

## Chapter 5

# Taipei Property Market Before and After Asian Financial Crisis

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### Introduction

From the first oil crisis in 1972 to the late 1980s, Taipei property markets have performed very well (fig.1). Owing to the land boom in the late 1980s, property markets in Taipei used to be speculative and profitable. Investment in real estate consequently gained greater profits than other investments.<sup>1</sup>

However, after the ‘bubble economy’ burst in the 1990’s, Taipei’s property markets experienced a downturn. Vacancy in the housing sector jumped, but due to an overall downward rigidity of prices in the property markets<sup>2</sup>, land and housing prices did not significantly drop.

The Asian financial crisis, in 1997, damaged property markets in several Asian cities, but Taipei’s property markets were not affected. The real estate indicators<sup>3</sup> did not show any significant change during this period.

Taipei’s property markets were nevertheless seriously hit, in the post-crisis period, by the collapse of the stock markets and by the poor macro-economic performances. Most of real estate researchers were pessimistic upon the prospects of their industry. International research institutes and media even predicted that the poor performance of property markets would endanger the financial sector and cause a domestic financial crisis.

Owing to both Asian financial crisis and long-lasting recession in the property market, the Taiwanese government proposed several short-term solutions to solve problems in the property markets. The government also tried to define a long-lasting and consistent housing policy. Some aspects of this policy have started to show positive effects. Most indicators are still not performing well, but property markets have shown signs of recovery since the fourth quarter of 2001.

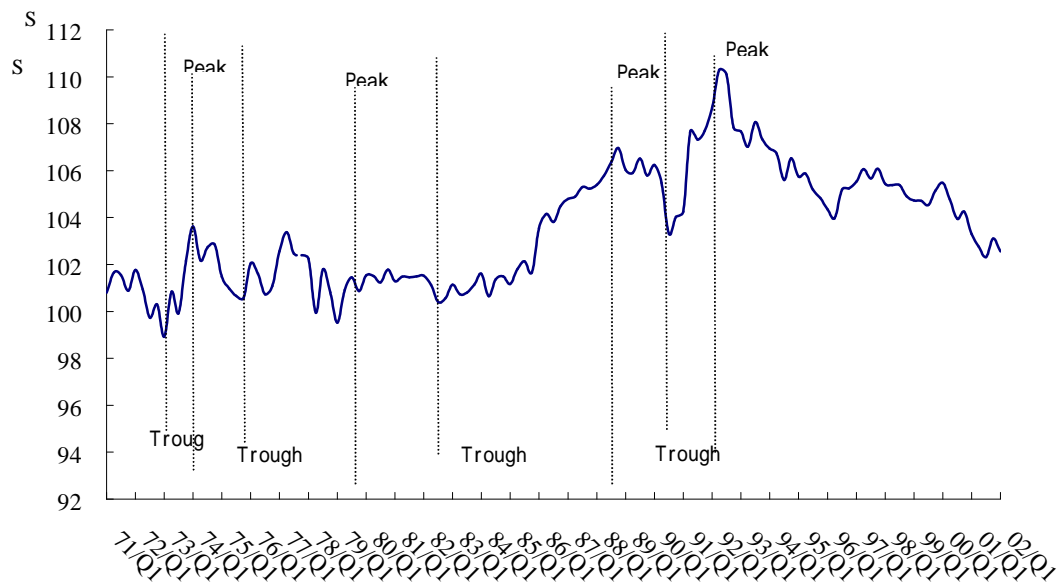
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<sup>1</sup> Chang (1996) suggests the annual average return for housing investment on equity (ROE) was on average 20.79% in Taipei in 1989.

<sup>2</sup> Hua(2000) suggests that land price in Taiwan had remained firm. As shown in figure 2, the housing price has remained above a certain level.

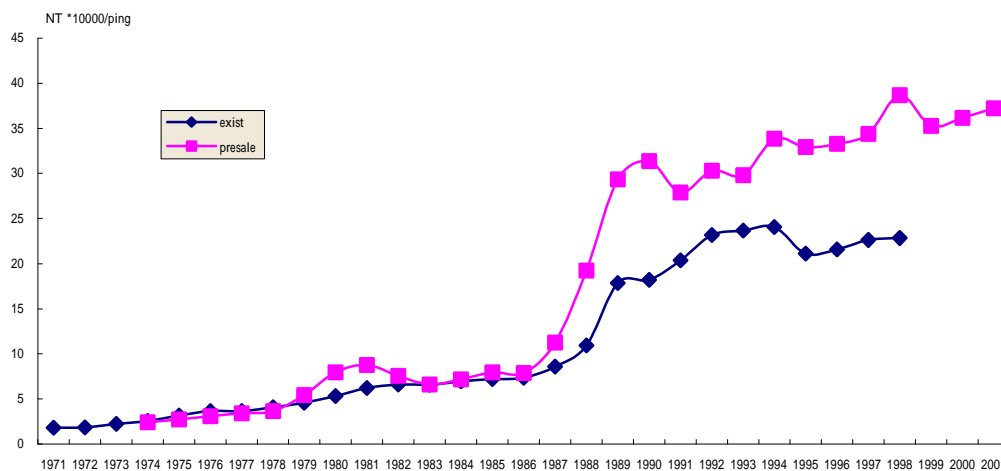
<sup>3</sup> These variables include the housing price, land incremental value tax, quantity of house traded, the floor area of construction license permit, the quantity of vacant house, and the construction stock index.

**Figure 1. The Real Estate Business Cycle Indicator (index %)**



Source : Estate Cycle Indicators published by theTaiwan Real Estate Research Center.

