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THE UNIVERSITY OF HONG KONG

AN EMPIRICAL ANALYSIS OF THE IMPACTS OF
GOVERNMENT POLICIES ON PRIVATE HOUSING
PRICES IN HONG KONG

A DISSERTATION SUBMITTED TO
THE FACULTY OF ARCHITECTURE
IN CANDIDACY FOR THE DEGREE OF
BACHELOR OF SCIENCE IN SURVEYING

DEPARTMENT OF REAL ESTATE AND CONSTRUCTION

BY
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HONG KONG
APRIL 2005

Declaration

I declare that this dissertation represents my own work, except where due acknowledgement is made, and that it has not been previously included in a thesis, dissertation or report submitted to this University or to any other information for a degree, diploma or other qualification.

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Name: _____

Date: _____

Abstract

Private housing market is one of the vital markets in the economy of Hong Kong. Numerous research has been done on the relationship between various macro-economic factors and the private housing prices. However, the same does not apply in the case between the government policies and the private housing prices which is always neglected and under-researched. In this study, focus has been placed on the effects of government policies on the private housing prices in Hong Kong between 1985 and 2004.

In the regression model of this study, demand-side and supply-side factors as well as the government controlled factors of the private housing price determination have been integrated and formulated to show their effects on private housing prices. In concurrence with previous studies, mortgage rate, income level, population, unemployment rate, Hang Seng Index and the supply of land for private housing have been found to play a significant role in the determination of private housing prices. On the contrary, the Gross Domestic Product, total supply of private housing units and the supply of HOS flats are shown to be insignificant in affecting the private housing prices although they are expected to do so.

Moreover, the timing of different government policies relating to the anti-speculation measures, the Long Term Housing Strategy, suspension of land sale programme, relaxation of HOS resale restrictions as well as moratorium of HOS flats have also been examined in this study. The empirical results revealed that except for the

moratorium of HOS flats, all the them had a significant impact on private housing prices.

This study explicates the effects of government intervention on the private housing market, and thus, puts forward the crucial role of government intervention. Government policies should be imposed after detailed deliberation so as to maintain a healthy and "free" development of private housing market in the future.

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Chapter 1 Introduction

1.1 Background

Hong Kong is regarded by Milton Friedman (1982) as "the freest city in the world" because of its free market for transaction and *laissez-faire* economic policy. In 2004, the annual Index of Economic Freedom has ranked Hong Kong as the world's most free economy for the 10th successive year (Anonymous, 2004). Hence by conjecture, this market is supposed to provide an environment that has minimal government intervention in the private market and which would enable effective and efficient mechanism for productions (MacPherson and Chan, 1997). The city can be justly proud of its protection of property rights, free flow of capital, low taxes and low level of government intervention in the financial and commercial markets. However, the situation in the residential property market is not so "free" since the government has played a significant role to intervene this market in the past few decades.

In the past two decades, the private residential property market has passed through several crests and troughs. For example, the private residential property price experienced its sky-high peak in the early 1997 but this glorious market collapsed after the Asian Financial Crisis. The housing prices in the mass market had taken a 65% dive since their climax before the crash of 1997. Even so, it rebounded about 40% since mid-2003 (Chan, 2004). The vigorous fluctuation of the residential property market would seriously impinge on the economic development of the whole city as this market has a relatively significant size. Nevertheless, it could become one of the noteworthy elements which influence the economy of Hong Kong.

Together with the construction industry, the real estate sector has contributed an average of 14% of the Gross Domestic Product (GDP) over the past five years (Suen, 2002a). In 2002, the GDP in this field was HK$120,057 million. Compared to the figures in United States and United Kingdom, their real estate and construction share in the total stock market capitalization were under 5% and 10 % respectively. On the other hand, that of Hong Kong was around 45% (Renaud *et al.,* 1997). So, it is no doubt that the performance of the residential property market would notably affect the overall performance of the economy of Hong Kong. The government has adopted several policies in this field which aimed at maintaining the stability in the development of the property market.

In recent years, the government has imposed several policies in housing market and land sales market in order to pump-prime the deflation-battered economy and restore the public's confidence in the property market. According to the announcement made by the Housing Authority, from 2003 onwards, the production and sale of Home Ownership Scheme (HOS) flats will cease indefinitely as to reduce the overlapping between the HOS and private residential market (Suen, 2002a). Moreover, the government has implemented some land policies such as Application List System and Suspension of land sales with the aim of boosting up the property market. It is believed that these land policies work in tandem with the housing policies to trigger some changes on the land price and the housing price of Hong Kong. Besides, it is worth finding out how would these government intervention policies affect the private residential property markets.

There have been many research on the significance of the government intervention on the private residential property market. However, empirical studies on how the government policies affect the private residential property prices are still limited in Hong Kong. Therefore, this present study aims at showing the extent of the significance of the government policies in the determination of the private residential prices in Hong Kong. The major macroeconomic factors will also be investigated together in order to get an all-rounded examination of the whole aspect.

1.2 Purpose of study

1.2.1 Goal of the study

The government has played an evident role in the residential property market for a long time and this is commonly believed to influence the private residential property prices. Hence, this study attempts to analyze empirically whether and to what extent the private residential property prices are affected by the government policies.

1.2.2 Objectives of the study

There are three main objectives of this study:

- To examine the general relationship between the government policies and the private residential property prices while various macroeconomic factors are being taken into account.

- To identify the major government policies and the degree to which they influence the private residential property prices in the past two decades using regression models.

- To analyze and elaborate the impacts caused by these identified dominant factors or policies on the private residential property market in Hong Kong.

1.3 Structure of study

The framework of this study is divided into eight chapters. This introduction chapter is followed by a chapter of literature review, in which the previous academic studies related to this study are illustrated. Chapter 3 gives an introduction to the private residential property market in Hong Kong from early 1980s onwards. This offers the readers a general understanding to the background and performance of the private housing market in Hong Kong.

Then, various kinds of the government interventions related to the private residential property market will be studied comprehensively in Chapter 4 before the empirical analysis in this study is carried out.

In Chapter 5, the methodology of this study is put forward and illustrated in detail, while the empirical model of this study will be specified and explained in Chapter 6. The expectations of the empirical results and the detailed steps in achieving the results will also be included in Chapter 6. The empirical results of this study will be shown in Chapter 7. Analysis and implications of the findings will also be given in the same chapter.

Finally, the main findings and observations in this study, together with the limitations and further study areas of this study, will be concluded in Chapter 8.

Chapter 2 Literature Review

2.1 Introduction

As the residential property market is one of the pillars of the whole economy, people are getting more and more concerned about the drastic movements or fluctuations of the property prices. Numerous studies have been done to investigate its trends and behaviors throughout the past few decades. It is believed that there should be some relationships between the performance of the residential property market and the environment of the Hong Kong economy, especially with regards to the government policies. Before going into the empirical model of this study, a literature review about the studying field would effectively give a clearer pre-view to all readers.

In the following part, studies about the factors affecting the residential property prices are reviewed. Moreover, research about the government interventions in the housing market and their impacts on the residential property market will also be considered.

