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THE IMPACT OF FISCAL POLICY ON REAL ESTATE TRANSACTION PRICES AND VOLUMES – A CASE STUDY OF TAIWAN'S MUNICIPALITIES

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Abstract

In the evolution of Taiwan's real estate market, policies to curb soaring housing prices have always been a topic of close concern to the government and academia. This study analyzes the relevant data between the counties and cities in the municipalities between 2008 and 2023, the relationship between the number of building and residential sales transfers, the unit price per ping and the average total price of real estate, and uses the number of building and residential sales transfers, the unit price per ping and the average total price of real estate in Taiwan's municipalities as the response variables; various real estate control policies are used as independent variables; economic growth rate, annual growth rate of consumer price index, average mortgage interest rate of the five major banks, weighted index return rate, annual growth rate of money supply, regular salary, basic salary, total population, and unemployment rate are used as control variables for analysis to evaluate the effectiveness of different policies in achieving the expected goals.

The analysis results show that housing prices and transaction volumes in Taipei City have changed significantly after the implementation of the real estate control policy. In contrast, housing prices and transaction volumes in Tainan City are at the bottom among the municipalities. The total population of Taoyuan City has a significant impact on the real estate market. In addition, the correlation coefficient between the Consumer Price Index and the number of building and residential sales transfers is not high, and its direct impact on real estate transaction volume is relatively weak. There is a positive correlation coefficient between real estate prices in municipalities and actual income and wage levels, indicating that increases in income and wage levels will promote increases in housing prices. There are significant differences in the impact of policy implementation on housing prices and transaction volumes in various regions. These differences are mainly affected by factors such as local economic development level, population mobility, and income and wage levels. These findings can provide important reference for formulating more precise and effective real estate regulation policies in the future, and emphasize the importance of adapting to local conditions.

Keywords

Real Estate Regulation, Real Estate, Transaction Price and Volume

1. Introduction

Taiwan's real estate market has experienced four economic cycles. The causes and backgrounds of these four cycles are different, and the corresponding policies introduced by the government are also different. The first and second real estate transaction peaks were from 1973 to 1974 and from 1979 to 1980 respectively. It is generally believed that the reasons for these two house price increases were the first and second oil crises. As oil prices rose, prices also rose accordingly. In addition, in order to resist inflation, the public invested a lot of money in real estate projects to maintain their value. In response to the peak of the first cycle, the government took measures such as banning construction, price restrictions and raising interest rates; in the face of the second wave of the cycle, it took

measures such as restricting land development and further investigating the source of funds of home buyers. The third wave of the housing market boom occurred between 1987 and 1989, mainly due to the government compensating the land for expropriation and issuing compensation fees, which enabled the landowners to obtain large amounts of cash. At the same time, a large influx of foreign speculative funds and Taiwan's low interest rate environment at the time led to an oversupply of money, which in turn pushed up land prices and housing prices. In response to the phenomenon of rising housing prices, the government implemented measures to significantly increase deposit interest rates and implemented selective credit controls. The fourth wave of housing market boom gradually recovered after the end of the SARS epidemic in 2003 and lasted until it reached its peak in 2014. This fluctuation was longer than previous cycles, mainly due to increased investment activities, which in turn led to a sharp rise in housing prices. In addition, against the backdrop of a low interest rate environment, a large increase in domestic funds, coupled with the signing of the Cross-Strait Economic Cooperation Framework Agreement (ECFA) and the reduction of inheritance tax, have made Taiwan's real estate market a focus of investors, further shaping Taiwan's real estate market into an ideal investment environment. In response to this wave of high housing price cycles, the government adopted regional credit controls, imposed luxury taxes, mansion taxes and house hoarding taxes, implemented a real-price registration system, and carried out reforms to integrate real estate and land.

In the evolution of Taiwan's real estate market, policies to curb soaring housing prices have always been a topic of close concern to the government and academia. These policies have had important theoretical and practical impacts on real estate market transaction volumes and prices. In-depth research on the impact of these policies on trading volume and price is critical to assessing whether they have achieved their intended goals, and also provides valuable reference value for practical applications. The core objective of this study is to explore the extent to which Taiwan's anti-housing policy affects real estate market transaction volume and prices. By collecting transaction data from Taiwan's real estate market, including transaction volume and price data for a period of time before and after the implementation of the housing policy, this study explores the actual effects of different policies on Taiwan's real estate market. The study hopes that future policies will be able to effectively reduce the housing purchase costs of owner-occupiers, alleviate their burden, and at the same time curb investors' investment behavior in the real estate sector. The specific purposes are as follows:

1. The extent to which various real estate regulatory policies affect real estate market prices and transaction volumes, and whether there are differences in the actual effects after implementation.
2. Assess whether different policy measures were implemented in the year due to the impact of other major events, which had an impact on real estate market prices and transaction volumes.

2. Literature review

Edel, M. and Sclar, F. (1974) showed that property transaction taxes have a negative impact on housing prices. According to Rosen (1979) research, due to the impact of income tax policies, there is a correlation between after-tax prices and home ownership rates. Narwold and Sonstelie (1994) pointed out that when the top tax rate is high, the home ownership rate is more limited; however, when the marginal tax rate is high, the home ownership rate is relatively high. Hua (1994) pointed out that raising property taxes can reduce appreciation expectations and increase capital ratios, thereby reducing real estate prices. Green and Vandell (1999) focused on the rental tax policy in the United States and found that after policy reform, if the government imposes heavier taxes on the rich and lighter taxes on the poor, the home ownership rate will increase, especially in low-income areas, where this situation will be more significant. Bourassa and Yin (2006) emphasized that housing costs and household characteristics have limited explanatory power for home ownership; however, relevant subsidy policies can provide a more reasonable explanation. Yang Zihan (2009) emphasized in his research that Taiwan's tax system does not fully reflect the tax burden that luxury homes should bear, and because the houses cannot hide their conspicuousness, only by imposing a luxury tax on luxury homes can the socially recognized perception(regular public's expectation) be met. Wu (2009) found in her study on the purchasing behavior characteristics of the luxury housing market that wealthy consumers can be divided into the following six types. These types of consumers and the wealthy are not concerned about whether a luxury housing tax should be levied. The six consumer types include: 1. Focus on obvious symbolic meaning, 2. Emphasize material enjoyment, 3. Focus on expressing self-worth, 4. Prefer to show off prestige, 5. Emphasize appearance, and 6. Focus on praising achievements.