**Figure 2. The Price of pre-sales Housing and the Price of Existing Housing**



Source: Real Estate Cycle Indicators published by Taiwan Real Estate Research Center.

This chapter is devoted to exploring the property cycle and the related property issues in Taipei before and after the Asian financial crisis. We are particularly interested in analyzing the following questions: How was the property market correlated to the macro-economy and the stock market during the period of 'bubble economy'? Why did Taipei's property markets show a striking rigidity after the bubble economy burst? Why did the Asian financial crisis not affect the property market in Taipei? Was poor real estate

performance responsible for the bad performance in the financial sector? Are public policies likely to be successful in improving the situation of property markets?

This chapter is laid out as follows: the first section will introduce the attributes of Taipei property market. The second section will analyze the Taipei property cycle and its relationship with the macro-economy, stock market, and financial sector.. Section three summarizes various public property policies and evaluates their possible outcomes.

## **1. Attributes of Property Market in Taipei**

The majority of developable land in Taipei is owned by the private sector.. But the government can claim privately owned land for public use (compulsory purchase) by paying compensation to the owner..

The local zoning system is of a dual nature, separated by urban and rural classifications. Taipei land use in 2000 was broken down accordingly: 14.78% zoned for residential use, 3.29% for commercial use, 1.74% for industrial use, 27.5% for public facility, 2.42% for agricultural use, 0.56% for scenic use, 41.79% for conservation area, and 7.89% zoned for other.

In Taipei, land values take up approximately 60% of total property values. In fact, the true transaction price of land in the market is difficult to obtain. Data is not reliable because the licensed appraisal system has not been well established. Therefore, various actions related to land, including compensation payment for compulsory purchase by the government and bank's loan decisions, all depend on the officially assessed values.

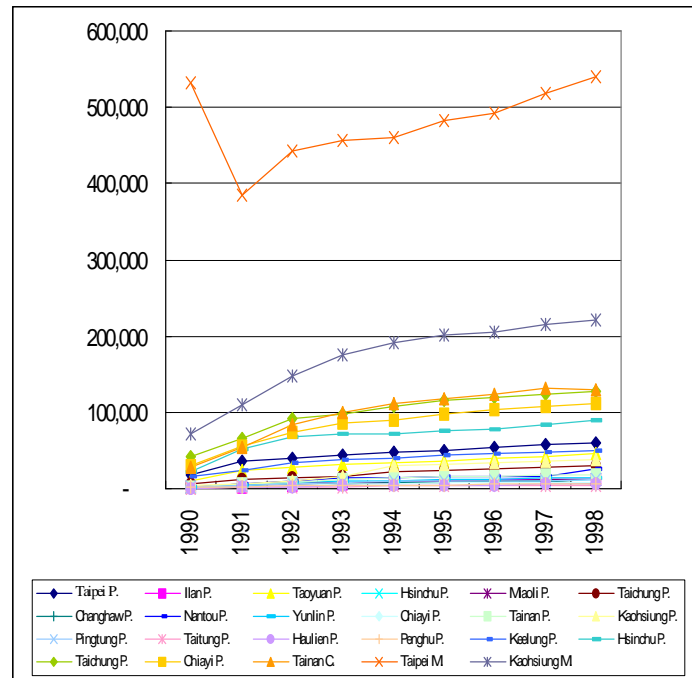
Land taxes also depend on the officially assessed values. The capital gains on the land value are subject to 'land incremental value tax'. Land incremental value taxes are calculated on a progressive base upon the declared current value of land, rather than the actual market price.<sup>4</sup> For the convenience of the taxpayers in their declaration of current value of the land being transferred, the land value assessment committee of local government announces a current value of the land, called the declared current value of land, once a year. It is used as a taxation standard. The committee firstly makes investigation and divides the local land into several sections. They compute the average price of the land in each section, and then formerly announce the current value of the land to the public. The land value assessment is often adjusted in lagged time. In addition, it is generally adjusted up.<sup>5</sup> As shown in figure 3, the declared value of land has been continuously increasing, and varies across prefectures. The declared current value of land in Taipei is much higher than that in other Taiwanese prefectures.

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<sup>4</sup> Nominal rates are 40%, 50% and 60% of the difference in current values.

<sup>5</sup> The local land committee does not tend to adjust down the assessed value even though the given market situation is not good. They have in general adopted a policy of increasing assessment value.

**Figure 3. The Declared Current Value of Land in Taiwan  
(in NT\$)**



Source: Lai and Hua (1999).

The declared current value of land is also often far different from the actual market value. Declared current values are generally less than half of actual market values in transactions. One of major reasons for the difference is that, though Dr. Sun Yat-Sen had advocated a heavy land tax in order to equalize the land right, Taiwanese authorities in reality have become very conservative and cautious in dealing with land issues and particularly the land tax policy. They tend to under-assess the current value of land. Owners of property can therefore pay lower land incremental value taxes. According to the past experience, it is 'politically incorrect' to replace the under-assessed land value with the transaction-based market value.<sup>6</sup>

The land incremental value tax is the major tax imposed on land, but the land value tax<sup>7</sup> is also important. It is annually levied and computed on the basis of Official Declared Value, which is adjusted every three years. The local government establishes a Land Value Assessment Commission which makes public announcement of its assessments by section and lot, based upon data including market values submitted by the land administration

<sup>6</sup> The Minister of Finance Wang was forced to resign from his office as he tried to take steps to replace the under-assessed land value with the transaction-based market value in 1992.

<sup>7</sup> It is an ad *valorem* tax. In other words, it is a price proportional tax.

(“Posted Values”). Landowners must declare their land value with reference to the Posted Values. If a landowner declares a value below 80% of the Posted Value, the Official Declared Value shall be adjusted to 80% of the Posted Value.<sup>8</sup> The Official Declared Values are much lower than the assessed values.