2.2 Studies on private residential property prices

2.2.1 General views on residential property prices

Many economists have developed different models to analyze and examine the determinants of the housing prices for years. Theoretically, according to the laws of demand and supply, the market price is set by the market mechanism if there is no external interference from the market. In other words, the price is directly related to the demand and supply forces in the market. So, residential property prices can be investigated through the macro or microeconomic factors which affect the demand and supply of the residential property market. Macro and microeconomics are the two

different points from which the economy is observed. For instance, macroeconomics looks at the total output of a nation and the way the nation allocates its limited resources. Conversely, microeconomics, while looking into similar issues, focuses on the level of the individual people and firms within the economy (Investopedia Inc., 2005).

In the investigation of private residential property prices, microeconomic factors are those which are related to the attributes of the property itself such as its age, location, size, height and facilities. A lot of studies can be found in this area. For example, Chau *et al.* (2001) indicates that the private housing price is significantly affected by the "luckiness" of the flat's floor number during property booms. On the other hand, Sirpal (1994) finds that the improvement in nearby shopping arcades would have a significant positive impact on private housing prices. Greenstone (1998) puts forward that the air quality matters and the extent of pollution in an area significantly influences the area's housing prices. Bowes (1999) uses a housing price hedonic model to estimate the direct price effects of railway stations and the price effects of higher crime and increased retail service on the housing market. Moreover, Cheung *et al.* (2004) indicated the private housing prices are highly related to the frequently of transaction of that properties. So, he had shown the factors which affect the transaction frequency or the intensity of a housing unit and treated them as the fundamental elements which influence the housing prices mutely. However, investigation from the microeconomic point of view usually only focus on one or two chosen types of residential properties which have certain characteristics different from others.

Macroeconomic factors are factors from the environment or the society, such as the economy of the city, the population, interest rate and income rate. Investment Property Databank and University of Aberdeen (1993) indicates that there is a close relationship between the demand for housing units in the market and key macroeconomic factors such as the employment rate and income rate. Moreover, Apergis (2003) puts forward the view that macroeconomic variables have significant dynamic effects on the residential property prices in the housing market.

In this study, the private residential property prices will be investigated through the macroeconomic points of view since this study is aimed to analyze the performance of the all private residential properties in the market as a whole. It is inevitable that the property market is closely related to the environment of the whole economy. In addition, the targeted study area of this study is about the government intervention in private housing prices, in which, since government intervention is classified as a kind of macro-economic factors. Therefore, the study will be carried out in the macroeconomic level of investigation.

2.2.2 Macroeconomic factors affecting private residential property prices

As mentioned above, the determination of price is driven by the demand and supply force. Therefore, in order to study the performance of private residential property prices, the factors which affect the demand and supply for private residential properties in the market should be studied. Hence, macro-economic factors which affect the private housing prices can be classified into two groups, the demand-side factors and supply-side factors. Basically, there are many studies previously done in

this area that investigate how these two groups of macro-economics factors affect the private residential property prices.

2.2.2.1 Studies on demand-side factors

According to report done by the UBS Securities research arm (1998), the top seven factors affecting the residential property prices of Hong Kong are, in order of importance: unemployment, bank financing, income growth, vacancy rates, real interest rates, domestic economic growth and mainland economic growth (Lo, 1998). This research shows that the above factors do significantly vary with the market demand for residential properties. Tse *et al*. (1999) examines the role of population growth, inflation and interest rate in determining private housing prices (Tse *et al*., 1999). Ho (2002) finds that not only the household income, interest rate, mortgage arrangements and employment conditions are highly correlated to the private residential property demand and prices, but also the economic conditions and disturbances from political events within the region.

Besides the reality that private housing market in Hong Kong has always experienced sharp swings due to the condition of the economy, private housing markets in other foreign countries also have similar state of affairs. In fact, a number of studies concerned with the relationship between the private housing prices and the macro-economic factors can be found. Lamb (1999) examines the effects of national factors, which influence the demand for private housing such as mortgage rate, population, employment and income, on the private housing prices in different regions of the States. Paloma (2003) finds evidence of the existing relationship between the housing

prices and economic and demographic factors that are demand determinants such as wages and migrations to explain price formation in Spanish cities.

Based on the various research quoted above, there is considerable consensus about the general determinants of demand, at least in the long run. To summarize the factors which are commonly accepted as the determinants of the demand for private housing, they are the economic growth (GPD), income rate or income growth, unemployment rate, demographic factor, mortgage rate and stock market performance. All of them are highly accepted to have influences on the private housing prices concurrently.

Economic growth (GDP)

Economic growth is a measure which reflects the overall market performance of a territory. It is believed that the economic situation and atmosphere of an economy could significantly influence the consumption behaviour of different households, especially in the housing market. Hui[2] points out that the demand of housing is affected by two factors: population growth and economic growth, in which, the economic growth is a key factor. According to a survey done by him, about 30-40% of the demand for properties was induced by the positive economic growth recently. In addition, the survey also shows that if the economy is good, expatriates will come to Hong Kong and this will lead to an increase in demand of private properties (People's Daily, 18/1/2002).

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[2] John Hui is the president of the Hong Kong Institute of Real Estate Administration

Income

Income is one of the useful measures to investigate the wealth level of the market. The wealth level of citizens could directly reflect their affordability to purchase residential properties. Fahey (2004) puts forward that the increase in real disposable income is one of the main factors which drive the housing market to boom.

Population

Shoemaker (1987) describes several procedures and ways to assess the housing needs in a territory. In this study, he suggests that the demographic information should be gathered to determine population size since it is significant in affecting the housing demand and also the housing prices.

Unemployment rate

According to UBS Global Research, there was an analysis of local residential property trend which has shown that the property prices were moved primarily by unemployment rates. In addition, in a basket of property-affecting factors, unemployment rates had the highest correlation with property prices (Lo, 1998).

Mortgage rate

Property prices are highly related to the interest rate or mortgage rate in bank since these can influence the demand of the property. For interest rate, Fu (1995) explains that the rapid rise of property price during 1991-1994 was induced by the negative real mortgage interest rate. In other words, the saving interest rate in the bank was lower than the inflation rate. Keeping money in the bank would depreciate the value

of wealth. Therefore, people were willing put their money in some investments such as the real estate investments.

In addition, mortgage rate is significant in affecting the private housing prices since there are an increasing number of households who are involved in mortgage activities when they purchased them. In aggregate terms, residential loans in Hong Kong in the 1990s accounted for over 20 per cent of all financial institutions. By contrast, this share was only 10 per cent in the early 1980s. Besides, the outstanding residential mortgage loans as a percentage of GDP rose from 11.4 per cent in 1984 to 29.2 per cent in 1994 (Tse, 1996c).

Stock market performance

Tse and Webb (2000) examine the impacts of real estate stock prices in Hong Kong. In the study, they point out real estate-related firms account for over 30% of Hong Kong's stock market capitalization, Therefore, the real estate markets are potential major determinants of changes in real estate stock prices. By carrying out different investigations, this study indicates that residential prices and the expected rate of inflation are significantly linked of the change in real estate stock prices for Hong Kong.

2.2.2.2 Studies on supply-side factors

Monk *et al.* (1991) points out that the determinants of the supply of housing are a complicated matter since houses are durable goods. Therefore, the supply of new housing together with the amount of existing housing stock may affect the private housing prices concurrently. Besides, there are many factors that may influence the

developers to develop new housing projects. Charles (1977) designates that the supply of new housing is affected by the construction costs, availability of credit, availability and profitability of other work, seasonal factors and bottlenecks in the building process. In Hong Kong, most of the studies of supply side issues are related to land supply and construction cost.

