 2007
	T07Q4	Soled on forth quarter 2007
	T08Q1	Soled on first quarter 2008
	T08Q2	Soled on second quarter 2008
YIMBY facilities	MRT	Distance to the nearest MRT station
	PARK	Distance to the nearest large-scale park
	SCHOOL	Distance to the nearest elementary or junior high school
	STORE	Distance to the nearest department store
NIMBY facilities	FUNERAL	Distance to the nearest funeral home
	TEMPLE	Distance to the nearest temple
	SEWAGE	Distance to the nearest sewage treatment plant
	POWER	Distance to the nearest power transmission station

The Empirical

For test the value of investment of YIMBY and NIMBY facilities, this paper set two group data for each facilities. One is to close to the facility, the other one is not to close to the facility. The detail of each facilities is as table4.

Table4 Description of the distance for close to facilities

Facility	Distance range1(DR1)	Distance range2(DR2)
MRT station	<300 meters	>300 meters
Large-scale Park	<500 meters	>500 meters
Elementary or junior high school	<300 meters	>300 meters
Department store	<500 meters	>500 meters
Funeral home	<1200 meters	>1200 meters
Temple	<500 meters	>500 meters
Sewage treatment plants	<1500 meters	>1500 meters
Power transmission stations	<1000 meters	>1000 meters

The table5 represents the Hedonic model for each facilities with all data , DR1 data , and DR2 data. All model would be processed the DFFITs outlier detected. The R-square are from 0.88 to 0.92 and all the F test are significantly different from zero. Most variables are significantly different from zero. These model are predictable.

And the figure1 to figure8 represents the timing trend of each facilities. It is shown very different value of investment in YIMBY and NIMBY facilities. The appreciation rate of property close to MRT station and large-scale park are significantly higher than that not close to both the facilities. And the appreciation rate of property close to funereal home is significantly lower than that not close to the facility. Others facilities, including elementary or junior high school, department store, temple, sewage treatment plant, power transmission station, are not significantly different from the close to and not close to.

