

Analysis of PRMR and LRMR According to Tax Decrease using Registration Information of Apartment

Seong-hoon Jeong^{1*} and In-ho Choi^{2**}

^{*1} Associate professor in Dept. of Economics & International Trade, Daegu Catholic University, Daegu 384-30, South Korea

^{**2} Corresponding author: In-ho Choi, professor in Dept. of Real Estate, Namseoul University, Cheonan 331-707, South Korea

. Telephone: 82-10-5632-7177

¹James1101@cu.ac.kr, ²landchoi@nsu.ac.kr

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Abstract:

The purpose of this study is to analyze the PRMR and LRMR in the real estate market according to tax decrease. After the Lehman Brother's shock in the US in 2008, the Korean government had temporarily cut real estate taxes. Therefore, the study used the trade data from January 2006 to June 2014 among 360 apartments in Korea. In this study, two hypotheses were established. The first hypothesis is that the PRMR (Profit Real Estate Maximized Potential Rate of Profit) is larger than LRMR (Loss Real Estate Maximized Potential Rate of Loss). The second hypothesis is if the transfer income tax decreases, the difference between PRMR and LRMR declines.

The results of the study revealed that hypothesis 2-1 was rejected in the first and second increase of transfer income tax and the second increase of acquisition tax. However, it was accepted in the third increase of acquisition tax, which was analyzed based on a one-year standard. This can be attributed to the investors' strain for the increase of tax rate, which should be traded more carefully, thereby decreasing PRMR decrease and increasing LRMR.

It can be concluded that the implementation of other policy on tax increase, except the third acquisition tax increase, led investors' cognitive bias to decrease what previously existed.

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1. INTRODUCTION

The tax system can be categorized into two parts: trading tax (acquisition tax and registration tax) and holding tax (property tax and comprehensive real estate holding tax). These two types of taxes are common topics for research. The acquisition tax is mainly discussed as a trading tax. Han and Yoo (2011) examined how the trading volume of the house changed after the reform of

the trading tax rate.

The tax rate related to the trading showed great changes because it was used as a governmental policy for the real estate market. Their study stated that, although trading rate is decreased, the house trading volume increases are insignificant. This means that the decrease in trading tax rate does not affect the depressed house trading.

Park and Rim (2012) researched the effect of acquisition tax reduction on the activation of

house market to figure out its effectiveness. In contrast to the other studies, Park and Rim (2012) investigated the policy of acquisition tax reduction with a two-part classification. First, a chronic acquisition tax reduction policy means the policy which have been done from 2006. Second, a temporary acquisition tax reduction policy means the policy with a limited period which have been done from March to December of 2011. The result of the study showed that both have few effect on the real estate market, which is same with the research of Han and Yu (2011). Rim's study (2013) has the same conclusion that analyzed the housing demand change after the acquisition tax reduction. A regression analysis was used to analyze the change of demand after the reduction of acquisition tax rate using the selling price, the stock price and the income, and so on. In conclusion, both the studies of Han and Yu (2011) and Park and Rim (2012) verified that the reduction of acquisition tax and housing trade rate is insignificant. The tax rate reduction does not affect the real estate market vitalization.

On the other hand, there is a different result in the study of holding tax. Lee and Kim (2008) analyzed the relation between property tax and the cost of the apartment using VAR model based on the national housing costs survey research from 1989 to 2005 by Kookmin Bank in South Korea. In this research, the effect of property tax volatility has a significant positive effect on selling price of apartment and residence price. It could be interpreted that the increase of the tax rate on property makes the price rise influencing the apartment price.

1.1. STUDY OBJECTIVE

The specific research questions under investigation are as follows.

First, is the PRMR greater than the LRMR if the real estate tax rate is lowered?

Second, does the difference between PRMR and LRMR decrease when the capital gains tax on real estate decreases?

2. STUDY METHOD

2.1 STUDY SUBJECT

After the Lehman Brother's shock in the US in 2008, the Korean government had temporarily cut real estate taxes. Therefore, this study used the trade data of 360 apartments collected from January 2006 to June 2014. This study used the 2,245 data through the certificate copy of the registration. In addition, 601 data which is from the -60 days of tax decrease implementation to the 60 days of tax decrease implementation. The range means 60 days before the implementation to a day before the implementation, and from day 0 of implementation to 60 days after implementation on day 0. Statistical tests using SAS program and t-test are used to analyze the difference of the data between before and after PRMR or LRMR.

2.2. STUDY TOOLS: RESEARCH MODEL AND ESTABLISHED HYPOTHESIS

2.2.1. THE EXAMPLE OF THE PRMR AND LRMR MODEL

To analyze the PRMR and LRMR of real estate using this model, a fixed standard period is needed to figure out the potential profit or potential loss [1]. The two types of fixed standard period used are six months and 1 year.