2.2.3 External forces obstructing market mechanism

Theoretically, the private housing prices are determined and set by the market mechanism as discussed. However, this statement is true only if there is no external, impedimental force acting on the market. In reality, in addition to the demand and supply forces from the market, price determination is always affected by others factors outside the market. The private housing market in Hong Kong is a good example; it experiences a series of interventions from the government which deteriorates the market mechanism in determining prices.

2.3 Presence of government intervention

In Hong Kong, there is an "invisible hand" in the housing market which can significantly affect the demand and supply of the market. This control force is widely known as the government intervention. According to Von Mises (1964), the reason for having government to intervene in the market is because individuals and private entities would misuse the resources. Thus in order to prevent such outcome, governmental orders and prohibitions would help to regulate and control imbalance of resource allocation and market price of goods and services. During intervention, the government should interfere with all those actions of the businessmen which it

considers as detrimental to the public interest; in other respects, however, it should leave the market alone (Von Mises, 1964).

Accordingly, as documented by Chan and MacPerson (1997), the reason for the high level of government intervention in the housing market is mainly because of the incapability of the private sector to meet the basic housing needs of general public. Numerous evidence can be found in the past few decades to show the government's actions in the housing market, for example, the announcement of a Ten-year Housing Programme to provide housing for 1.8 million people in 1972 and the establishment of new Hong Kong Housing Authority (HA) to co-ordinate public housing matters in 1973 (MacPherson and Chan, 1997).

2.4 Impacts on private residential property prices by government policies

According to Chu (2001), although the external factors are important in influencing the housing market, government intervention also plays a crucial role in affecting the property cycles and property prices. Moreover, she also finds that the government's involvement in the housing market has become more active and intervened in wider aspects since 1990 which leads to several fluctuation on private residential property prices.

Wong (2001) analyzes the impacts of government intervention on the housing market in the period 1990-2000. The study indicates that different modes of intervention related to the property market which is introduced by the government do have impacts

on the private housing market. A regression model was used in her study to show the effectiveness of different government policies in affecting the private property prices.

Many analysts claim that the price escalation in the residential property market is caused by some of the government policies such as land sales policy. Peng and Wheaton (1994) uses a multi-equation aggregate housing model to show that restrictive land supply policy in Hong Kong has caused higher housing prices but not lower housing output. They argue that the restrictions on land sales would lead to an anticipation of decrease in overall land supply, thus, the prospect of increase in future housing rent would be rationally capitalized into higher current housing prices.

However, Lai (1993) states that the effective government intervention in the private housing market could help to cool down the high-rise private housing price. She also claims that the allegation of the Government's "high land price" policy leading to high housing prices could hardly stand, at least not in short term (Lai, 1993). Tse (1998) shows that there is no causal relationship between land supply and housing prices by estimating the annual data of Hong Kong's public land sales. Furthermore, Lai (1995) puts forward that the housing market is still characterized by keen competition. The property prices are left to be determined by the market mechanism which has not been deteriorated by government's acts although the huge monopolistic power of the Housing Authority has policy priority to take new land and a market share of more than 50% for the new units.

In Singapore, the similar situation exists in their housing market. Phang & Wong (1997) indicated that several government policies have great impacts on the private

housing prices. In their study, it is proved that the private housing prices in Singapore are highly correlated with the prices for public-sector-built housing and the timing of the implementation of government policies relating to the liberalization of rules on public housing ownership criterion (Phang and Wong, 1997). Alternatively, Hannah *et al*. (1993) argues that a substantial part of the rapid increase in urban housing prices in Korea is led by the improper land allocation policy of its government.

2.5 Summary of the literature review

In conclusion, the private housing market in Hong Kong is intervened by the government. As a consequence, the private housing prices are determined by the demand and supply forces together with the government controlled forces.

Although certain amount of research have already been done to study the impacts of government policies on the private residential property prices, only a few number were done by econometric approach. Besides, as the government has implemented several crucial policies which were aimed to the restore the confidence of the public and investors in the property market recently, it is worth studying the topic in order to examine the outcome of these policies. To the best of the author's knowledge, there is no similar research that has been done in the previous two years in Hong Kong.

Therefore, this study is will give a comprehensive study to examine the effects of government policies on the private residential property prices in Hong Kong with an econometric analysis.

Chapter 3 Private Residential Property market

3.1 Introduction

The private property market is one of the most important sectors in the economy of Hong Kong. In particular, the residential property prices have important implications on the macro-economic and fiscal stability due to its vital role in Hong Kong.

In Hong Kong, property ownership is understood and proved to be an inflation-resistant investment as well as an effective wealth accumulation vehicle, at least during the period 1987-1997 (Lee, 2003). Therefore, residential property is the most important form of savings for many households. According to the Quarterly Bulletin from the Hong Kong Monetary Authority (2001), about half of the domestic credit in the banking sector currently is comprised of mortgage loans for the purchase of private residential properties and loans for building and construction, property development and investment. Besides, real estate-related firms account for over 30% of Hong Kong's stock market capitalization, and ten of the top twenty companies listed are real estate or real estate-related companies (Tse and Webb, 2000). As a result, fluctuations of the private residential property prices and rents would influence the financial sector and also the economy of the whole region.

In this chapter, an introduction to the private residential property market in Hong Kong will be given as a background of this study. Various kinds of factual information of this market will also be specified, followed by an illustration of the performance of the private residential property prices in the past 20 years.

3.2 Factual information of the private residential property market

In order to gain a preview and some background knowledge about the situations of the private residential property market in Hong Kong, some factual information will be stated to introduce the market. The stock, annual production as well as the population distribution in private housing units will be included in the following section.

3.2.1 Stock of private housing units

In Hong Kong, among the three types of permanent housings, i.e. public rental housing, subsidized saleable housing and private housing, private housing makes up majority, occupying about 54% of the total stock of permanent housing. At the end of 2003, the stock of private housing has reached 1,258,000 units. Figure 3.1 shows the market shares of these three types of housings.

Figure 3.1 Stock of Permanent Housings

☐ Public rental housing
■ Subsidized saleable housing
☐ Private housing

no. of flats ('000)

[Source: Hong Kong Housing Authority, HKSAR]