Chen (2014) studied and analyzed the impact of luxury tax on the real estate market before and after its implementation, including changes in transaction volume and prices, as well as the effectiveness of its predictions. According to the research results, it was found that the implementation of the luxury tax had a dual effect on the real estate market in Taipei City, namely, affecting both transaction volume and price. However, in New Taipei City, Taichung City, and Tainan City, the luxury tax only had an effect on transaction volume; while in the real estate market in Kaohsiung City, the luxury tax did not achieve the expected effect. The above shows that the implementation effects of luxury tax vary in different regions. Zhang (2014) found that although the

implementation of luxury tax led to a simultaneous decline in supply and demand in the real estate market, with a clear decrease in housing market transaction volume, it was not very effective in curbing rising housing prices. The studies by Ji (2016) and Zhang (2017) both pointed out that the impact of the real estate tax on the real estate market prices and transaction volumes in New Taipei City and New Taipei City only achieved the effect of "using tax to control quantity", but it is difficult to achieve "using tax to control price".

Chen (2018) found that the implementation of luxury tax did not have a significant impact on housing prices, but increasing the property tax rate had a significant effect in curbing housing prices. Based on the derivation of the theoretical model, Peng et al. (2020) concluded that although the relevant policies formulated by the government play a role in reducing the cost of purchasing a house, it will attract more investors to participate, leading to the opposite result. Lin (2014) pointed out that the public disclosure of real housing price information produces an anchoring effect, causing housing prices to return to normal market levels, avoiding deviations from market supply and demand fundamentals, and thus curbing excessive decoupling of housing prices. Lin (2013) research results show that in the short term, the actual price registration system has a positive effect on curbing house price increases.

The transparency and openness of real estate transaction information will help prevent improper housing price manipulation and price gouging, thereby enabling the steady development of the residential market. However, some studies show that after the policy was implemented, housing prices showed a positive impact. Lin (2013) investigated real estate transactions based on actual transactions around the Kaohsiung Arena MRT station and found that taking into account overall economic factors, the impact of real price registration on house prices is better than luxury tax. The research by Lin (2014) showed that the government's implementation of luxury tax and actual price registration system were both aimed at curbing hype and speculation in the real estate market. According to the empirical results of regression analysis, it was found that although the actual price registration system increased the transparency of housing prices, it only slowed down the rate of house price increases. Wang (2014) and Chen (2015) pointed out that real-price registration has an impact on the transaction volume and price of the domestic real estate market; the number of real estate transactions has decreased, but housing prices have continued to rise. Research by Ke (2014) shows that the real-price registration system enhances the transparency of market information, giving buyers greater flexibility in house price negotiations and helping to speed up transaction completion. At the same time, it also enhances the persuasiveness of real estate developers in the sales process and increases home buyers' trust in the market. According to the above literature, there are different views on the effect of the real price registration policy on housing prices. Although opinions vary, it is certain that the real-price registration policy has increased the transparency and circulation of market information and has had a certain impact on the real estate market.

3. Research Methods

3.1 Samples and Data Sources

The sample for this study collects the number of sales and purchase transfers, the average unit price of sales contracts, the average total price, and overall economic variables of buildings and houses in Taiwan's special municipalities from 2008 to 2023. The data sources are the Actual Price Registration System of the Real Estate Information Platform of the Ministry of the Interior, Executive Yuan, and the Directorate-General of Budget, Accounting and Statistics.

3.2 Variable Definition

3.2.1 Dependent variables (PQ)

The number of sales and transfers of buildings and houses in Taiwan's municipalities (N), the unit price per ping (P), and the average total price (AP).

3.2.2 Independent variables

This study compares and discusses the implementation dates of various real estate control policies to observe the impact of the policies on the real estate market. This study refers to the method of Li (2018) and controls multiple variables when analyzing the factors affecting real estate prices and volumes, including economic growth rate(EGR), annual growth rate of consumer price index(CPI), average mortgage interest rate of the five major banks(MIR), weighted index return rate(WIR), annual growth rate of money supply(MS), regular wages(RW), basic wage(BW), total population(TP) and unemployment rate(UR).

1. Economic growth rate (EGR)

This study uses the growth rate compared with the same period of the previous year, that is, the year-on-year growth rate, and uses the increase ratio of this year's value to the same period of the previous year as the calculation method of economic growth rate. When the annual economic growth rate is positive, it means that the economy is

growing, which can drive real estate transactions and increase housing prices. Therefore, there is a positive correlation between the expected economic growth rate and real estate prices.

2. Consumer price index (CPI)

The annual growth rate of the Consumer price index reflects the extent of inflation. It takes into account each country's consumption habits and the weights of different goods and services, and estimates the purchasing power of the country's residents by taking a weighted average. There is a positive correlation between expected consumer price index and real estate prices.

3. Average mortgage interest rate of the five major banks (MIR)

The five largest banks in Taiwan are Bank of Taiwan, Land Bank of Taiwan, Taiwan Cooperative Bank, First Bank and Hua Nan Bank. When the average mortgage rate of the five major banks falls, the cost of housing loans is reduced, stimulating more people to come to banks to apply for housing loans; on the contrary, if the average mortgage rate of the five major banks rises, the loan burden increases, and home buyers' demand for additional loans may decrease. Therefore, it is expected that the average mortgage interest rate of the five major banks will be inversely correlated with real estate prices.

4. Weighted index return rate (WIR)

When the weighted index return rate declines, investors lose confidence in the market, causing funds to begin to shift to the relatively safe and value-preserving real estate market, leading to rising housing prices; on the contrary, when the weighted index return rate rises, investment funds are more inclined to remain in the stock market for operations and transactions, which in turn leads to a decrease in demand for real estate. Therefore, there is an inverse correlation between the expected weighted index return and real estate prices.