For example, buyer A purchased the house located in Gangnam district, Seoul, for 300 million won in January 2012. In June 2012, buyer A sold this house for 400 million won, therefore earning a profit of 100 million won. In this case, the PRMR can be calculated based on the six-month standard using Table I. Also, buyer B purchased a house located Yongsan district, Seoul for 200 million won in January 2012. However, buyer B got a loss profit when the house sold for 150 million won in June 2012. The LRMR can be computed as show below.

Table I. Example of Index of Real Estate Price for PRMR, LRMR

Time	Index of Real estate price Gangnam, Seoul	Index of Real estate price Yongsan, Seoul
Jan-12	100	98
Feb-12	102	99
Mar-12	103	98
Apr-12	102	96
May-12	105	99
Jun-12	106	100
Jul-12	109	98
Aug-12	110	99
Sep-12	111	102
Oct-12	108	101
Nov-12	109	97
Dec-12	110	96
Jan-13	112	98
Feb-13	109	102

* This data were composed randomize number to explain the example.

RMR: Profit Real Estate Maximized Potential Rate of Profit. LRMR: Loss Real Estate Maximized Potential Rate of Loss. MPRP: Maximized Potential Rate of Profit in Real Estate Price Index MPRL: Maximized Potential Rate of Loss in Real Estate Price Index RRP: Realized Rate of Profit. RRL: Realized Rate of Loss.

This paper should calculate the realized return rate of buyer A (RRP) to product PRMR of buyer A. The RRP of buyer A is 33%, which is divided by the transfer marginal profit. Next, MPRP (maximized potential rate of profit in real estate price index) of buyer A is used to maximize rate of return from June 2012 to December 2012 based on standard term. MPRP of buyer A shows 4.72%, which is the result value of $(111-106)/106$; the land price index 111 is a maximized index in September 2012, and the land price 106 is standard. Therefore, PRMR shows 0.87, which divides RRP (33%) by the sum of RRP (33%) and MPRP (4.72%). This study also calculated the realized return rate of buyer B (RRL) to product LRMR of buyer B. In the case of buyer B, the house trade loss - 50 million won, which is the result value of purchase price (200 million won) minus sold price (150 million won). The RRL of

buyer B shows -25%. The maximized potential rate of loss (MPRL) in real estate price index uses the lowest indices from June 2012 to December 2012. Therefore, MPRL is -4.00%, which used 96 in December 2012. LRMR of buyer B is 0.862, which is the result value of RRL (-25%) divided by the sum of RRL (-25%) and MPRL (-4.00%).

2.2.2. THE HYPOTHESIS FOR RESEARCH ON COGNITIVE BIAS TO A CHANGE IN TAX POLICY

If the disposition effect occurs to the investors like the definition mentioned above, Investors' quick profit realization can appear as a form of selling before the maximum profit realization [2]. In other words, the difference between the realized profit rate and maximized potential rate of profit will be big. On the other hand, investors' holding behavior in region of loss means a failure of a loss-cut, which shows that the rate of loss realization is getting bigger even though they can minimize the loss. Therefore, the difference between the LRMR and the RRL will not be big. If the difference between PRMR and RRP is bigger than the difference between LRMR and RRL, it is a bad trading behavior. Realizing profit quickly

will end up with a bigger PRMR [3]. If there is no change on the loss rate potential maximum of real estate, the difference between the loss rate potential maximum of real estate profit and loss rate of the maximum potential of the real estate of profit will be increased, which increases a cognitive bias on the investors[4]. These hypotheses are set to explain this.

[Hypothesis 2]: PRMR (Profit Real Estate Maximized Potential Rate of Profit) is larger than LRMR (Loss Real Estate Maximized Potential Rate of Loss).

[Hypothesis 2-1]: If the transfer income tax decreases, the difference between PRMR and LRMR declines.

2.3. DATA ANALYSIS

2.3.1. ANALYSIS OF PRMR AND LRMR ACCORDING TO TAX DECREASE

The empirical analysis shows how tax policy change can affect an investor's investment psychology using PRMR and LRMR before and after the decrease acquisition tax and transfer income tax [5]. The analysis reveals that the first decrease of transfer income tax based on the six-month standard of PRMR is 0 while on one-year standard, the calculated result is 0.160. After the transfer income tax decrease implementation, PRMR is 0.128 based on six-month standard while 0.409 on one-year standard). In addition, LRMR before implementation is 0.047 in both six-month and one-year standard, while the calculated result after the implementation is 0.095 for both standards. It means that a big potential profit occurred to investors, which is a negative investment behavior, but can also be judged that the desirable investment behavior occurs after the implementation.