- 17 -
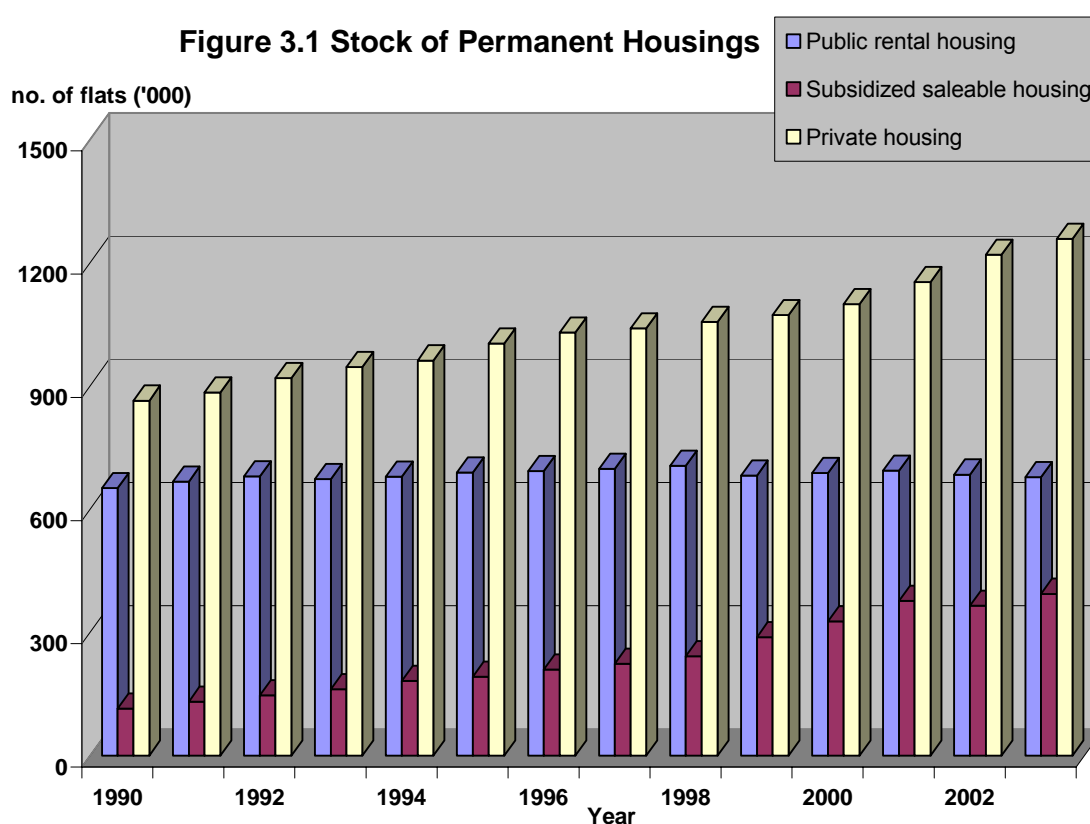
3.2.2 Annual production of private housing units

The statistics of annual production of differnet types of housing are shown in Figure 3.2. Essentially, the number of private housing units produced in each year is subjected to fluctuations since it is controlled by the developers in private sector. It was found that the annual production of this housing type was high in the early 90s but the production rate slowed down in the mid-90s. This has led to a shortage in private residential property. Nevertheless, the number of newly completed private housing units rises again from late 90s and which is the largest among the three types of housing in the past three years.

Figure 3.2 Newly completed residential flats
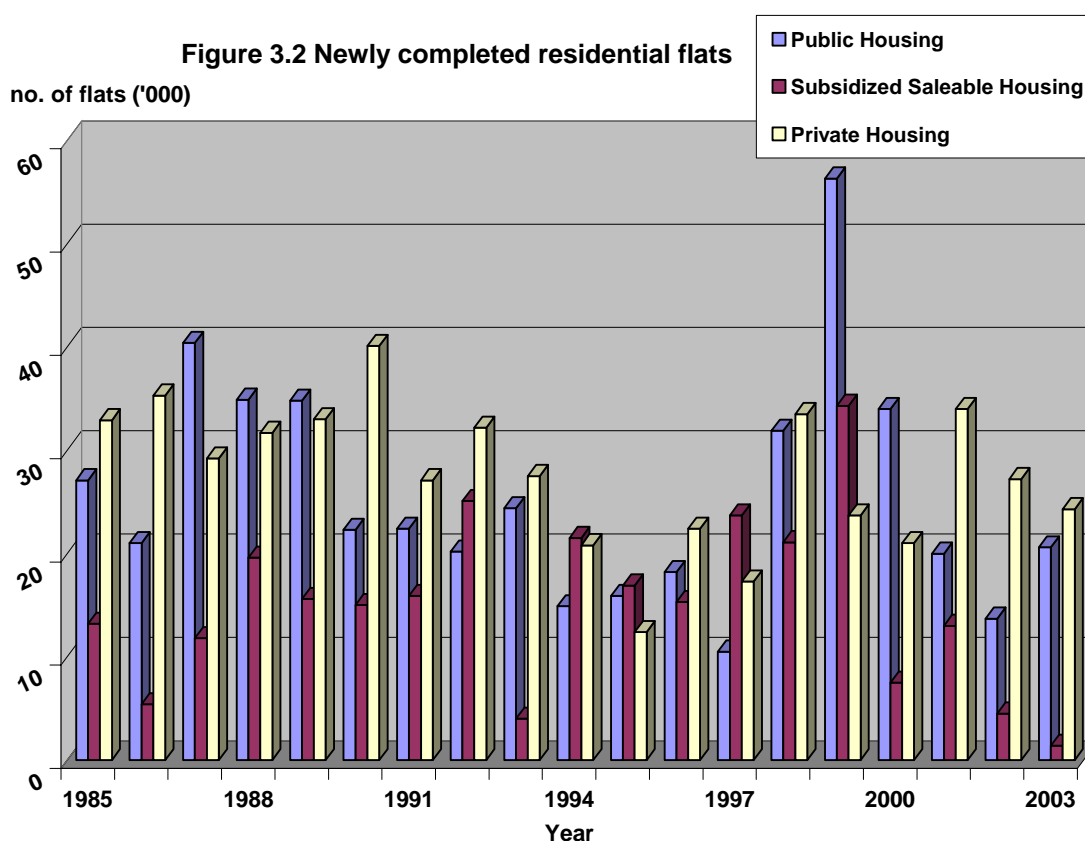
[Source: Hong Kong Housing Authority, HKSAR]

3.2.3 Population distribution in private housing

According to the surveys done in the Population Census, it was found that the proportion of population living in private permanent housing units is increasing. As shown in Table 3.1, about 46.9% of population was living in private housing in 1996. However, this market share was increased to 49% in 2001. This indicates that about half of the population in Hong Kong resides in private housing units.

Type of Housing	1991		1996		2001	
	Number	% of total	Number	% of total	Number	% of total
Public rental housing	2 234 565	40.5	2 391 857	38.5	2 135 624	31.9
Housing Authority subsidized sale flats	415 540	7.5	691 895	11.1	1 080 377	16.1
Housing Society subsidized sale flats	2 587 287	47.0	17 117	0.3	51 315	0.8
Private permanent housing			2 912 626	46.9	3 284 001	49.0
Temporary housing	197 767	3.6	124 617	2.0	72 035	1.1
Non-domestic housing	76 020	1.4	69 254	1.1	79 142	1.2
Total	5 511 179	100.0	6 207 366	100.0	6 702 494	100.0

Table 3.1 Population by type of housing in 1991, 1996 and 2001

[Source: Census and Statistics Department, HKSAR]

3.3 Performance of private residential property prices in 1985-2004

In the past twenty years, the private residential market experienced its booms and busts. The movement of the prices of average private housing is illustrated in the Figure 3.3.