5. Annual growth rate of money supply (MS)

When the annual growth rate of money supply shows an upward trend, it shows that the amount of currency in circulation among the people has increased and the public has ample funds, which helps to promote the vitality of the consumer market or the investment market. On the contrary, when the annual growth rate of money supply shows a downward trend, it means that the amount of currency in circulation has decreased, the available funds have shrunk, and the development of the stock market or investment field will be restricted. When the money supply grows, it increases the amount of money circulating in the market, prompting more investment to flow into real estate, thereby driving the development of the real estate market. Therefore, the expected annual growth rate of money supply is positively correlated with real estate prices.

6. Regular wages (RW)

The recurring monthly salary received by employees, which includes basic salary and fixed allowances and bonuses paid monthly. As regular wages increase, individual's disposable living funds increase, and idle funds can easily become a source of real estate investment. Therefore, expected recurring wages are positively correlated with real estate prices.

7. Basic wage (BW)

The purpose of setting a minimum wage is to ensure that workers have sufficient income to meet basic living needs, while taking into account the minimum living standards and purchasing power of vulnerable workers. As the basic wage increases, individuals' basic income levels rise, resulting in more opportunities to invest in the real estate market. Expected base salary and real estate prices are positively correlated.

8. Total population (TP)

According to Taiwan's population structure indicators, the young population aged 0 to 14 accounts for 11.93% of the total population, the middle-aged population aged 15 to 64 accounts for 69.73%, and the elderly population aged 65 and above accounts for 18.35% of the total population. As the total population grows, the demand for real estate market increases accordingly. Therefore, it is expected that the total population will be positively correlated with real estate prices.

9. Unemployment rate (UR)

When the unemployment rate increases, the ability to buy houses weakens, which in turn makes the real estate market lack vitality, causing housing prices to fall; on the contrary, when the unemployment rate decreases, it means that the number of unemployed people decreases, the ability to afford houses increases, and the ability to buy houses stimulates the real estate transaction market and pushes up housing prices. Therefore, expected unemployment and real estate prices are inversely correlated.

3.3 Research model

To test the research hypothesis, this study uses the number of sales transfers, the unit price per ping of real estate, and the average total price as the response variables (PQ) to explore the impact of real estate control policies on real estate prices in municipalities and establishes the following regression equation:

$$PQ_{i,t} = \alpha_0 + \alpha_1 EGR_{i,t} + \alpha_2 CPI_{i,t} + \alpha_3 MIR_{i,t} + \alpha_4 WIR_{i,t} + \alpha_5 MS_{i,t} + \alpha_6 RW_{i,t} + \alpha_7 BW_{i,t} + \alpha_8 TP_{i,t} + \alpha_9 UR_{i,t} + \varepsilon_{i,t}$$

4. Empirical Results

4.1. Real Price Registration 2.0

The Real Price Registration 2.0 policy will be implemented from July 1, 2021, requiring that transaction-related information be publicly registered during real estate transactions, including details such as the property's location, building layout, land conditions, building contents, past transaction records of the house, house number address, etc. It can be seen from Table 4.1 that after the implementation of Real Price Registration 2.0 in Taipei City, the economic growth rate and basic wage have a positive and significant impact on the price per square meter, and the annual growth rate of money supply has a negative and significant impact on the price per square meter; the economic growth rate and total population have a positive and significant impact on the average total price, and the unemployment rate has a negative and significant impact on the price per square meter. In terms of the joint impact of various factors, the economic growth rate has a significant positive impact on the unit price per square meter and the average total price; the others have no joint impact.

	N		P		AP	
	Real Price Login before 2.0	After real price registration 2.0	Real Price Login before 2.0	After real price registration 2.0	Real Price Login before 2.0	After real price registration 2.0
EGR	85.37***	28.17	0.001	0.52***	-8.66***	13.83***
	(3.39)	(0.70)	(0.01)	(10.00)	(-3.10)	(3.39)
CPI	32.98	142.25	-0.42	0.13	4.08	-5.12
	(0.48)	(0.80)	(-1.36)	(0.57)	(0.53)	(-0.29)
MIR	1520.57***	133.00	-7.84***	-1.24	-296.97***	-48.19
	(3.48)	(0.13)	(-4.00)	(-0.97)	(-6.14)	(-0.48)
WIR	-0.42	1.90	-0.01	0.02	1.27	0.69
	(-0.03)	(0.15)	(-0.11)	(1.27)	(0.90)	(0.53)
MS	-4.60	108.66	0.68***	-0.26**	21.00***	-1.18
	(-0.18)	(1.21)	(6.07)	(-2.29)	(7.59)	(-0.13)
RW	1.09***	0.51	-0.001	0.0005	-0.09***	-0.02
	(4.14)	(1.30)	(-0.88)	(1.14)	(-2.96)	(-0.58)
BW	-0.74***	-0.05	-0.0006	0.0007**	0.04	-0.02
	(-3.46)	(-0.25)	(-0.73)	(2.73)	(1.59)	(-0.82)
TP	-0.001***	-0.0008	7.23E-06***	1.04E-06	0.0002***	0.0001**
	(-5.35)	(-1.12)	(5.40)	(1.09)	(9.04)	(2.43)
UR	1926.26***	-429.25	-11.48***	0.14	-465.32***	-130.41**
	(8.03)	(-0.74)	(-10.66)	(0.18)	(-17.50)	(-2.21)
Adj R^2	0.69	0.31	0.74	0.94	0.90	0.73

Table 4.1 Empirical Results-Taipei City

Note:The value in () is t-value. The significant levels of 1%, 5% and 10% are expressed in ***, ** and * respectively.

It can be seen from Table 4.2 that after the implementation of Real Price Registration 2.0 in New Taipei City, the economic growth rate, consumer price index, basic salary, and total population have a significant positive impact on the price per square meter; the economic growth rate has a significant positive impact on the average total price. In terms of the joint impact of various factors, the economic growth rate has a significant positive impact on the unit price per square meter and the average total price; the others have no joint impact.