The reason of these phenomena might be attributed to the financial crisis in 2008 and the promotion of real estate trading. First, when the price of real estate declined due to financial crisis, the investors would want to resolve the uncertainty to realize gains. In this moment, when the transfer income tax decreased, selling the property was done quickly. However, there will be

a disposition effect wherein they cannot get the potential profit after the decreased tax rate in the real estate market.

For this reason, hypothesis 2-1 is rejected. Next, the second decrease of transfer income tax is different from the analysis of the first decrease.

Before the decrease of transfer income tax, PRMR is 0.279 on the six-month standard and 0.297 on the one-year standard. After the decrease, PRMR declined to 0.139 on the six-month standard and to 0.170 on the one-year standard. On the other hand, LRMR is 0 before and after the decrease because of the constantly rising real estate price after the increase. The investors who had profit on real estate got more potential profit than before the decline for the transfer income tax decrease.

After the financial crisis, the government uses DTI for regulating a recovery speed. Real estate investors might have an expectation and belief of price increasing because the second tax rate decrease is the policy of improving trade and stimulating the economy, which started after the DTI plan. Investors sold their profit real estate carefully, which is why PRMR value is lower than before the implementation.

Therefore, hypothesis 2-1 is accepted[6].

There were five times of decrease on acquisition tax as of this writing. The first and fifth decrease was not enough for analysis so the second to fourth decreases were also analyzed. The result of the second acquisition tax decrease showed that before the decrease, PRMR value is 0.157 on six-month standard and 0.203 on one-year standard. After the decrease, PRMR value is 0.136 on six-month standard and 0.191 on one-year standard. It means that the potential profit of investors who had profit real estate declined. This is because DTI was partially reinforced in April 2011. After the decrease, investors' trades were limited unlike before the DTI plans. This limit made investors who had profit real estate trade carefully.

The PRMR before the decrease was lower than the PRMR after decrease value. The third decrease implementation was similar to the second decrease. Before implementation, PRMR is 0.157 on six-month standard and 0.187 one-year standard. However, after the implementation, it was 0.119 on six-month standard and 0.162 on

one-year standard. It means that the regulatory reform of the DTI was implemented together to invigorate the economy and improve the slumped former real estate trade while investors sold profit real estate carefully. On the fourth acquisition tax decrease, PRMR is 0.113 on the six-month standard and 0.183 on the one-year standard. After

the implementation, PRMR values increased to 0.141 on the six-month standard and to 0.224 on the one-year standard.

The fourth decrease of acquisition tax was a temporal policy. It was open information to the public on the end date of the policy, which was going to be a permanent decrease.

Table II. The Analysis of PRMR-LRMR when the Tax Decrease

An implementation date	Segregation of before or after implementation	6 months			12 months		
		PRMR	LRMR	DIFF	PRMR	LRMR	DIFF
2009-01-01 (First transfer income tax decrease)	Before	0.000	0.047	-0.047	0.160	0.047	0.113
	After	0.128	0.095	0.033	0.409	0.095	0.314
2010-01-01 (Second transfer income tax decrease)	Before	0.279	0.000	0.279	0.297	0.000	0.297
	After	0.139	0.000	0.139	0.170	0.000	0.170
2006-09-01 (First acquisition tax decrease)	Before	1.000	0.000	1.000	1.000	0.000	1.000
	After	0.069	0.000	0.069	0.197	0.000	0.197
2011-03-22 (Second acquisition tax decrease)	Before	0.157	0.000	0.157	0.203	0.000	0.203
	After	0.136	0.000	0.136	0.191	0.000	0.191
2012-09-24 (Third acquisition tax decrease)	Before	0.157	0.007	0.150	0.187	0.007	0.180
	After	0.119	0.007	0.112	0.162	0.007	0.155
2013-03-22 (Fourth acquisition tax decrease)	Before	0.113	0.004	0.108	0.183	0.004	0.178
	After	0.141	0.002	0.139	0.224	0.003	0.221

tax decrease)							
2014-01-01 (Fifth acquisition tax decrease)	Before	0.202	0.002	0.200	0.000	0.000	0.000
	After	0.021	0.000	0.021	0.000	0.000	0.000
Statistical test	6month chi square	88.791***			12month chi square	69.381***	

***: Significant level is less than 0.01

**: Significant level is less than 0.05

*: Significant level is less than 0.1

In this moment, investors were reacting the temporal policy. When the acquisition tax decreases, they sold the profit real estate, which makes PRMR value increase. In addition, LRMR is decreased from 0.004 on both standards to 0.002 on six-month standard and 0.003 on one-year standard after the implementation of the acquisition tax. Because of this, the potential loss decreased and the inappropriate investment appeared. The temporal implementation and permanent decrease make investors take more risk, therefore, LRMR volume is decreased.