Generally, both declared current value and Official Declared Value are far below the actual market values. Therefore, the official information related to land values is not accurate and reliable. A better system of appraisal has been established recently. The law of real estate appraisal was passed in 2000 and the first examination of the appraiser license was held on December of 2001. Once the appraisal system is well established, the information regarding land values obtained from both public and private sectors should be more reliable.

Like other Asian people, Taiwanese prefer owning to renting a house. As a result, 72% of total dwelling units are owner-occupied in Taipei<sup>9</sup>, while more than 80% of dwelling units are owner-occupied in Taiwan. As shown in Table 1, the home ownership rate increased gradually in the past two decades. The rental housing market is far less developed. In Taipei, approximately 20%-30% of dwelling units are rented. Because of this phenomenon, the quality of rental housing is always lower than the quality of self-owned housing. For instance, the average size and the average room number of the self-owned dwellings were 38.57 ping (or 127.281 square meters)<sup>10</sup> and 3.7 units, while those of the rental housing were 26.13 ping and 2.8 units in 1993. In addition, rental housing units are generally older than self-owned housing units.

There are two major types of demand in the housing market: consumption demand for owner-occupiers and investment demand for either resale or rental purposes. Owing to the variations in different type of demand, the relation between market prices and transaction volume in Taipei has differed across periods. As shown in figure 4, the continuous increase in price and transaction volume was apparent before 1975. Due to the speculation in housing investments, the price and transaction quantity were in flux between 1975 and 1985. When the investment demand in the housing market gradually matured after 1985, the market price and transaction quantity correlated in a counter-clockwise direction (Chang and Hua, 1996).

In terms of selling strategy, the housing market in Taipei can be generally divided into two types of sub-markets: the pre-sales and the existing housing markets. The pre-sales system plays an important role in Taiwan housing markets. The pre-sales system allows constructors (or housing suppliers) to sell housing units right after receiving the construction permit. They can, therefore, evaluate the projected sales performance before the entire

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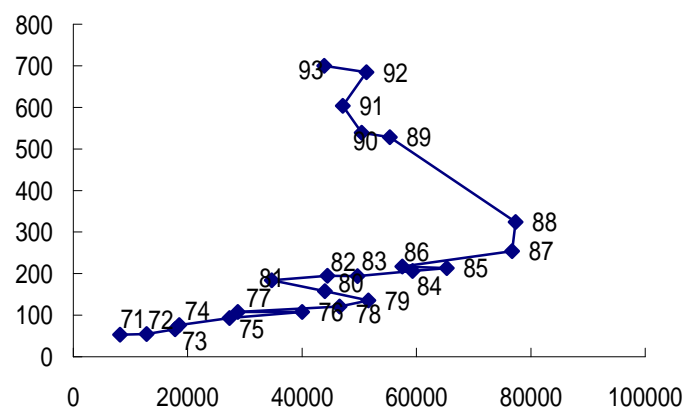
<sup>8</sup> When the land value is declared in excess of 120% of the Posted Value, it shall be adjusted to 120% of the Posted Value as the Official Declared Value (see Guide to ROC Taxes).

<sup>9</sup> See Table 1.

<sup>10</sup> 1 ping=3.3 square meters.

investment is actually completed. In addition, they can use down payments from the purchasers to fund construction. On the other hand, buyers can also take advantage of the pre-sales system. They can reduce the risk of price by locking-in the buying price. The down payment in installment (instead of lump sum) provides a form of financing. No transaction cost before completion is another advantage for buyers. Though there are several disadvantages<sup>11</sup>, the pre-sales system is popular and new housing units are sold predominantly through this system in Taiwan.

**Figure 4. Housing Price (in NT\$) and Transaction Volume (in units)**



Source: Chang and Hua (1996).

The long-lasting recession in the real estate market has, however, made the existing housing market more and more important. The two sub-markets are closely related. The housing price in the pre-sales market is an important housing price index and serves as a leading indicator of prices in the existing housing market.<sup>12</sup> As shown in figure 2, the pre-sales price is usually higher than the completed (existing) house price in Taipei. The price difference, however, becomes smaller during the downswing of the real estate cycle, while it is larger during the upswing phase.

Which type of housing is the most popular in Taipei? The apartment, particularly the low-rise apartment. Table 1 indicates that in 1995 more than 80% of Taipei households lived in apartments, while only 35% of the rest of the island's households chose apartments. Low-rise apartments (five stories or less) are more popular than high-rise ones. Housing

<sup>11</sup> The disadvantages for the developer are no opportunity to increase price in bull periods and interference from buyer at the planning stage. The disadvantages for the buyer are lack of security for deposit, risk of delay in completion, risk of default by developer, and risk of product quality after completion (Chang and Ward, 1993).