	N		P		AP	
	Real Price Login before 2.0	After real price registration 2.0	Before real price registration 2.0	After real price registration 2.0	Real Price Login before 2.0	Real price login After 2.0
EGR	158.09**	103.71	0.14*	0.20***	3.21	8.23**
	(2.08)	(0.99)	(1.76)	(3.92)	(0.84)	(2.28)
CPI	-136.80	147.91	-0.23*	0.61**	-5.93	20.02
	(-1.11)	(0.32)	(-1.79)	(2.71)	(-0.97)	(1.26)
MIR	208.11	1110.44	7.41***	1.88	142.53**	31.63
	(0.16)	(0.43)	(5.50)	(1.49)	(2.24)	(0.35)
WIR	-10.45	-3.82	0.06**	-0.000	2.32*	-0.81
	(-0.38)	(-0.12)	(2.15)	(-0.06)	(1.69)	(-0.71)
MS	15.43	190.45	0.17***	-0.08	7.69***	5.25
	(0.27)	(0.81)	(2.80)	(-0.71)	(2.64)	(0.65)
RW	0.91*	0.45	0.002***	0.000	0.02	-0.02
	(1.90)	(0.44)	(3.06)	(-0.06)	(0.98)	(-0.61)
BW	-0.60*	-0.55	0.000	0.001***	0.02	0.04
	(-1.74)	(-0.96)	(0.02)	(3.68)	(1.03)	(2.20)
TP	-0.001**	0.0003	0.000**	0.000***	0.000	0.000
	(-2.09)	(0.13)	(-2.12)	(0.43)	(0.18)	(0.93)
UR	3473.65***	-3058.23*	-2.87***	-0.33	-171.38***	-103.81*
	(5.04)	(-2.02)	-3.92	(-0.45)	(-4.96)	(-1.99)
Adj R^2	0.34	0.36	0.80	0.94	0.77	0.58

Table 4.2 Empirical Results-New Taipei City

Note:The value in () is t-value. The significant levels of 1%, 5% and 10% are expressed in ***, ** and * respectively.

It can be seen from Table 4.3 that after Taoyuan City implemented the Real Price Registration 2.0, regular wages had a positive and significant impact on the number of building and residential sales transfers, and the basic salary had a negative and significant impact on the number of building and residential sales transfers; the economic growth rate had a positive and significant impact on the price per square meter; the economic growth rate, the average mortgage interest rate of the five major banks, and the total population had a positive and significant impact on the average total price, and regular wages and unemployment rate had a negative and significant impact on the average total price. In terms of the common influence of various factors, the economic growth rate has a significant positive impact on the unit price per square meter and the average total price; the average mortgage interest rate of the five major banks has a significant positive impact on the unit price per square meter and the average total price; regular wages have a significant positive impact on the number of building and residential sales transfers, but a significant negative impact on the average total price; the rest have no common influence.

	N		P		AP	
	Before real price registration 2.0	After real price registration 2.0	Real Price Login before 2.0	After real price registration 2.0	Before real price registration 2.0	Real price login After 2.0
EGR	-28.96	7 4.60	-0.01	0.20 ***	-3.80**	8.09 ***
	(-0.56)	(1.43)	(-0.17)	(5.28)	(-2.25)	(4.79)
CPI	-104.14	- 35.64	-0.35***	0.16	-3.71	3.65
	(-1.30)	(-0.16)	(-6.94)	(0.99)	(-1.41)	(0.49)

MIR	-932.57 (-1.01)	8 5.44 (0.38)	-0.90 (-1.54)	4.35 *** (4.68)	-209.13* ** (-6.85)	2 82.84* ** (6.78)
WIR	8.34 (0.43)	1.36 (0.08)	-0.02 (-1.42)	0.01 (0.92)	- 1.26* (-1.99)	0.27 (0.51)
MS	17.59 (0.49)	8 1.13 (0.70)	0.19*** (8.17)	- 0.07 (-0.85)	7.86 *** (6.59)	6.65 * (1.76)
RW	1.25*** (4.07)	1.25 ** (2.44)	0.000 (0.04)	0.000 (-0.22)	- 0.02 (-1.59)	- 0.05*** (-2.97)
BW	-0.88*** (-4.05)	- 1.01*** (-3.60)	0.000 (0.45)	0.0002 (1.12)	0.001 (0.21)	0.02 * (2.07)
TP	-0.001*** (-2.96)	- 0.001 (-1.15)	0.000** (2.33)	0.000 (0.96)	0.000 *** (5.16)	0.0001 *** (3.57)
UR	789.81 (1.58)	- 726.37 (-0.97)	0.45 (1.41)	- 0.47 (-0.86)	- 6.89 (-0.42)	- 112.77*** (-4.62)
Adj R^2	0.31	0.55	0.85	0.97	0.81	0.95

Table 4.3 Empirical Results-Taoyuan City

Note:The value in () is t-value. The significant levels of 1%, 5% and 10% are expressed in *, ** and * respectively.**

It can be seen from Table 4.4 that after the implementation of Real Price Registration 2.0 in Taichung City, regular wages have a positive and significant impact on the number of building and residential sales transfers, and the basic wage has a negative and significant impact on the number of building and residential sales transfers; the economic growth rate and basic wage have a positive and significant impact on the unit price per square meter, and the unemployment rate has a negative and significant impact on the unit price per square meter; the consumer price index, the average mortgage interest rate of the five major banks, and the total population have a positive and significant impact on the average total price, and regular wages and unemployment rate have a negative and significant impact on the average total price. In terms of the common influence of various factors, regular salary has a positive and significant impact on the number of building and residential sale and purchase transfers, and a negative and significant impact on the average total price; basic salary has a negative and significant impact on the number of building and residential sale and purchase transfers, and a positive and significant impact on the unit price per ping; unemployment rate has a negative and significant impact on the unit price per ping and the average total price; the rest have no common influence.