(1984, Q3 = 100)   **Figure 3.3 Private Residential Price index**
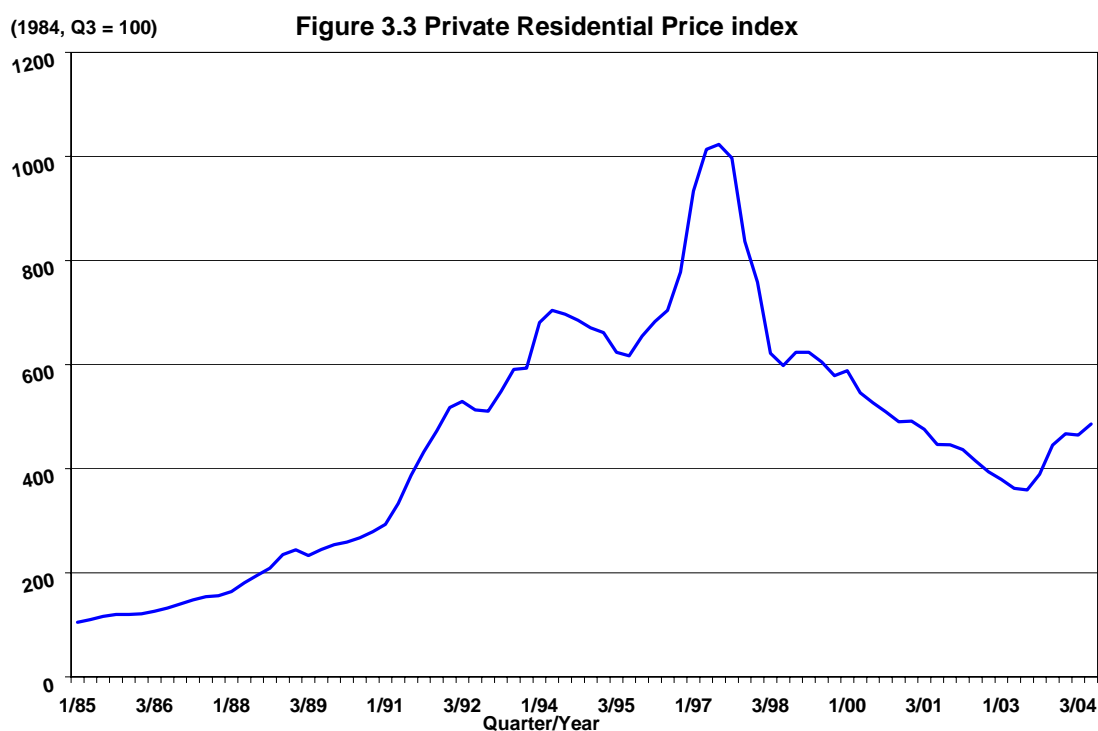
[Source: Rating and Valuation Department, HKSAR]

The private residential price index is derived from the weighed average prices of different types of private properties in the market. This index is designed to measure the price change with quality kept at a constant.

From Graph 3.4, the cycle of the private housing market is lucidly illustrated. It can be observed that the private housing prices experienced a more than ten times increment between 1985 and 1997. This growth was extremely fast since the start of 1990s. However, the market collapsed and prices dampened severely in the mid-1997

due to the Asian Financial Crisis. The private housing prices fell continuously and met the trough in 2003. Since then, it was shown that the market has started to recover and is moving up in a moderate pace up to the present. In the following section, the movement of the private residential property prices in these two decades will be explained in detail.

3.3.1 Growth years from 1985-1991

After the Sino-British Joint Declaration[4] was signed in the late 1984, the confidence to the future of Hong Kong was restored in most people. The private property market started to recover and had a continuous moderate growth. In 1987, this growth rate was speeded up since an optimistic climate was created by the China Factor[5].

Although there was a minor downfall in the growth of the private housing prices in mid-1989 due to the Tiananmen massacre in China, the prices rose more rapidly subsequently. This is attributed to the buoyant economic situations in Hong Kong generated by the announcement of the new airport project plan at Chek Lap Kok and the increasing stability of the economy after the Gulf War.

In January 1991, the prime interest rate was further reduced. This attracted people, especially speculators, to enter the private housing market. As a result, it led to an unprecedented increase in private housing prices in which the residential price index rose by 33% in only two months.

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[4] These documents are the outcome of two years of negotiations between the two Governments, the Governments of the United Kingdom and of the People's Republic of China, undertaken with the common aim of maintaining the stability and prosperity of Hong Kong.
[5] In 1987, as one of the critical step in the "Open door policy", China started to prepare to enter the World Trade Organization (WTO).

3.3.2 Skyrocket Years from 1992-1997

The soaring prices in private residential property market rose government's concern on the speculation activities in the market. In the late 1991, the government had taken some actions, such as the imposition of levy stamp duty on property transaction, to dampen the speculation activities. However, these actions did not reduce the property prices significantly and only caused to a minor fall within a short period in 1992 because of the favorable economic situations at that time. Therefore, residential property prices continuous to experience an expeditious growth until the mid-1994.

In June 1994, the government implemented an "Action Plan" which was aimed to depress the speculation activities in the property market. A series of anti-speculation measures were imposed, this significantly cooled down the market and led to a decrease in private housing prices for a few quarters.

However, the private housing market recovered soon after the announcement of reduction in Best Lending Rate at the end of 1995 and the relaxation in anti-speculation measures in 1996. Owning to the optimistic atmosphere in the economy of Hong Kong, the housing prices rose again from 1995 to 1997 at an amazing pace. Finally, in the mid-1997, the private housing prices reached the lofty crest that had never been reached before.

3.3.3 Nosedive Years from 1997-2003

The glamorous residential property market was vanished by the Asian Financial Crisis in the last quarter of 1997. During the Asian Financial Crisis, almost every Asian economy was stroke hardly through the substantial downward pressure on stock

markets and real estate, upsurge in interest rates, inflation and rising unemployment. Although Hong Kong did not experience sharply depreciated and highly volatile exchange rates due to the linked exchange-rate with US dollar, it did experience a downturn in its economy.

The residential property market was one of the most destroyed markets in Hong Kong. The private housing prices dived by more than 60% within a year. This turned the properties owned by many households to negative equity and investors' confidence towards the property market was lost completely due to the sluggish atmosphere of the economy. Although the government had carried out different policies which aimed to boost up the property market gradually, this was almost helpless since the market was seriously affected. Therefore, the property prices dropped continuously until the start of 2003.

3.3.4 Revival Years from 2003 to the present

Over time, the sentiments brought by the Asian Financial Crisis were diminished. The economic conditions in Hong Kong have improved distinctly in the second half of 2003. The unemployment rate fell to 8% in the third quarter of 2003 from a peak of 8.7% in the second quarter. Real GPD recovered significantly in the third quarter of 2003, with real GDP increased by 8.2%, compared with a rise of 3.3% in the second quarter. For the residential property market, a sign of recovery was observable from the slow upward movement of residential prices.

Chapter 4 Government Intervention in Private Residential Property Market

4.1 Introduction

Before 1954, the residential property market was entirely manipulated and supplied by private sectors. However, due to the political instabilities in the mainland, a huge number of refugees kept immigrating to the Colony which led to an explosion in the population of the Colony[6]. At that time, there was a serious shortage in housing as the private sectors were incapable of building enough housing units to meet the ever-growing demand. Triggered by a serious fire in 1953, the government finally started to intervene in the housing market and set up the Housing Authority in 1954 to construct fast track public housings.

At that time, the intention of the government was to solve the housing shortage and to provide affordable accommodation for the needy. Chiu (2003) points out that the producer-subsidy approach was adopted by the government, of which the direct provision of public housing by the government is one form. As argued by Howenstine (1986), this approach is the most effective way to solve housing shortage and clear slums. Although the government intervention has been intensified since then, the private housing market was not significantly affected by it since the target groups of public housing and private housing were distinct. Nevertheless, this situation had been changed since the late 80s.