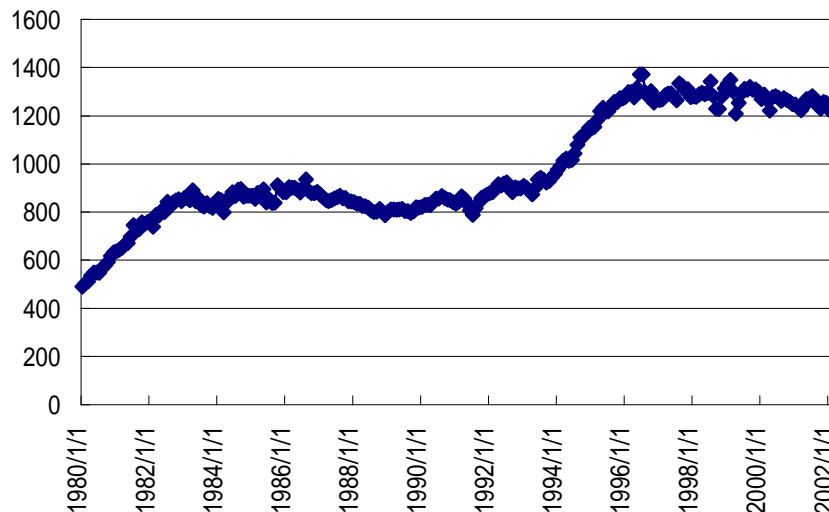
<sup>12</sup> The hedonic price of existing housing is used. However, the hedonic price of existing housing has not been conducted lately.

units in Taipei are relatively new than in other cities. According to a 1995 housing survey, about 40% of dwelling units were less than 15 years old. Approximately 80% of them had been constructed in the past two and half decades. Generally speaking, Taipei has a relatively new housing stock compared with other Taiwanese cities.

The living standard in Taipei has gradually improved in terms of housing space, with the increase of the average floor area per household. For instance, the floor area occupied per household increased from 92.6 square meters in 1980 to 103.95 square meters in 1995, while the floor area occupied per person increased from 24.9 square meters in 1980 to 25.95 square meters in 1995 (table 1).

Owing to the dramatic increase in new construction prior to capacity regulations<sup>13</sup>, as well as to the long-lasting demand recession, the oversupply in the housing market has constantly increased. As a result, the quantity of vacant housing units<sup>14</sup> climbed gradually after 1990. Their number exceeded one million nationwide in 1994, and the figure has reached 1.2 million-1.5 million since then. The vacancy rate in the housing market in Taiwan has maintained a high level of 15%. Compared with other Taiwan cities, Taipei has a relatively lower quantity of vacant houses owing to both a steady urbanization and more job opportunities (Peng and Chang, 1995).

**Figure 5. Quantity of Vacant House** unit:1,000



Source: Real Estate Cycle Indicators published by the Taiwan Real Estate Research Center.

By contrast, the industrial property market in Taipei is declining. Land, labor and environmental costs make Taipei too expensive for traditional industries. Therefore, manufacturing industries are moving from Taipei city to other places including overseas

<sup>13</sup> The rumor has been flying for a long time before the regulation had actually been implemented in 1999.

<sup>14</sup> A housing unit is considered vacant if the household's monthly consumption of electricity is lower than a certain degree.

production bases. Unlike industrial property, the demand for shopping malls<sup>15</sup> and office buildings is very strong. ‘Industrial offices’, that is, high-rise buildings with permission for industrial use, have been developed and used for office use in Taipei city. Office-factories become the mainstream products of the industrial property market. The growth of the office market in the city has led many large enterprises to build office buildings for owner-occupied purposes. In addition, Taipei’s rental office market is very active.

The average rent of Grade A office in Taipei city is about NT\$2,000-3,000/ping (US\$18-28/square meter) (Huang, 2002). Offices in both Taipei Manhattan Xin-Yi Planned Zone and Dun-Hwa Financial Zone pay the highest rent, at the average rate of NT\$3,500/ping (US\$32 per square meter). The average rent of rental housing is about NT\$600~1,000/ping (US\$6-9/square meter). Quality maintenance and contract protection mechanism of rental housing is not well established, so the rent level of rental housing has remained relatively low and unchanged. The average rent of mixed office and residential buildings in areas with Grade A office is about 900~1500/ping (US\$8-14/square meter). In the same building, there is a 20% difference in rent between office and residential purposes.

## **2. The Property Market Cycle before and after Asian Financial Crisis**

Before the outbreak of the Asian financial crisis, Taiwan’s real estate markets had experienced three big cycles. The main reasons for the downward phases of the first two cycles were the 1<sup>st</sup> and 2<sup>nd</sup> oil crisis. The major reason of the third cycle was the ‘bubble economy’ occurring between 1987 and 1991. Figure 1 indicates that the recent peak of the real estate cycle before the financial crisis happened in 1991. As shown in Figure 2, the median list price of the pre-sales housing<sup>16</sup> before 1987 had steadily risen. It then dramatically jumped to reach a peak in 1990. During this period of 1987-1991, participation in the stock market became a popular activity. People bought property after having made money owing to the stock bubble. They returned to the stock market after having made money in the property market. The two markets thus strongly interacted with each other<sup>17</sup>. In addition, the money supplied significantly increased during this period, because the government reclaimed a sizeable surface land for public purposes and paid huge amount of compensation to the public. Therefore, the real estate markets experienced a prosperous period owing to the inflow of hot money<sup>18</sup>. As a result, the affordability index<sup>19</sup> reached a record high level of nine following the price bubble.

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<sup>15</sup> Taipei recently opened several large shopping malls, such as Living Mall or Breeze Center.

<sup>16</sup> The transaction price of pre-sales housing is not available.

<sup>17</sup> Wu and Chang (2002) find the property market and the stock market had mutual causalities in Taipei.

<sup>18</sup> Wu and Chang (2002) find the key macroeconomic variables such as GDP, money supply and CPI are leading indicators of the property market in Taipei.

<sup>19</sup> Average housing price/average annual income per household.



After the burst of the bubble economy, the real estate market experienced a long-lasting recession until the Asian crisis, but land and housing values did not fall. Hua (2000) suggests that the land tax system plays an important role in supporting the values. The role of official assessment<sup>20</sup> has an effect in stabilizing the markets. As mentioned earlier, the assessed value of land is usually far below the actual market value, particularly after the property boom, so the effective tax rate is much lower<sup>21</sup>. Such light tax burden on land holding encouraged people to purchase land and houses, not just for use but also for investment. In addition, the lag and the incremental practice do have a stabilizing effect on the property market.