	N		P		AP	
	Real Price Login before 2.0	After real price registration 2.0	Before real price registration 2.0	After real price registration 2.0	Real Price Login before 2.0	After real price registration 2.0
EGR	85.51 -1.64	46.74 -0.72	-0.07 (-1.21)	0.12** -2.35	-11.84*** (-3.01)	-1.35 (-0.38)
CPI	-175.81** (-2.07)	-153.9 (-0.54)	-0.08 (-0.80)	0.2 -0.92	8.7 -1.36	32.55** -2.09
MIR	1252.33 -1.44	317.29 -0.2	0.04 -0.04	1.92 -1.57	-189.83*** (-2.89)	288.20*** -3.29
WIR	-0.61 (-0.03)	-17.21 (-0.84)	0.01 -0.39	0.01 -0.51	-0.14 (-0.10)	0.27 -0.24
MS	35.62 -0.9	86.91 -0.6	0.21*** -4.61	0 (-0.04)	7.49** -2.49	13.19 -1.66
RW	0.98*** -3	1.75** -2.74	0.00* -1.8	0 (-1.35)	0.02 -0.88	-0.09** (-2.69)
BW	-0.59** (-2.50)	-1.35*** (-3.82)	0 -0.87	0.00*** 3.53	0.01 -0.46	0.04* -2.06
TP	-0.00*** (-3.01)	0 (-1.28)	-1.34E? (-0.24)	1.57E? -1.71	4.38E? -1.22	0.00*** -2.93
UR	1699.47*** -3.6	-1533.59 (-1.63)	-3.34*** (-6.05)	-2.43*** (-3.39)	-217.08*** (-6.08)	-203.08*** (-3.97)
Adj R^2	0.25	0.55	0.89	0.92	0.84	0.69

Table 4.4 Empirical Results-Taichung City

Note:The value in () is t-value. The significant levels of 1%, 5% and 10% are expressed in ***, ** and * respectively.

It can be seen from Table 4.5 that after Tainan City implemented the Real Price Registration 2.0, the economic growth rate had a significant positive impact on the number of building and residential sales transfers; the economic growth rate had a significant positive impact on the unit price per ping. In terms of the joint impact of various factors, the economic growth rate has a significant positive impact on the number of building and residential sales transfers and the unit price per square meter; the rest have no joint impact.

	N		P		AP	
	Before real price registration 2.0	After real price registration 2.0	Real Price Login before 2.0	After real price registration 2.0	Before real price registration 2.0	After real price registration 2.0
EGR	16.42 -0.68	121.04** -2.66	-0.02 (-0.53)	0.23*** -4.84	-4.53** (-2.27)	4.85 -1.28
CPI	-15.74 (-0.40)	221.2 -1.11	-0.02 (-0.30)	0.04 -0.22	2.5 -0.77	15.08 -0.91
MIR	619.96 -1.53	315.11 -0.28	-1.55*** (-2.71)	2.30* -1.96	-102.41*** (-3.07)	158.2 -1.69
WIR	2.08 -0.24	12.66 -0.88	0.004 -0.39	0.02 -1.47	0.66 -0.92	1.53 -1.29
MS	4.59 -0.25	-50.52 (-0.50)	0.14*** -5.45	-0.12 (-1.11)	7.37*** -4.84	-2.59 (-0.31)
RW	0.35** -2.28	-0.48 (-1.08)	0.0005** -2.43	-0.0003 (-0.76)	0.02* -1.85	-0.07* (-1.78)
BW	-0.11 (-0.99)	0.13 -0.51	0.0001 -1.05	0.0004 -1.56	0.01 -0.78	0.03 -1.29
TP	-0.0006*** (-2.75)	0.0008 -1.04	-6.64E-08 (-0.21)	1.21E-06 -1.37	6.87E-06 -0.38	0.0001* -2.04
UR	753.59*** -3.42	-193.06 (-0.29)	-1.98*** (-6.35)	-1.30* (-1.89)	-100.57*** (-5.56)	-82.23 (-1.51)
Adj R^2	0.15	0.26	0.94	0.93	0.91	0.71

Table 4.5 Empirical ResultsTainan City

Note:The value in () is t-value. The significant levels of 1%, 5% and 10% are expressed in ***, ** and * respectively.

It can be seen from Table 4.6 that after the implementation of Real Price Registration 2.0 in Kaohsiung City, the economic growth rate has a significant positive impact on the price per square meter, and the unemployment rate has a significant negative impact on the price per square meter; the economic growth rate, the average mortgage interest rate of the five major banks, and the total population have a significant positive impact on the average total price, while regular wages and unemployment rate have a significant negative impact on the average total price. In terms of the joint impact of various factors, the economic growth rate has a significant positive impact on the unit price per square meter and the average total price; the unemployment rate has a significant negative impact on the unit price per square meter and the average total price; the rest have no joint impact.

	N		P		AP	
	Real Price Login before 2.0	After real price registration 2.0	Before real price registration 2.0	After real price registration 2.0	Real Price Login before 2.0	Real price login After 2.0
EGR	- 8.16 (-0.41)	4 3.43 (0.68)	- 0.09*** (-3.59)	0.20 *** (4.57)	- 4.03*** (-3.69)	7.81 *** (3.89)
CPI	3 2.56 (0.59)	- 102.42 (-0.36)	- 0.04 (-0.56)	0.23 (1.18)	3.77 (1.24)	- 3.30 (-0.37)
MIR	- 393.91 (-1.15)	1 67.37 (0.11)	- 0.50 (-1.18)	1.96 * (1.83)	- 69.73*** (-3.68)	1 76.72*** (3.56)
WIR	- 0.79 (-0.08)	2.66 (0.13)	0.02 (1.30)	0.02 (1.28)	0.92 (1.65)	1.11 * (1.75)

MS	4 6.69** (2.39)	1 12.47 (0.79)	0.15 *** (6.23)	- 0.07 (-0.71)	5.67 *** (5.23)	2 .04 (0.45)
RW	0.12 (0.59)	0.57 (0.90)	0.000 (0.04)	- 0.0002 (-0.53)	- 0.01 (-1.05)	- 0.05** (-2.41)
BW	- 0.19 (-1.13)	- 0.55 (-1.59)	0.0003 (1.36)	0.0003 (1.46)	0.02 ** (2.42)	- 0.01 (-0.75)
TP	0.0002 (0.94)	- 0.0001 (-0.12)	0.000 *** (3.01)	0.000 (1.39)	0.000 *** (4.38)	0.0002 *** (4.06)
UR	- 714.39*** (-3.78)	- 1686.50* (-1.82)	- 2.57*** (-10.88)	- 1.57** (-2.50)	- 105.87*** (-10.10)	- 136.00*** (-4.69)
Adj R^2	0.19	0.41	0.88	0.92	0.89	0.85

Table 4.6 Empirical Results-Kaohsiung City

Note:The value in () is t-value. The significant levels of 1%, 5% and 10% are expressed in ***, ** and * respectively.