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[6] The population of Hong Kong was doubled from 1.8 million to 3.8 million in 20 years, 1948-1968.

In the past two decades, the government has implemented various policies to intervene the housing market, in which, some of them were done with intention while some were not. For instance, the government had carried out some measures to cool down the price escalation of the residential property market before 1997 and it also concerned the promotion of home ownership to the middle-income group at that time. However, since the economy is sluggish these years, the government then executed a series of policies which was aimed to boost the market. Accordingly, the objectives of the government in the past two decades are twofold - increasing home ownership and stabilizing property prices in the near and longer term (Lee, 2000).

Before moving to the analytical model of this study which investigates the effects of government policies on the private housing prices, the government policies which are directly or indirectly related to the private housing market in these two decades will be studied in this chapter.

Fundamentally the prices in private housing market are set by the demand and supply of housing in the market. However, government intervention seldom impede the prices directly, instead, it would interfere the demand and supply of housing. As proposed by Chu (2001), government intervention can be studied from two aspects, i.e. the production and consumption aspects of the private housing market.

4.2 Government intervention in production aspect

In the private residential property market, supply of private housing units is decided and planned by developers in private sector. As mentioned before, the production considerations of the developers are usually the construction costs, availability of credit, availability of resources and profitability of the work. However, even though there is no policy or quota set by the government to hinder the supply of private housing units during the years, intervention in the production factors of private housing does circuitously influence the private housing supply and thus, the private housing prices.

On the whole, the government exercises different policies on supply of land, which is a key factor of private housing production.

4.2.1 Land supply

In Hong Kong, nearly all land is leased or otherwise held by the government. Under the leasehold system, the government is the largest landlord who can dominantly control the amount and time of land supply for housing development. The time and amount of new residential land for sale are solely decided by the Housing, Planning and Lands Bureau in each year, while the Lands Department will carry out the process by publishing the timetable for annual Land Sale Programme. Moreover, new land is usually leased out in three methods, i.e. auction, tender or private treaty grant. The annual sale of land for private housing between 1985 and 2004 is shown in Figure 4.1. It is found that the amount of land supply for private housing development was quite unstable over the years.

Square Meters   **Figure 4.1 Land Sales for Private Housing**
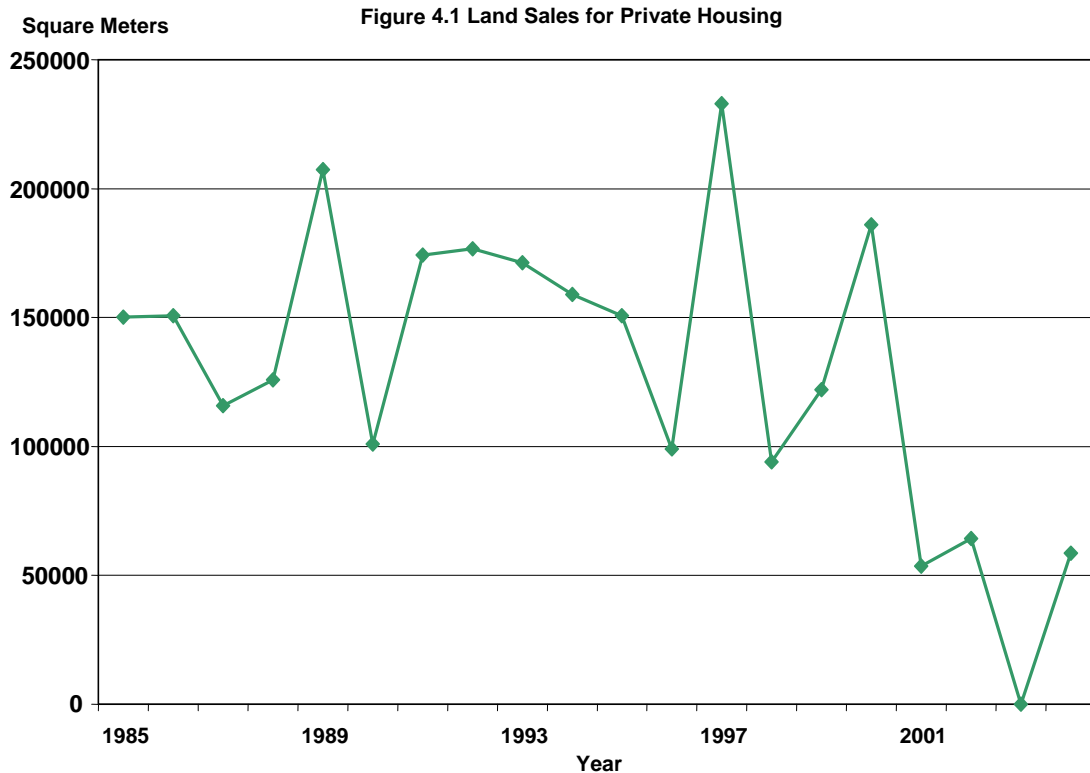
[Source: Lands Department, HKSAR]

Private sectors were placed at a feeble position such that they had no way to deal with the amount of land supply. Until 1999, the Application System was introduced. Under the system, the Lands Department will publish a list of sites available for sale upon application ('the Application List'). The Application List contains information on lot number, location, use, site area, and the estimated earliest available date for each of the sites. Interested parties could then apply for the sale of the sites from the Lands Department with the indication of the "minimum price" that they are prepared to bid. If the "minimum price" is accepted, the particular sites will then be disposed through public auction or tender[7]. The Application System is well accepted by many people in the private property market since it was introduced because it can give flexibility to

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[7] The method of disposal is determined by the Lands Department, details about the determination of disposal methods can be found on the website of that Department.

the land sale programme by allowing the market to determine the timing, amount and type of land required in the territory (HPLB, 2002).

However, evidence shows that the control by the government on land supply is still strong and dominant. In the past ten years, the government has carried a series of policies which had created great impacts on the residential property prices. For example, based on the "Action Plan" which aimed to cool down the soar private housing prices in 1994, several policies were imposed. For example, the government had decided to increase the land supply by 15 ha in 1994/1995, which was 28% more than the provision amount of that year and about 10,000 additional flats could be produced by this increment of land supply (PELB, 1994). Consequently, these policies did cause a sharp fall in the private housing prices at the end of 1994.

On the other hand, in response to the post-1997 slump of the private housing market, the government had suspended the land sale programme for twice in 1998 and 2003 for 10 months and 13 months respectively. These suspensions were aimed to stabilize the private property market and restore public confidence in the property market as speedily and effectively as possible (Suen, 2002a). In addition, all the new land is only supplied through the Application System since 2004.

There is evidence which shows that these suspension policies did have influences on the private housing prices. For instance, after the removal of "Suspension of land sale" policy in 2003, the government had fetched HK$ 14.12 billions from selling two residential sites at post-1997 highest record prices in the third land auction in 2004, in which the closing prices of these two sites were 76% and 48% above their starting

bids (Chan, 2004). Moreover, in 2004, the government had raised HK$ 17.82 billions from land sales and the estimated revenue from land transaction was about HK$ 12 billions, which was the largest amount since the 1997-98 fiscal year (Lau, 2004).

Therefore, the government has taken an active role in interfere the supply of private housing through the restrictive land supply.