Statistical evidence<sup>22</sup> from various sources support the widely believed hypothesis that Taipei property market was not affected by the Asian financial crisis. Hua (2000) suggests that the major reason was the good performance of the economy previously to the currency crisis. The other reason was the 'lock-in effect' (rigidity towards downward trends) in land markets. Wu and Chang (2002) tested the hypothesis, using structural change tests, and found that real estate cycle indicators and most of key real estate variables did not show structural changes during the crisis period. This implies that the Asian financial crisis did not have a negative and significant influence on the real estate market. In addition to the well-performed macro-economy, they suggest that the non-internationalization of real estate and the long-lasting recession in property markets also played a role in this pattern. Taipei's real estate market was not open to global participants. Therefore, the crisis in other Asian economies did not have contagious effects on the local real estate market. In addition, the real estate market has been trapped in a trough of the real estate cycle, so it was not observed a significant fluctuation during the crisis period.

The real estate markets are nevertheless undergoing a dramatic change since the Asian crisis. Real estate indicators have continued to fall since 1997. Both land incremental value tax income and number of housing units sold,<sup>23</sup> amongst the key demand-side indicators, have been dropping during the post-crisis period, especially in 2001. The floor area of construction license permit -considered one of production-side indicators- has continued to decrease. The construction stock index has fallen dramatically and remains at a low level since the crisis (see figures 6-9).

### **Figure 6. Total Floor Area of Construction License Permit**

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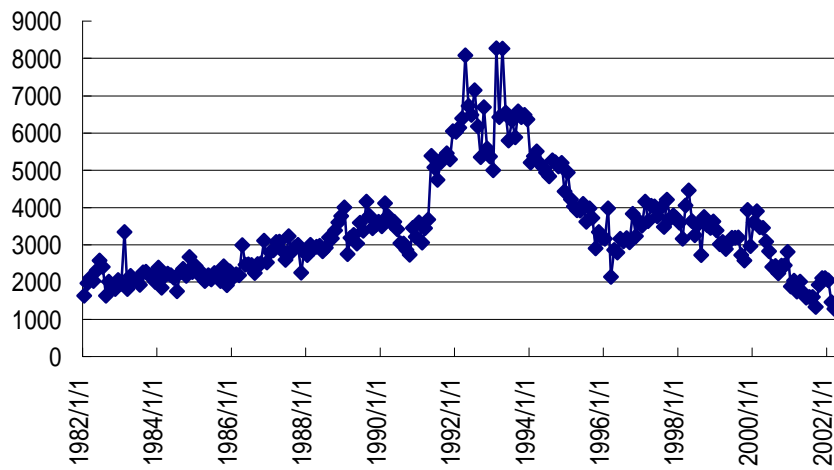
<sup>20</sup> The land incremental value tax is based on the declared current value of land, while the land value tax is based on the declared value of land.

<sup>21</sup> Hua (1999) estimated an effective tax rate of 0.17% for the taxed land in Taiwan in 1996.

<sup>22</sup> The real estate cycle indicator did not fluctuate dramatically during the crisis period. The housing price did not drop significantly and the number of vacant house did not jump dramatically during the crisis period. Other real estate indicator variables such as the land incremental value tax revenue, the floor area of licensed construction and quantity of house traded also did not change dramatically.

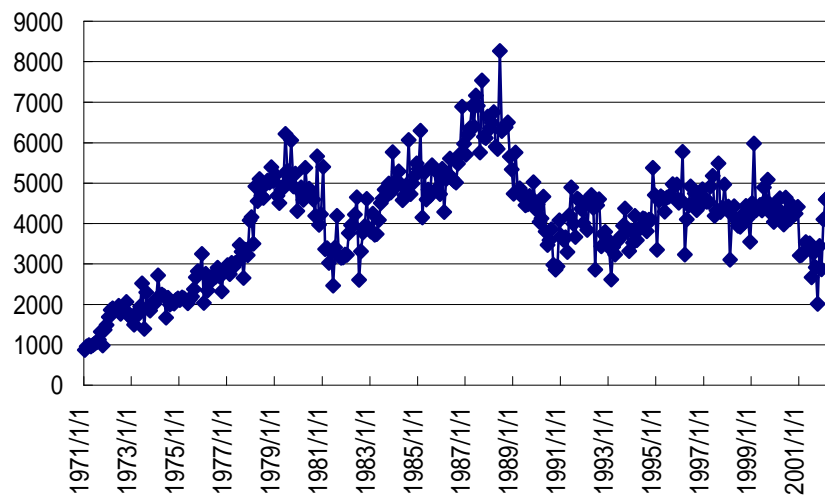
<sup>23</sup> We use the number of housing transaction contract tax as the proxy.

Unit: Square meter



Source: Real Estate Cycle Indicators published by the Taiwan Real Estate Research Center.

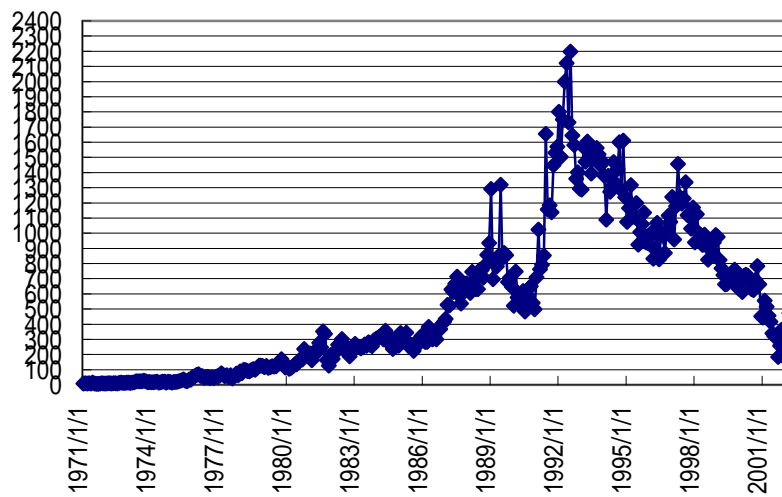
**Figure 7. The Number of Housing Transaction Contract Tax (in units)**



Source: Real Estate Cycle Indicators published by the Taiwan Real Estate Research Center.