4.2. Home Hoarding Tax

The house hoarding tax was officially implemented on June 6, 2014. The purpose of levying the house hoarding tax is to encourage real estate holders to effectively use real estate resources, release idle or undeveloped real estate to the market, and reduce idle situations. It can be seen from Table 4.7 that after the implementation of the house hoarding tax in Taipei City, regular wages have a positive and significant impact on the number of building and residential sales transfers, while the consumer price index, basic wages and total population have a negative and significant impact on the number of building and residential sales transfers; the economic growth rate, the average mortgage interest rate of the five major banks, regular wages and UR have a positive and significant impact on the unit price per square meter of real estate, while the basic wage and total population have a negative and significant impact on the unit price per square meter of real estate; the consumer price index, the annual growth rate of money supply, and regular wages have a positive and significant impact on the average total price of real estate, while the basic wage has a negative and significant impact on the average total price of real estate. In terms of the common influence of various factors, regular salary has a positive and significant influence on the number of building and residential sale and purchase transfers, the unit price per ping and the average total price of real estate; basic salary has a negative and significant influence on the number of building and residential sale and purchase transfers, the unit price per ping and the average total price of real estate; total population has a negative and significant influence on the number of building and residential sale and purchase transfers and the unit price per ping of real estate; consumer price index has a negative and significant influence on the number of building and residential sale and purchase transfers, and a positive and significant influence on the average total price of real estate; the rest have no common influence.

	N		P		AP	
	Before housing tax	After the housing tax	Before housing tax	After the housing tax	Before housing tax	After the housing tax
EGR	-0.83 (-0.02)	26.60 (0.98)	0.13 (1.02)	0.36*** (3.50)	-0.69 (-0.30)	0.24 (0.08)
CPI	87.28 (0.72)	-114.46** (-2.28)	-0.04 (-0.10)	0.36* (1.89)	7.00 (0.90)	11.32** (2.13)
MIR	116.79 (0.18)	194.16 (0.61)	-12.02*** (-5.30)	12.82*** (10.66)	-282.34*** (-6.87)	31.42 (0.93)
WIR	-2.66 (-0.16)	-0.06 (-0.01)	-0.01 (-0.25)	-0.001 (-0.05)	0.93 (0.89)	1.28 (1.14)
MS	55.80 (1.39)	43.41* (1.87)	0.29** (2.04)	0.33*** (3.75)	11.14*** (4.34)	10.01*** (4.06)
RW	1.52*** (2.66)	0.41** (2.55)	0.01*** (2.68)	0.004*** (8.01)	0.04 (1.03)	0.06*** (3.52)
BW	-1.99*** (-5.06)	-0.28** (-2.19)	0.001 (1.40)	-0.002*** (-5.21)	0.16*** (6.52)	-0.03** (-2.07)
TP	-0.0009 (-1.05)	-0.0004** (-2.19)	-6.93E-06** (-2.14)	-5.73E-06*** (-8.05)	-5.47E-05 (-0.93)	-3.14E-06 (-0.16)

UR	594.63 (0.94)	64.12 (0.20)	-2.67 (-1.19)	5.29*** (4.47)	-222.21*** (-5.48)	33.26 (1.00)
Adj R^2	0.61	0.18	0.85	0.85	0.96	0.64

Table 4.7 Empirical Results-Taipei City

Note:The value in () is t-value. The significant levels of 1%, 5% and 10% are expressed in ***, ** and * respectively.

It can be seen from Table 4.8 that after the implementation of the house hoarding tax in New Taipei City, the economic growth rate and regular wages have a positive and significant impact on the number of building and residential sales transfers, while the basic wage and total population have a negative and significant impact on the number of building and residential sales transfers; the economic growth rate, consumer price index, the average mortgage interest rate of the five major banks, regular wages and unemployment rate have a positive and significant impact on the unit price per square meter of real estate, while the basic wage and total population have a negative and significant impact on the unit price per square meter of real estate; the economic growth rate, consumer price index, the average mortgage interest rate of the five major banks, regular wages, total population and unemployment rate have a positive and significant impact on the average total price of real estate. In terms of the common influence of various factors, economic growth rate and regular wages have a positive and significant impact on the number of building and residential sales transfers, the unit price per ping and the average total price of real estate; basic salary has a negative and significant impact on the number of building and residential sales transfers and the unit price per ping of real estate; total population has a negative and significant impact on the number of building and residential sales transfers and the unit price per ping of real estate, and has a negative and significant impact on the unit price per ping of real estate; consumer price index, average mortgage interest rate of the five major banks, and unemployment rate have a positive and significant impact on the unit price per ping and the average total price of real estate ; the rest have no common influence.

	N		P		AP	
	Before housing tax	After the housing tax	Before housing tax	After the housing tax	Before housing tax	After the housing tax
EGR	-126.91 (-0.73)	133.27*** (2.87)	0.32*** (2.78)	0.14*** (3.48)	8.46** (2.15)	6.21*** (3.24)
CPI	-25.00 (-0.09)	-148.87* (-1.73)	-0.07 (2.78)	0.17** (2.30)	8.77 (1.38)	9.52*** (2.69)
MIR	-25308.15*** (-3.50)	-1066.44* (-1.96)	9.51* (1.97)	5.22*** (11.23)	597.73*** (3.62)	61.53*** (2.74)
WIR	-32.42 (-0.69)	7.53 (0.41)	0.01 (0.35)	0.01 (0.66)	0.70 (0.65)	0.06 (0.08)
MS	241.81* (1.73)	-6.79 (-0.17)	0.24** (2.52)	0.07* (1.94)	12.16*** (3.80)	2.27 (1.38)
RW	3.75** (2.64)	1.05*** (3.85)	0.003*** (3.09)	0.002*** (9.44)	0.08** (2.52)	0.06*** (4.99)
BW	-0.23 (2.64)	-0.68*** (-3.09)	0.002*** (3.06)	-0.0006*** (-3.19)	0.11*** (5.69)	-0.01 (-1.28)
TP	-0.005* (-2.03)	-0.001*** (-3.10)	-0.000*** (-3.77)	-0.000*** (-10.15)	-0.0002*** (-4.52)	0.00*** (-4.03)
UR	4063.87* (1.86)	7.24 (0.01)	-1.70 (-1.16)	2.08*** (4.55)	-6.76 (-0.14)	47.62** (2.15)
Adj R^2	0.42	0.37	0.93	0.95	0.95	0.87

Table 4.8 Empirical Results-New Taipei City

Note:The value in () is t-value. The significant levels of 1%, 5% and 10% are expressed in ***, ** and * respectively.