Table5 The estimation of Hedonic price model of YIMBY and NIMBY facilities

Variable	All data	MRT <300m	PARK <500m	SCHOOL <300m	STORE <500m	FUNERAL <1200m	TEMPLE <500m	SEWAGE <1500m	POWER <1000m
LOTSIZE	0.057*	0.058*	0.06*	0.052*	0.062*	0.064*	0.055*	0.075*	0.059*
LOTSIZE2	-0.0003*	-0.0003*	-0.0003*	-0.0002*	-0.0004*	-0.0004*	-0.0003*	-0.0006*	-0.0004*
AGE	-0.022*	-0.021*	-0.024*	-0.02*	-0.029*	-0.037*	-0.022*	-0.018*	-0.025*
AGE2	0.0005*	0.0004*	0.0005*	0.0004*	0.0006*	0.0007*	0.0004*	0.0003*	0.0005*
LSIZE	-0.001*	-0.0001	-0.0004	-0.002*	-0.001	-0.002	-0.002*	-0.001	0.0001
FLOOR	-0.003*	-0.006	-0.011*	-0.026*	-0.011*	-0.024*	-0.002*	-0.013*	-0.023*
FLOOR2	0.0001*	0.0005*	0.0007*	0.002*	0.0008*	0.002*	0.0001*	0.0008*	0.002*
TFLOOR	-0.0002	-0.003	-0.009*	-0.0003	0.0008	-0.001	-0.0004	-0.005	0.001
GARAGE	0.048*	0.05*	0.082*	0.05*	0.026	-0.0007	0.049*	-0.013	0.04*
TYPE	-0.004	0.022	0.048*	-0.018*	-0.0009	-0.016	-0.006	-0.004	0.009
RDCLAS3	0.19*	0.176*	0.207*	0.169*	0.157*	0.071*	0.192*	0.099*	0.161*
RDCLAS2	0.146*	0.097*	0.194*	0.131*	0.088*	0.052*	0.144*	0.071*	0.099*
RDCLAS1	0.077*	0.078*	0.108*	0.063*	0.086*	0.076*	0.08*	0.062*	0.075*
Zip100	0.405*	0.431*	0.313*	0.388*	0.299*		0.405*		0.315*
Zip103	0.208*	0.309*	0.259*	0.299*	0.624*		0.211*	-0.346*	
Zip104	0.349*	0.429*	0.471*	0.402*	0.588*	0.215	0.348*	-0.211*	0.262*
Zip105	0.499*	0.624*	0.603*	0.549*	0.705*	0.284	0.495*	0.065	0.528*
Zip106	0.576*	0.558*	0.537*	0.605*	0.713*	0.194	0.569*		0.533*
Zip110	0.459*	0.488*	0.502*	0.477*	0.582*	0.137	0.457*		0.512*
Zip111	0.377*	0.457*	0.331*	0.367*	0.958*		0.369*	-0.149	0.311*
Zip112	0.302*	0.369*	0.268*	0.286*	0.797*		0.286*		0.189*
Zip114	0.432*		0.918*	0.5*			0.449*		0.669*
Zip115	0.339*	0.529*	0.379*	0.439*	0.227		0.339*		0.545*
Zip116	0.252*	0.048		0.223*			0.244*		0.178*
T06Q2	0.041*	0.035*	0.069*	0.042*	0.047*	0.033*	0.039*	0.059*	0.05*
T06Q3	0.059*	0.043*	0.092*	0.061*	0.059*	0.04*	0.059*	0.075*	0.069*
T06Q4	0.115*	0.121*	0.134*	0.119*	0.136*	0.089*	0.115*	0.121*	0.115*
T07Q1	0.144*	0.159*	0.146*	0.149*	0.166*	0.112*	0.143*	0.159*	0.156*
T07Q2	0.16*	0.167*	0.181*	0.155*	0.215*	0.122*	0.159*	0.113*	0.157*
T07Q3	0.162*	0.189*	0.164*	0.161*	0.184*	0.165*	0.159*	0.134*	0.139*
T07Q4	0.176*	0.199*	0.21*	0.182*	0.183*	0.176*	0.177*	0.217*	0.158*
T08Q1	0.202*	0.208*	0.224*	0.213*	0.229*	0.173*	0.205*	0.211*	0.198*
T08Q2	0.228*	0.244*	0.255*	0.231*	0.258*	0.196*	0.231*	0.253*	0.205*
MRT	-0.001*	-0.023*	-0.009*	-0.0006	-0.0006	-0.008	-0.002*	-0.006	-0.004*
MRT_D1	0.003*		0.019*	0.0001	-0.0155	0.011	0.003*	0.006	0.002*
MRT_D2	0.005*		0.012	0.003			0.006*	0.089	0.006
PARK	-0.005*	0.003*	0.004	-0.005*	-0.011*	-0.028*	-0.005*	0.0008	-0.005*
PARK_D1	-0.002*	0.0005		-0.002*	-0.005	-0.025*	-0.002*	-0.016	-0.003*
SCHOOL	-0.007*	0.009	-0.012*	-0.018*	-0.027*	-0.017*	-0.003	0.014	-0.013*
SCHOOL_D1	-0.006	-0.033*	-0.003		0.054*	0.002	-0.008	-0.08*	-0.0006
STORE	-0.001	0.002	-0.002	0.00003	0.0009	-0.004	-0.0003	0.014	0.0009
FUNERAL	0.004*	0.006*	0.006*	0.005*	0.009*	0.018*	0.004*	-0.011	0.007*
FUNERAL_D1	-0.007*	-0.018*	-0.014*	-0.01*	-0.029*		-0.008*	0.015	-0.013*
TEMPLE	0.006*	0.017*	0.004	0.008*	0.012*	-0.009	0.005*	0.008	0.006*
SEWAGE	0.006*	0.006*	0.012*	0.008*	0.006*	0.029*	0.006*	-0.003	0.011*
SEWAGE_D1	-0.005*	-0.004*	-0.008*	-0.005*	-0.003	-0.033*	-0.005*		-0.004*
POWER	0.003*	-0.0007	0.002	0.0003	-0.007	0.012	0.003*	0.003	-0.005*
POWER_D1	0.003*	0.003	-0.008	0.006*	0.025*	0.015	0.004*	-0.004	
Observations	19,012	3,100	3,191	9,941	2,669	2,025	17,058	1,149	6,276
Adj R-square	0.884	0.904	0.911	0.889	0.923	0.908	0.884	0.897	0.894