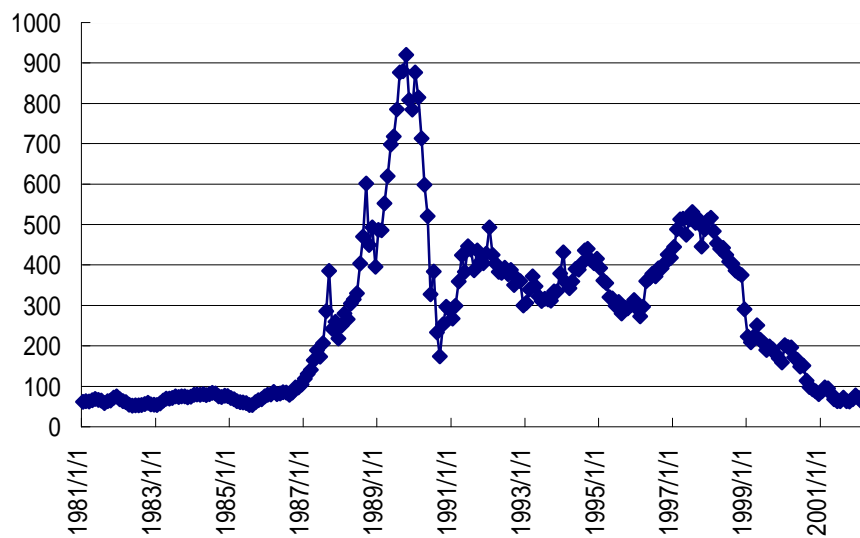
**Figure 8. Land Incremental Value Tax Revenue**

Unit: NT\$10 millions



Source: Real Estate Cycle Indicators published by Taiwan Real Estate Research Center.

**Figure 9. Construction Stock Weighted Index** unit: points



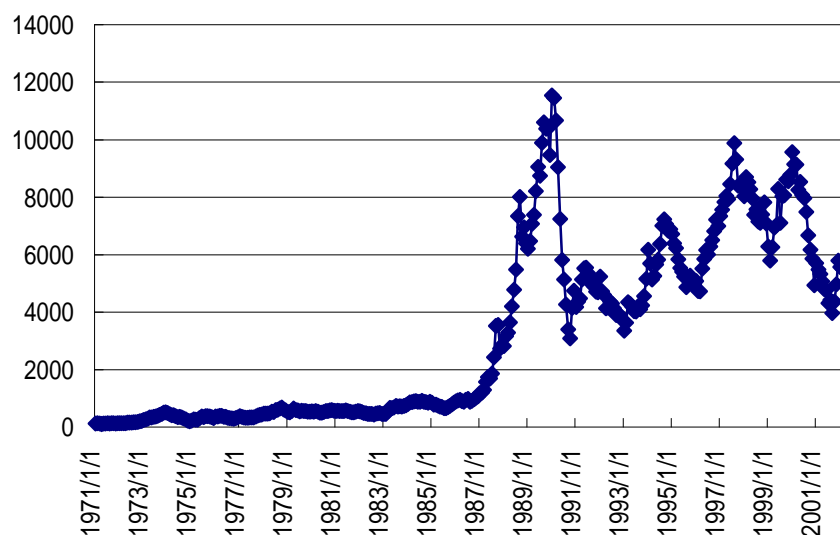
Source: AREMOS

Real estate loans share a very high percentage of total loans in the banking sector, so both the real estate sector and the banking system are closely related. Two years

after the Asian financial crisis, many construction companies ran into insolvency problems due to the real estate market recession, so the bad credit in the banking sector reached a record level.

The worst-ever macro-economic performances, with a negative GDP growth and a collapse of the stock market in 2001, made the problem even more serious. The poor performance eroded consumer's confidence. The stock market index dropped from 10,000 points in 1997 to the lowest point around 4,000 in 2001 (figure 10). One major effect of shrinking stock assets on the housing market was the low incentive to purchase a house. The shrinking stock asset value has a significant impact on constructors who use stocks to take loans from the banks. They have a significant amount of surplus in housing stock and a heavy burden on bank loans, so some of them face insolvency. As a consequence, the banking system bears a significant amount of non-performing loans. For instance, the non-performing loan ratio jumped up to be around 8% on December of 2001<sup>24</sup>. The total non-performing loans were approximately NT\$1,600 billion (US\$48 billion) at that time. Compared to NT\$55.2 billion (US\$1.7 billion) in 1991, it has increased by more than 20 times over the past decade. More than half of non-performing loans are based on real estate collaterals. Therefore, the total value of non-performing assets is estimated around NT\$550 billion (US\$17 billion). This huge amount of non-performing assets has become a headache for the banking system, which is on the verge of a crisis.