It can be seen from Table 4.9 that after Taichung City implemented the house hoarding tax, regular wages had a positive and significant impact on the number of building and residential sales transfers, while the consumer price index, basic wages and total population had a negative and significant impact on the number of building and residential sales transfers; the consumer price index, the average mortgage interest rate of the five major banks, the

annual growth rate of money supply, regular wages and unemployment rate had a positive and significant impact on the unit price per square meter of real estate, while the total population had a negative and significant impact on the unit price per square meter of real estate; the consumer price index and basic wages had a positive and significant impact on the average total price of real estate. In terms of the common influence of various factors, regular salary has a positive and significant influence on the number of building and residential sale and purchase transfers and the unit price per ping of real estate; the total population has a negative and significant influence on the number of building and residential sale and purchase transfers and the unit price per ping of real estate; the consumer price index has a positive and significant influence on the unit price per ping and the average total price of real estate, and has a negative and significant influence on the number of building and residential sale and purchase transfers; the basic salary has a positive and significant influence on the average total price of real estate, and has a negative and significant influence on the number of building and residential sale and purchase transfers; the rest have no common influence.

	N		P		AP	
	Before housing tax	After the housing tax	Before housing tax	After the housing tax	Before housing tax	After the housing tax
EGR	-105.00 (-1.13)	70.60* (1.73)	-0.04 (-0.39)	0.01 (0.23)	-7.11 (-1.44)	-2.70 (-1.14)
CPI	-5.64 (-0.04)	-227.33*** (-3.01)	0.20 (1.40)	0.31*** (4.42)	12.91 (1.62)	18.01*** (4.13)
MIR	-17253.60*** (-4.43)	27.33 (0.06)	1.79 (0.47)	2.83*** (6.42)	-340.24 (-1.65)	-33.04 (-1.20)
WIR	2.37 (0.09)	-6.96 (-0.43)	0.01 (0.25)	0.01 (0.82)	-1.30 (-0.97)	1.22 (1.33)
MS	161.55** (2.14)	25.88 (0.74)	0.37*** (5.05)	0.07** (2.18)	17.05*** (4.26)	-0.50 (-0.25)
RW	2.47*** (3.23)	1.28*** (5.30)	0.00** (2.36)	0.00*** 6.39	0.04 (1.09)	0.00 (0.32)
BW	0.15 (0.34)	-0.88*** (-4.55)	0.00 (1.25)	0.00 0.65	0.06** (2.40)	0.03*** (2.95)
TP	-0.00** (-2.47)	-0.00*** (-4.74)	-2.53E** (-2.15)	-2.23E*** -8.54	2.18E (-0.34)	3.83E (0.23)
UR	1547.35 (1.31)	58.22 (0.12)	-2.50** (-2.20)	1.29*** 2.98	-232.03*** (-3.71)	22.40 (0.82)
Adj R^2	0.46	0.35	0.89	0.96	0.83	0.84

Table 4.9 Empirical results-Taichung City

Note:The value in () is t-value. The significant levels of 1%, 5% and 10% are expressed in ***, ** and * respectively.

It can be seen from Table 4-10 that after Tainan City implemented the house hoarding tax, the economic growth rate had a positive and significant impact on the number of building and residential sales transfers; the consumer price index, the average mortgage interest rate of the five major banks, regular wages and unemployment rate had a positive and significant impact on the unit price per square meter of real estate, and the total population had a negative and significant impact on the unit price per square meter of real estate; the consumer price index, the average mortgage interest rate of the five major banks, the weighted index return rate, the annual growth rate of money supply, regular wages, and basic wages had a positive and significant impact on the average total price of real estate, and the total population had a negative and significant impact on the average total price of real estate. In terms of the joint impact of various factors, the consumer price index, the average mortgage interest rate of the five major banks, and regular wages have a positive and significant impact on the unit price per square meter and the average total price of real estate; the total population has a negative and significant impact on the unit price per square meter and the average total price of real estate; the rest have no joint impact.

	N		P		AP	
	Before housing tax	After the housing tax	Before housing tax	After the housing tax	Before housing tax	After the housing tax
EGR	0.02	55.97**	0.10*	0.06*	6.10**	-0.64
	(0.0003)	(2.59)	(1.89)	(1.69)	(2.09)	(-0.35)
CPI	-57.31	-35.54	-0.08	0.31***	-1.04	11.05**
	(-0.71)	(-0.89)	(-0.88)	(4.48)	(-0.22)	(3.22)
MIR	-4301.82**	155.47	2.47	2.84***	175.62	110.21***
	(-2.05)	(0.61)	(1.07)	(6.48)	(1.44)	(5.07)
WIR	-8.54	0.86	0.0001	0.02	-0.09	1.53**
	(-0.63)	(0.10)	(0.01)	(1.50)	(-0.12)	(2.11)
MS	4.73	0.79	0.03	0.05*	-3.72	5.50***
	(0.12)	(0.04)	(0.64)	(1.71)	(-1.57)	(3.46)
RW	0.64	0.15	0.001**	0.001***	0.01	0.04***
	(1.55)	(1.16)	(2.36)	(6.13)	(0.60)	(3.64)
BW	-0.09	-0.02	-8.73E-05	0.0001	-0.01	0.02**
	(-0.38)	(-0.17)	(-0.33)	(0.82)	(-0.59)	(2.06)
TP	-0.0005	-0.0002*	-1.25E-06*	-2.31E-06***	1.74E-05	-6.94E-05***
	(-0.79)	(-1.77)	(-1.73)	(-8.89)	(0.46)	(-5.39)
UR	-284.92	463.60*	-1.19*	1.03**	-128.43***	33.37
	(-0.45)	(1.86)	(-1.70)	(2.38)	(-3.47)	(1.56)
Adj R^2	0.08	0.24	0.82	0.96	0.76	0.94

Table 4.10 Empirical Results-Tainan City

Note:The value in () is t-value. The significant levels of 1%, 5% and 10% are expressed in ***, ** and * respectively.