* p-value<0.01

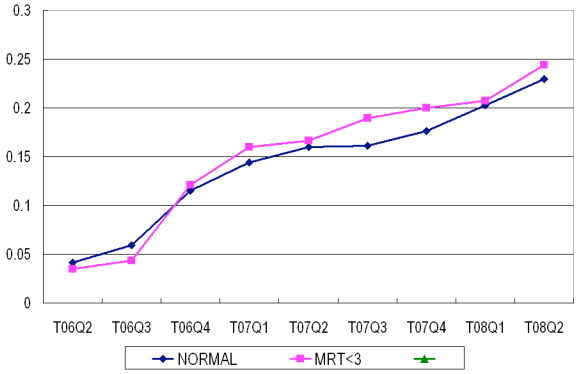

Figure1 The time trend of MRT station

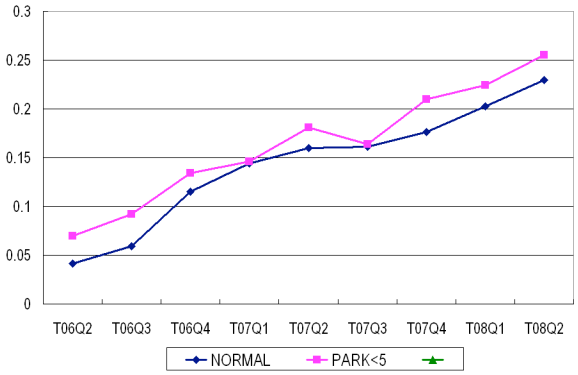

Figure2 The time trend of large-scale park

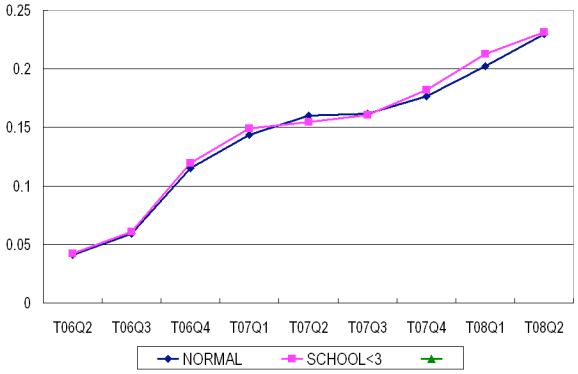

Figure3 The time trend of school

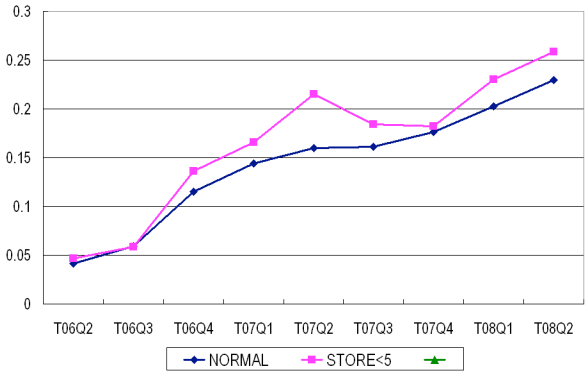

Figure4 The time trend of department store

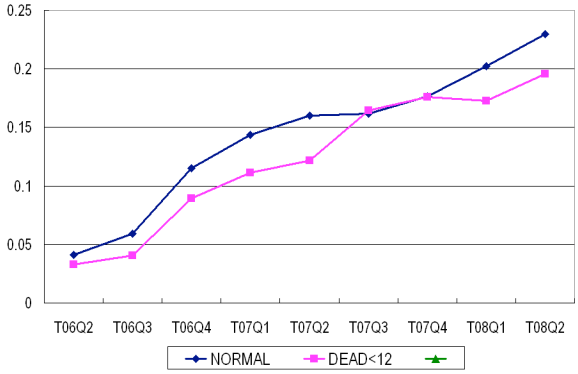

Figure5 The time trend of funeral home

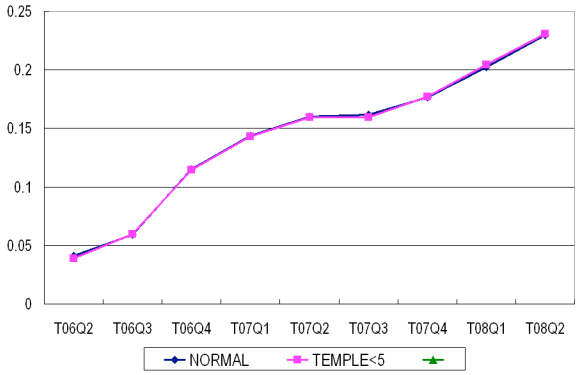

Figure6 The time trend of temple

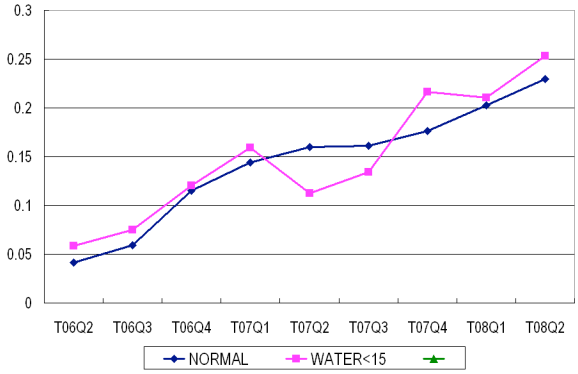

Figure7 The time trend of sewage treatment plant

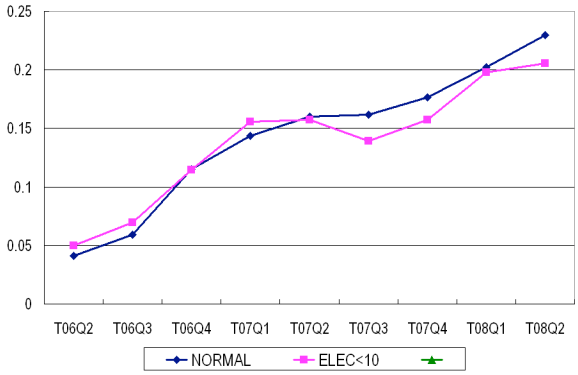

Figure8 The time trend of power transmission station

Conclusion

This paper discuss a interesting question, the value of investment of YIMBY & NIMBY facilities on housing market. The most well-knows that YIMBY would be higher price by its advantage utility and NIMBY would be lower price by its disadvantage utility. Therefore, would the appreciation rate of YIMBY facilities be higher? Would the appreciation rate of YIMBY facilities be lower? From this paper, there are different output from this issue. MRT station and large-scale park have higher appreciation rate, and the funeral home has lower appreciation rate. Others facilities have no significantly different with appreciation rate.

This paper found that the value of investment between facilities is different. A higher price of property which close to YIMBY would be higher appreciation rate. And it's also proved that word "Location, Location, Location".

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