2.3.2. ANALYSIS OF THE APARTMENT MARKET AFTER THE TAX RATE CHANGE

1) PRMR AND LRMR AFTER THE TAX RATE INCREASE

The result from the analysis on the cognitive bias of the investors in apartment market using PRMR of profit real estate and the LRMR of the loss real estate says that the investors of the apartment market earned the potential profit. Also, the LRMR of the loss real estate appeared after the second acquisition tax rate increase.

However, it was not proper to compare because of the lack data on the prior loss realization frequency. At the first increase of acquisition tax rate in six months analysis, PRMR is calculated at 0.644. However, after the implementation, PRMR is calculated at 0.422, which can be estimated that the investors show more desirable investment behavior. In case of the investors who sold before the increase of the tax rate, it is caused by the rapid reaction to a negative signal of tax rate, which is ended up with an incomplete earning of real estate.

In addition, the when real estate investors reacted to the risk in a more aversive way, it ends

with a loss that could have been avoided. For the second transfer income tax rate increase, PRMR before and after the increase are calculated at 0.007, which shows no change in the investors' potential profit due to the increase of the acquisition tax rate and the second transfer income tax rate increase. The PRMR of the second acquisition tax rate increase, which occurred on January 1, 2013, is calculated at 0.000.

Therefore, it is verified that the PRMR increases after the increase of the acquisition tax rate increase.

However, LRMR increased from 0.062 to 0.086, which increases the potential loss of real estate investors. This means that the investors with loss trade in a desirable way after the increase of acquisition tax rate, and the increase affect the careful trade of the investors.

On the other hand, the third increase in July 1, 2013 showed that PRMR increased from 0.071 to 0.163, which is similar to what happened in the real estate market. In other words, the 8.28 plan have significant effect on the investors. The third increase, which was a temporary policy, ended up to rapid selling remaining a potential profit due to the uncertainty caused by the frequent changes.

However, it affected positively the real estate investors to sell without a potential loss, which is caused by the anxiety from the frequent changes

of the policy.

The similar results can be seen in the one- year term analysis of PRMR and LRMR.

Table III. Analysis on the Increase of the Acquisition Tax Rate and Transfer Income Tax Rate using PRMR-LRMR

An implementation date	Segregation of before or after implementation	6 months			12 months		
		PRMR	LRMR	DIFF	PRMR	LRMR	DIFF
2011-01-01 (First transfer income taxes increased)	Before	0.644	0	0.644	0.716	0	0.716
	After	0.421	0	0.421	0.504	0	0.504
2012-01-01 (Second transfer income taxes increased)	Before	0.007	0	0.007	0.007	0	0.007
	After	0.007	0.176	-0.169	0.007	0.249	-0.242
2013-01-01 (Second acquisition taxes increased)	Before	0	0.062	-0.062	0.007	0.077	-0.07
	After	0.009	0.086	-0.077	0.084	0.095	-0.011
2013-07-01 (Third acquisition taxes increased)	Before	0.071	0.095	-0.024	0.193	0.095	0.098
	After	0.163	0.026	0.138	0.244	0.052	0.191
Statistical test	6month chi square	41.362***			12 month chi square	32.191***	

***: Significant level is less than 0.01

**: Significant level is less than 0.05

*: Significant level is less than 0.1

PRMR: Profit Real Estate Maximized Potential Rate of Profit. LRMR: Loss Real Estate Maximized Potential Rate of Loss. MPRP: Maximized Potential Rate of Profit in Real Estate Price Index MPRL: Maximized Potential Rate of Loss in Real Estate Price Index RRP: Realized Rate of Profit. RRL: Realized Rate of Loss.

2) PRMR AND LRMR AFTER THE TAX RATE DECREASE

This analysis reviewed how tax policy change can affect investor’s investment psychology, using PRMR and LRMR before and after the decrease in acquisition tax and transfer income tax.

The results showed that on the first decrease in transfer income tax, PRMR is 0.037 on six-month standard and 0.112 on one-year standard. After the implementation, PRMR is 0.182 on six-month

standard and 0.352 on one-year standard. In addition, LRMR is 0.000 on both standards. It means that a big potential profit occurred to investors who had profit real estate

It can be judged that the disadvantageous investment behavior occurs after the implementation. The reason of these phenomena might be due to the financial crisis in 2008 and the promotion of real estate trading.