It can be seen from Table 4.11 that after the implementation of the house hoarding tax in Kaohsiung City, regular wages have a positive and significant impact on the number of building and residential sales transfers, while the basic salary and total population have a negative and significant impact on the number of building and residential sales transfers; the consumer price index, the average mortgage interest rate of the five major banks and the unemployment rate have a positive and significant impact on the unit price per square meter of real estate, while the total population has a negative and significant impact on the unit price per square meter of real estate ; regular wages have a positive and significant impact on the average total price of real estate, while the total population has a negative and significant impact on the average total price of real estate. In terms of the joint impact of various factors, the total population has a negative significant impact on the number of building and residential sales transfers, the unit price per square meter and the average total price of real estate; regular wages have a positive significant impact on the number of building and residential sales transfers and the average total price of real estate; the rest have no joint impact.

	N		P		AP	
	Before housing tax	After the housing tax	Before housing tax	After the housing tax	Before housing tax	After the housing tax
EGR	- 22.03	4 0.41	0.01	0.01	- 1.24	-0.16
	(-1.01)	(1.38)	(0.43)	(0.19)	(-0.99)	(-0.07)
CPI	- 26.34	- 54.10	- 0.01	0.33 ***	3.52	7.81 *
	(-0.36)	(-1.00)	(-0.11)	(3.83)	(0.85)	(1.92)
MIR	- 1079.78***	- 344.42	0.01	3.47 ***	- 35.12	5 0.68*
	(-2.80)	(-1.00)	(0.04)	(6.44)	(-1.59)	(1.96)
WIR	- 7.23	3.57	0.01	0.02	0.61	1.57 *
	(-0.74)	(0.31)	(0.83)	(0.91)	(1.09)	(1.83)
MS	2 1.62	3 5.90	0.02	0.07 *	2.89 **	3.73 *
	(0.90)	(1.43)	(0.97)	(1.86)	(2.10)	(1.98)
RW	0.84 **	0.57 ***	0.001 ***	0 .001*p0.00	- 0.01	0.04 ***
	(2.45)	(3.28)	(3.49)	(5.29)	(-0.27)	(2.82)
BW	- 0.11	- 0.41***	0.001 ***	- 0.0002	0.06 ***	0.004
	(-0.48)	(-2.93)	(5.68)	(-1.09)	(4.67)	(0.37)

TP	- 0.001 (-1.86)	- 0.001** (-2.47)	-0.000*** (-4.68)	- 0.000*** (-6.57)	0.000 (0.01)	- 0.000*** (-2.93)
UR	- 449.64 (-1.18)	1 0.56 (0.03)	0.42 (1.03)	1.40 *** (2.64)	- 48.46** (-2.22)	4 0.06 (1.58)
Adj R^2	0.60	0.27	0.87	0.90	0.82	0.82

Table 4.11 Empirical results-Kaohsiung City

Note:The value in () is t-value. The significant levels of 1%, 5% and 10% are expressed in ***, ** and * respectively.

5. Conclusion

This study aims to explore the impact of Taiwan's real estate control policies on market transaction volume and prices. By analyzing relevant data between counties and cities in municipalities from 2008 to 2023, the relationship between the number of building and residential sales transfers, the unit price per square meter of real estate, and the average total price is explored. The impact of various economic variables on the real estate market is further considered to evaluate the effectiveness of different policies in achieving the expected goals. The research results show that different real estate control policies have different degrees of impact on housing prices and transaction volumes in different regions, and the impact of various economic variables on the real estate market also varies. These impacts vary significantly in time and region.

First of all, as the capital of Taiwan and the economic, political and cultural center, Taipei's real estate market has always been highly price sensitive and has great investment value. Research shows that housing prices and transaction volumes in Taipei City have changed significantly after the implementation of the real estate control policy. This phenomenon is, on the one hand, the effect of the implementation of the real estate control policy, and on the other hand, because the housing price base in Taipei City is already at a high level. Therefore, even with policy intervention, further price increases will still lead to a decline in purchasing power, causing transaction volume to show a downward trend. This phenomenon shows that high housing prices limit purchasing demand, which in turn affects market liquidity.

In contrast, Tainan City's housing prices and transaction volumes are at the bottom among the municipalities, mainly due to its relatively low level of economic development and investment demand, as well as the concentration of population mobility and economic activities in the northern and central regions. Although Tainan City has also experienced a certain degree of price adjustment after the implementation of the real estate control policy, due to the low base, the inhibitory effect of price increases on purchasing demand is relatively small, resulting in less impact on transaction volume. This shows that in the low-price market, the impact of policies is mainly reflected in price adjustments rather than significant changes in trading volume.

In addition, the research results also show that the total population of Taoyuan City has a significant impact on the real estate market. As an emerging economic center, Taoyuan City has a rapidly growing population, leading to an increasing demand for housing. This trend is reflected in the data on house prices and transaction volumes, showing the driving effect of population growth on the real estate market. With the implementation of real estate control policies, although housing prices have been adjusted in the short term, they still remain at a high level overall and transaction volumes have not declined significantly.

It is worth discussing that the correlation coefficients of the Consumer Price Index with the number of building and residential sales transfers are not high, indicating that its direct impact on real estate transaction volume is relatively weak, but there is still a certain degree of linkage, which may be because changes in the Consumer Price Index reflect changes in the overall economic environment rather than fluctuations in a single market.

There is a positive correlation coefficient between real estate prices in municipalities and actual income and wage levels, which indicates that the increase in income and wage levels has promoted the rise in housing prices. This high correlation reflects the direct impact of economic growth on the real estate market, and also reflects the high sensitivity of the real estate market to macroeconomic indicators. The price and transaction volume of the real estate market are not only related to various real estate regulatory policies, but also have complex interrelationships with multiple economic variables.

In summary, this study reveals the actual effects and impact mechanisms of different real estate regulatory policies in different regions through an in-depth analysis of the real estate market in the municipalities. The research results show that there are significant differences in the impact of policy implementation on housing prices and transaction volumes in various regions. These differences are mainly affected by factors such as local economic development level, population mobility, income and wage levels. These findings provide an important reference for formulating more precise and effective real estate regulation policies in the future, and emphasize the importance of adapting to local conditions. Through data collation and analysis, we hope to promote the stability and sustainable development of Taiwan's real estate market and provide valuable empirical support for subsequent research.

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