4.3 Government Intervention in consumption aspect

The demand for private housing is another crucial element to determine the prices. Thus, government intervention in altering the demand in the market does influence the consumption performance in the private housing market and also impede the movement of private housing prices. Basically, the stock in the private housing market is mainly consumed by two types of buyers, home buyers and property investors. For the home buyers, the major concerns of their home-purchasing is the affordability and total cost of purchase, while profitability of the investment the property investors.

On the whole, the government has implemented various policies which are claimed to affect the consumption of private housing units in the market directly and indirectly. Anti-speculation policies and loan assistant schemes are considered as direct intervenient policies, while the supply of subsidized saleable flats through Home Ownership Scheme or Private Sector Participation Scheme is considered as indirect intervenient policies.

4.3.1 Anti-speculation policies

In the early 90s, the private residential property prices experienced a sharp increase due to the keen speculation activities and the shortage of supply in the market. The government then intervened in the market and wanted to bring the unhealthy prices down.

In early in 1991, the government first intervened in the market to cope with the speculation problem. A few measures were done to dampen speculation. For example, legislative amendment was carried out to levy stamp duty on the sign of every agreement for sale and purchase during property transaction. Besides, the government had successfully persuaded the largest banks in Hong Kong to reduce the amount that they would extend for each home loan to 70% of the property's value from 90% previously (Stine, 1991). These actions by the government did bring the property prices down, but only for a few months.

In the mid-1994, the private housing prices again rose at an amazing pace that induced a rapid growth in inflation and unsteady market atmosphere. The government intervened in the market again, however, with a package of well-planned measures to dampen property speculation. During this intervention, a committee was set up to formulate measures to tackle the problems. On 8 June 1994, the "Action Plan" related to the property prices and housing supply was announced. Two of the major anti-speculation measures adopted were:

- The quota for private sales of uncompleted flats was cut from 50% to 10% which could release up to about 10,000 units of private housing to home buyers in each year.

- The initial deposit was increased from 5% to 10% of purchase price.

The government at last succeeded for the first time in curbing speculations in 1994. The private housing prices by 20% and the keen speculation activities was dampened consequently (PELB, 1994).

In 1998, in order to boost up the activities in the ailing private housing market affected by the Asian Financial Crisis, the government had removed the anti-speculation measure which was imposed in 1994. The amount of deposit a property buyer has to pay upon signing a preliminary agreement was reduced from 10% to 5%. Moreover, it had removed the minimum 20% on the total purchase price that buyers have to pay after signing the formal transaction agreement. The home buyers benefited from this measure because they were not required to pay a sizable amount of deposit in advance to secure their mortgage loans from banks (Wong, 1998).

All in all, the implementation of anti-speculation measures dampened the demand of private housing from both of the investors and home buyers since these measures increased the cost of property transaction. Therefore, these policies had placed significant effects on the private housing prices.

4.3.2 Loan Assistant Scheme

According to the 1987 Long Term Housing Strategy (LTHS), the government targeted to boost home ownership by introducing various kinds of schemes. Home Purchase Loan Scheme (HPLS) was one of the backbone scheme produced after the introduction of LTHS. This scheme was introduced in 1988, as a dual strategy to

utilize the forecast surplus production capacity of the private sector from 1990 onward and to satisfy the outstanding and increasing demand for assisted home purchase between 1987 and 2001 (Chiu, 1997). The essence of the HPLS was that families who meet the income and other criteria for the purchase of HOS/PSPS flats would be given the alternative to choose to purchase their homes in private housing market. Successful applicants of the HPLS could receive an interest-free loan to cover part of the down-payment costs for the purchase of a flat in private market.

Initially, this scheme was well-accepted by the private sectors since this scheme would not cause any competition against the private housing, instead, it encouraged the consumption in private housing market.

However, this scheme could not significantly altered the demand for HOS/PSPS flats to the private housing market as it was found that the amount of loan offered was insufficient to rise the affordability of the needy families. The reason for the failure was due to the fast growing pace of the private housing prices in the early 90s. After the review on this scheme in 1992, the government decided to increase the loan amount slightly in other to make the scheme became more realistic (HKHA, 1992).

On the other hand, a similar loan assistant scheme was launched in 1993. The Sandwich Class Housing Loan Scheme (SCHLS) was introduced which provide low-interest loans to lower-middle and middle class households for immediate purchase of private housing. The result of this scheme was quite satisfactory since about 92% of the quota was filled in three years after the promotion of the scheme (Chiu, 1997).

However, this scheme was abolished in March 1998 due to the reallocation of resource.

In 1998, as the private housing market was affected by the Asian Financial Crisis, the private housing prices were dropped to a more affordable level. Therefore, there was an upsurge in HPLS applications in mid-1998 (HKHA, 1998). The number of loan granted was increased to 8,692 in 1998/1999 from 550 in 1988/99. And based on the survey conducted by the Housing Authority about the applicants of HOS and HPLS in 2001, the HPLS did help finance a major portion of the down-payment for successful applicants. The median down-payment to price ratio for these applicant was 70%. Finally, in 2003, the HPLS was replaced by the new Home Assistance Loan Scheme (HALS) which was aimed to assist low to middle income family to acquire their homes.

Series of loan assistant schemes offered by the government increase the affordability of the middle-class households and encourage them to buy home in the private housing market. Although the results were only fair, the government had played a role in the private housing market and varies the consumption.

4.3.3 Subsidized salable flats supply

The two subsidized home ownership schemes, Home Ownership Scheme (HOS) and Private Sector Participation Scheme (PSPS) were introduced in 1976 and 1978 respectively. The initial intention of these schemes was to provide affordable housing to the middle-income groups in order to achieve higher rate of home-ownership. The HOS flats are constructed by the government through the Housing Authority, while

the PSPS flats are produced by the private developers but leave the process of allocation of flats to the Housing Authority.

Through the years, these two schemes are carried out smoothly and they are support by the middle-income groups. The annul production of the HOS/PSPS flats was increased from 5,000 units in 1980s to about 14,000 units in early 1990s after the LTHS in 1987. Supply of HOS/PSPS flats is shown in the Figure 4.2 below.