**Figure 10. Taiwan Stock Weighted Index** unit: points

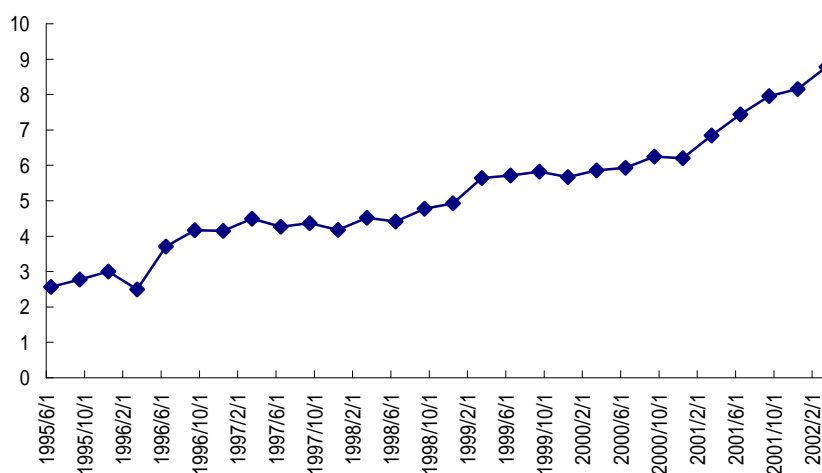


Source: AREMOS

<sup>24</sup> The potential number can be 15% (see Figure 11).

**Figure 11. Non-performing Loan Ratio**

unit: %



Source: AREMOS

### 3. Policies towards public property

The most successful property policy in Taiwan's history was the 1948 land reform. Based on Dr. Sun Yat-Sen's principles of 'land to the tillers' and 'equal land property right', the land reform contributed to economic growth and stimulated industrialization. This example made Taiwan a model for land reform in Asia.<sup>25</sup>

The Taiwanese government, however, has not implemented long-term and consistent housing policies after the rural land reform mentioned earlier. Apart from the subsidy to public housing, the government provides little assistance on rental payments of low-income households. Owing to the long-lasting recession in the property markets, defining efficient and appropriate public property policies becomes an important task for the government. We will discuss these property policies and evaluate their effects in this section.

#### *Lower mortgage rate policy.*

The major part of a housing purchase is financed by a mortgage. Mortgage interest rates are relatively high, though they have slowly adjusted downward. The interest rate of

<sup>25</sup> A lot of developing countries often send their officials to receive the training at the International Institute for Land Policy in Taiwan.

deposits has decreased to a level lower than 2%, while the mortgage interest rate remains around 6-7%. Therefore, the difference between mortgage and deposit interest rates have widened in past years. The mortgage interest rate still has a large space to adjust downwards. Several government policies recently enforced are related to the mortgage policies. The Taiwan government announced a NT\$150 billion fund (US\$4.5 billion) in 1998 for families wanting to purchase a new house. The amount of fund has constantly increased. For instance, NT\$200 billion (US\$6 billion) was recently added to the fund at a favorable mortgage interest rate of 3.025%.<sup>26</sup> The mortgage interest rate of public housing dropped to 3.95%. There is a significant difference between deposit interest rate and general mortgage interest rate, so the government pushes banks to adjust their mortgage interest rate downwards. Many banks started to provide lower mortgage interest rate to first-time purchasers<sup>27</sup>. This low interest policy stimulates housing purchases and has helped the property market recover from recession.

#### *A more open real estate market*

The real estate market in Taiwan has not been open to foreigners. Foreigners and Mainland Chinese are not allowed to acquire real estate or to rent land. However, the government lifted these restrictions this year, and completely opened the market to foreign investors and Mainland Chinese investors. This policy may attract more international money into Taiwan real estate markets. To date the effect of the open policy has had little impact.

#### *A healthier real estate finance system.*

The institutional system of real estate finance is underdeveloped in Taiwan. There is no real estate securitization vehicle, such as real estate investment trusts, and no secondary mortgage market vehicle. However, the planning process of both real estate securitization and secondary mortgage market vehicles has been completed, and is currently under review by the Legislature Yuan. In addition, Asset Management Corporation (AMC) will be established in order to deal with non-performing assets. Once these laws are passed, the real estate finance of institutional system in Taiwan will be more secure.

#### *A favorable land tax policy.*

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<sup>26</sup> There is a quota limit. Each household in Taipei can make a loan of NT\$2.5 million at this favorable interest rate.

<sup>27</sup> It is around 4.75%.

In order to stimulate property market transactions, the government cut the 'land incremental value tax' rate to half its previous level. This policy will be lasted for two years. As mentioned earlier, the land incremental value tax is the most important tax levied on land. Owing to the long-lasting property recession, many landowners will probably hold their parcels for a long period time. A lower land incremental value tax burden will have the effect of decreasing the selling price of land. The quantity of property traded is thus expected to increase. However, many economists consider that this policy will mostly benefit large corporate landowners, and not the general public.

### *Changing the land-use policy*

The decline of Taiwan's agricultural population has brought about an increase in idle agricultural land. Therefore, the government plans to release idle agricultural land for construction (residential, commercial or industrial purposes) through the deregulation of the national land-use plan. Much of agricultural land will be developed into science-based industrial parks. Many scholars are against this policy, because they consider that it will not achieve a sustainable development. Whatever the final results, the effect of the policy on land transactions has failed to achieve much.

## **Conclusion**

Before the Asian financial crisis, Taipei's real estate market had experienced three cycles in the post-war period. The key factor of the third cycle, in the period 1987-1991, was large money supply, which also provoked a bubble in the stock markets.

After the burst of the 'bubble economy', the real estate market experienced a long-lasting recession. However, both land and housing price showed a downward rigidity. The magnitude of the real estate cycle was thus relatively small. The peculiar feature of the Taiwanese land taxation system, together with very distinctive assessment methods, played a major role in stabilizing property markets.