Table IV. Analysis on the Decrease of the Acquisition Tax Rate and Transfer Income Tax rate using PRMR-LRMR

An implementation date	Segregation of before or after implementation	6 months			12 months		
		PRMR	LRMR	DIFF	PRMR	LRMR	DIFF

2009-01-01	Before	0.037	0	0.037	0.112	0	0.112
(First transfer income tax decrease)	After	0.182	0	0.182	0.352	0	0.352
2010-01-01	Before	0.45	0	0.45	0.564	0	0.564
(Second transfer income tax decrease)	After	0.176	0.323	-0.147	0.282	0.349	-0.067
2006-09-01	Before	0	0	0	0	0	0
(First acquisition tax decrease)	After	0	0	0	0	0	0
2011-03-22	Before	0.369	0	0.369	0.427	0	0.427
(Second acquisition tax decrease)	After	0.352	0.015	0.337	0.383	0.051	0.331
2012-09-24	Before	0	0	0	0	0	0
(Third acquisition tax decrease)	After	0.006	0.227	-0.22	0.006	0.237	-0.231
2013-03-22	Before	0.12	0.067	0.053	0.195	0.068	0.127
(Fourth acquisition tax decrease)	After	0.009	0	0.009	0.03	0	0.03
2014-01-01	Before	0.043	0	0.043	0	0	0
(Fifth acquisition tax decrease)	After	0	0.171	-0.171	0	0	0
Statistical test	6month chi square	45.378***			12month chi square	38.634***	

Significant level is less than 0.01

**: Significant level is less than 0.05

*: Significant level is less than 0.1

This result is like the real estate market's result.

Before the decrease in second transfer income tax, PRMR is 0.450 on six-month standard and 0.564 on one-year standard. After the decrease, PRMR declined to 0.176 on six-month standard and to 0.282 on one-year standard. LRMR is 0 before the tax decrease. After the implementation, it is 0.323 on six-month standard and 0.349 on one-year standard. This might be attributed to the apartments used as living spaces, therefore, traders do not realize losses.

As mentioned earlier, there were five times of decrease on acquisition tax to date therefore led to the analysis of the second to fourth decreases. The result of the second acquisition tax decrease showed that before the decrease, PRMR value is 0.369 on six-month standard and 0.427 on one-year standard. After the decrease, PRMR value is 0.352 on six-month standard and 0.383 on one-year standard. It means that the potential profit of investors who had profit real estate declined, which can be attributed again to the reinforcement of DTI, making investors trade carefully.

The PRMR before the decrease was lower than the PRMR after decrease value. The third decrease implementation was similar to the second decrease. Before the implementation PRMR is 0.000 on both standards. However, after the decrease, PRMR is 0.006 on six-month standard and 0.162 on one-year standard.

It means that the investors did realized profits and losses. When the fourth acquisition tax decreases, PRMR value is 0.120 on six-month standard and 0.195 on one-year standard. After the decrease, PRMR is 0.009 on six-month standard and 0.030 on one-year standard. The LRMR value is 0.067 on six-month standard and 0.068 on one-year standard. After the decrease, LRMR is 0.000 on both standards.

It can be judged that the desirable investment behavior occurs after the implementation. It means that the permanent acquisition tax decrease policy increased investors behavior which realized profits.

RESULTS

Based from the results of the study, hypothesis 2-1 was rejected in the first and second increase of transfer income tax and second increase of acquisition tax. However, it is accepted in the third increase of acquisition tax, which was analyzed by one-year standard. This can be attributed to the investors' worries on the increase of tax rate, therefore decreasing PRMR and increasing LRMR.

Except for the third increase in acquisition tax, the rest of the policies led to the investors' cognitive bias to decrease the value of their property. This is evident on the 2,245 copies of residence register used as data for the study. Previous researches only used PRMR and LRMR on the stock market and not in the in the real estate market, which this study focused on.

4. DISCUSSIONS AND CONCLUSION

This study is different from the previous studied onreal estate investment behavior. It explains whether the investment behavior is appropriate using PRMR and LRMR.

Academic suggestions are recommended in the study. First,it expends the base of behavior taxation investigate to import the concept of the investment psychology.Second,it studies about cognitive bias in the real estate market and find out recency prejudiced. The social dimension of the study indicate that cognitive bias could be reduced by using the investment psychology if the tax rate increases as a government tax policy. If recency prejudice is used, the effectwill be better. Although this real estate price could confirm the change value of each residence, it is difficult to explain the price change, and it has a limit on the possibility of attenuating data. But the explanatory power is as good as a substitute because there is no daily index of real estate. This limitation should be improved through further research.

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