The Asian financial crisis did not have a significant impact on the real estate markets. There are several reasons for this: the well-performed economy, the rigid price of land, non-internationalization, and the long-lasting recession. However, the Asian crisis severely hit the overall economy, which in turn caused damaged to the property markets. As a result, the financial sector is currently facing a crisis. The huge amount of non-performing loans has become a major problem for the banking system.

In order to save the real estate market from recession, the government has

recently proposed several policies. These policies can be summarized into the following categories: a favorable mortgage rate policy, a more open real estate market policy, a more healthy real estate finance of institutional system, a favorable tax policy on land, and a changing land-used policy. Some of these policies, such as the favorable mortgage interest policy, have stimulated the incentives to purchase houses and have had positive effects on the poorly performing real estate market in Taiwan.



## Reference

- Chang, Chin-Oh, (1996) *Real Estate Investment and Decision-Making*, Huatai, Taipei. (In Chinese).
- Chang, Chin-Oh and Lin, Chien-Yuan, (1999) Taipei, in Berry , James & McGreal, Stanley (ed), *Cities In The Pacific Rim: Planning Systems and Property Markets*, E&FN SPON, p. 89-106.
- Chang, Chin-Oh and Ward, Charles, (1993)Forward Pricing and Housing Market: The Pre-Sale Housing System in Taiwan, *Journal of Property Research*, 10, p. 217-227.
- Chang, Chin-Oh and Hua, Ching-Chun, (1996) Housing Fluctuation Pattern Between Transaction Price and Volume, *Journal of Housing Studies*, 5, p.1-15. (IN Chinese).
- Chang, Chin-Oh, Lin, Chu-Chia and Hua, Chang-I, (1999) *The Study on Taiwan Housing Policy*. (In Chinese)
- Chow, Gwo-Suan and Chang, Chin-Oh, (2002) *The Study on Non-performing Assets in Taiwan*, Master degree thesis, Department of Land Economics, National Chengchi University, Taipei, Taiwan.
- Hua, Chang-I, (2000)The Sticky Land Price in Taiwan: Its Causes, Effects, and Future, in Mara, Koichi & Renaud, Bertrand (ed) *Asia's Financial Crisis and the Role of Real Estate*, p.115-137.
- Huang, Ming-Yip, (2002)*The Study on Rent and Location of Office Market*, Ph.D Dissertation, Department of Land Economics, National Chengchi University, Taipei, Taiwan.
- Lai, Pi-Ying and Hua, Chang-I, (1999) A Quest For the Land Price Bubble in Taiwan, *AREUEA conference paper*.
- Lai, Pi-Ying, (2001) A Dynamic Analysis of Land Price After Economic Structural Change in Taiwan, *AREUEA conference paper*.
- Li, William Der-Hsing, (2001) The Growth of Mass Home Ownership in Taiwan, *Journal of Housing and the Built Environment*, p.1-12.
- Lin, Antsong, Lin, Vickey and Chang, Chin-Oh, (1997) Long-term relationship between Financial Variables and Real Estate Cycle in Taiwan, *Journal of Financial Studies*, 4(4), p. 75-91.
- Lin, Chu-Chia, Hua, Chang-I, Wu, Wen-Chieh, and Lai, Pi-Ying , (1999) *The Study on Issues of Vacant House and Surplus House in Taiwan*, Research Project of Land Bank of Taiwan.
- Mara, Koichi and Renaud, Bertrand, (2000) *Asia's Financial Crisis and the Role of Real Estate*, M.E.Sharp, New York.
- Ming, Yip Ngai, (2001)Housing in Taiwan: General Profile and the Impact of the Asian Financial Crisis, *RCPM Working Paper*.

Peng, Chien-Wen and Chang, Chin-Oh, (1995) An Analysis of Housing Vacancy Rate Phenomenon and reasons in Taiwan, *Journal of Housing Studies*, 3, p.45-71 (In Chinese).

Wu, Wen-Chieh and Chang, Chin-Oh, (2002) Taiwan Real Estate Market in the Post Financial Crisis Period, *AREUEA & ASRES conference paper*.

**Table 1     Housing stock and housing quality in Taipei, Taiwan**

	1980 Census		1990 Census		2000 Census	
	Taiwan	Taipei	Taiwan	Taipei	Taiwan	Taipei
Population	18,029,798	2,267,584	20,285,626	2,760,475	22,167,159	2,600,543
No. of Household	3,734,953	549,801	4,943,029	777,343	6,471,840	857,682
Housing Stock	3,677,300	485,201	5,073,909	755,242	6,975,088	827,295
Home-ownership	79.11	66.5	78.5	70.2	80.7*	72.2*
Floor area/ household	85.8	92.6	110	92.6	113.98*	103.95*
Floor area/ person	15.3	18	24.1	24.9	27.11*	25.95*
Building type (%)						
Row house, etc.	62	23	64.9	16.8	65.2*	17.1*
Low-rise apartment	31	61	28.2	55.9	26.1	58
High-rise apartment	3.3	12.6	6.7	27.3	8.60*	26.9*
Building age (%)						
Before 1945	13.73	7.61	5.5	2.3	4.4*	2.6*
1945-1960	14.0	11.55	6.2	3.4	5.5*	4.1*
1961-1970	—	—	15.2	16.1	11.9*	12.9*
(1961-1980)	72.27	80.84				
1971-1980	—	—	43.1	44.6	33.5*	39.1*
1981-1990	—	—	30.3	33.6	36.0*	38.6*
1990-2000	—	—	—	—	8.6*	2.7*

Source: Population Census 1980, 1990, and 2000, and 1995 Housing Survey.

\*: 1995 Housing Survey.