Figure 4.2 Supply of HOS/PSPS Units
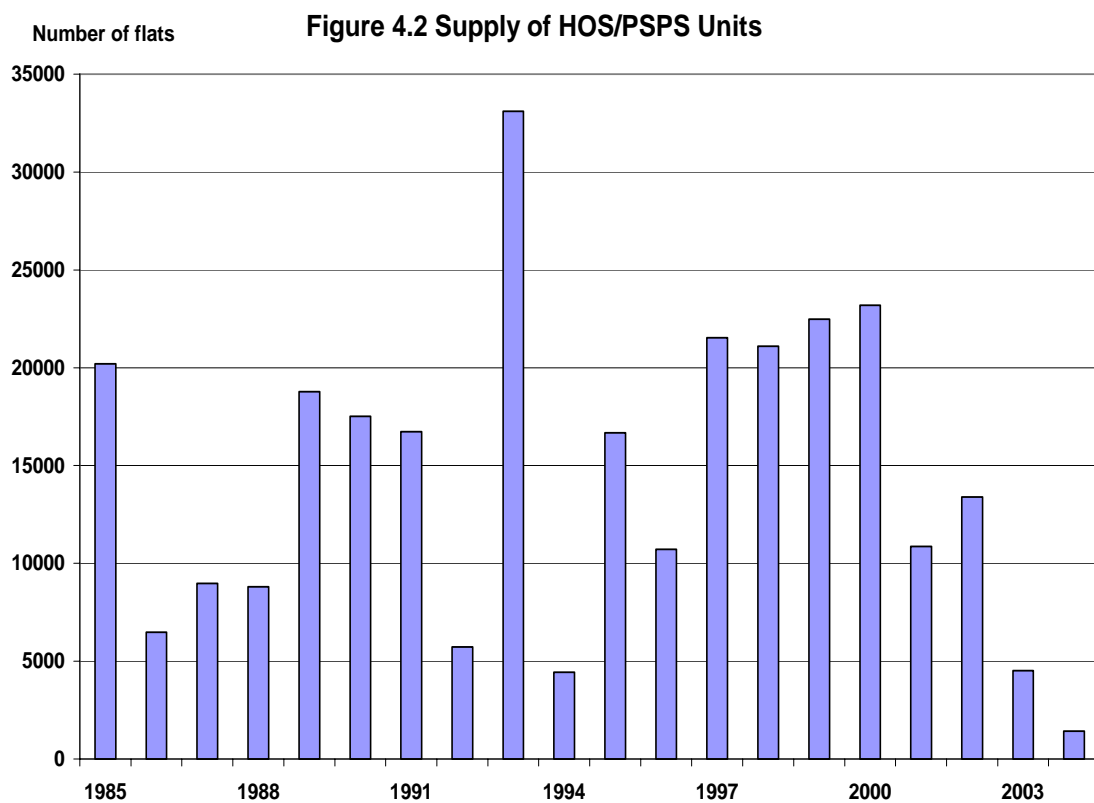
[Source: Hong Kong Housing Authority, HKSAR]

Usually, the HOS/PSPS flats are sold at a discounted price which is about 40% below the market price. Theoretically, this special offer would not compete with the private housing market since the target groups of these scheme are the middle-income groups, who are not financially unable to buy flat in the private housing market.

However, according to (Lee, 2003), the supply of HOS is now seen by the private sector as inappropriate government intervention in the private housing market, which is creating "unfair competition". Since the economic downturn after 1997, the private housing prices fell seriously and the private residential properties are now become much more affordable. For example, before the property crash in 1997, a typical HOS unit in New Territories was sold for around HK$1 million – HK$ 1.5 million while a brand new private unit was sold for HK$2 millions – HK$3 millions. HOS flats were not considered as a competitor by the developers back then because they catered for buyers from different segments. However, in 2000, in a same district a HOS unit was sold for around HK$0.7 million – HK$1 million, while the private housing unit for HK$1.2 million - HK$1.5 million. This time, the HOS unit and the private housing unit were competing against each other for the same group of buyers (Yip, 2001).

While Donald Tsang, the then Chief Secretary for Administration, admitted that there was overlapping between the target groups of the HOS and that of the private sector residential market. This overlap was growing as interest rates continue to fall (Tsang, 2001).

Indications were given out from the market continuously to allege that the supply of HOS/PSPS flats did impede the performance of the private housing market. To alleviate the problem of market intrusion by the public sector, the Authority agreed to the Government's request for halting all sales of HOS flats for 10 months form September 2001 to June 2002 and capping the sale of HOS flats thereafter to below 9000 units a year until 2005/2006. In support of this decision, it was decided that 12000 additional loans under the Home Purchase Loan Scheme should be provided in

two trenches, to make up for reduction in housing assistance opportunities to eligible households. In addition, suitable measures, which included the transfer of some 8000 home ownership flats to PRH, were taken to deal with the HOS overhung stock (HA, 2001). Moreover, the government announced the cessation of production and sale of HOS flats indefinitely from 2003 onwards, in order to stabilize the private housing market.

On the other hand, after 10 years from the date of first assignment, the HOS/PSPS flats were allowed to be resold in the open market after paying the government a premium and receiving the certificate for removal of alienation restrictions. In 1999, the government had relaxed the re-sale period of HOS/PSPS flats from 10 years to 5 years. It is also claimed that the secondary market of the HOS/PSPS flats would affect the private housing market as the relatively low price of these subsidized flats may compete with the private housing.

4.4 Summary of government intervention

All in all, after studying numerous of government policies carried out in the past two decades, it is found that the supply of land and supply of subsidized saleable flats are the most likely to have significant effects on the private housing prices. In order to prove their influences on the private housing prices, these two factors will be tested in the analytical model of this study.

Chapter 5 Methodology

5.1 Introduction

In terms of the objective of this paper, it attempts to find out the impacts of government interventions on the private housing prices (if any). It can be done by both extensive literature review and statistical models.

Recently, most of the studies in this area are done by extensive literature review approach (Chu, 2001 and Lai, 1993) instead of statistical approach. However, there are still two statistical studies in this area that could be found. The most significant example is the research by Phang and Wong (1997). They use a regression model to show the relationship between the government housing policies and the private housing prices in Singapore. Innovative approach is used in their study, i.e. timing of the implementation of various policies is quantified by dummy variables. After that, Wong (2001) follows their approach and makes a similar study investigating the situation in Hong Kong instead and aims to find out the impacts of government policies on the private housing prices.

In this paper, based on the methods used by the previous studies, the author modify some prior methods and have decided to use a multiple regression model to make quantitative estimates of economic relationships between the private housing prices and some chosen variables. Moreover, in order to find out the impacts of certain government policies on the private housing prices, another regression model, in which the chosen policies were quantified as dummy variable, was carried out. In the

regression models, the coefficients of variables are estimated with the Ordinary Least Squares (OLS), which is a technique to obtain the results.

In this chapter, the statistical methods used are introduced first. Then, measurements used to examine the fits of the estimated models and the significance of the estimates are explained and interpreted.

5.2 Regression analysis

Regression analysis is a statistical technique which tries to "explain" changes in one variable, the dependent variable, as a function of changes in a set of other variables, which are the independent or explanatory variables, through the quantification of a single empirical equation (Studenmund, 1987). For instance, in the below equation:

$$D = f(P_1, P_2, P_3) \tag{1}$$

D is the dependent variable while P_1, P_2 and P_3 are the independent variables. D is a function of P_1, P_2 and P_3 and the simple regression model of this is:

$$D = {}_0 + {}_1P_1 + {}_2P_2 + {}_3P_3 + \tag{2}$$

In addition to the independent variables stated in the equation, there is almost always variation that comes from other sources which cause variation in the dependent variable. So, is a stochastic error term which is added to the regression equation to introduce into the model all the variation in D that cannot be explained by the included Ps (Studenmund, 1987). So, the general form of the regression equation is:

$$Y = b_0 + \sum_i b_i X_i +$$

The simplest and most common method of estimating the parameters of the regression model is the Ordinary Least Squares (OLS) technique, which chooses estimates of the

coefficients (b_i) by minimizing the sum of the squared different between the actual values of Y and the estimated values of Y.

5.3 Model interpretation

After running the regression analysis, the partial regression coefficients (b_i), which are the coefficients of the independent variables, will be found and these coefficients measure the changes in the dependent variable associated with a unit change in X_i holding all other factors constant, i.e. when other things being constant, one unit change in X_i will cause Y to change in b_i units. In this paper, the relationships between the government policies and the private housing prices can be observed and analyzed by looking at these coefficients.

5.4 Model examination

Tests are required to ensure the fit of the estimated model. Measurements are also needed to monitor the accuracy of the founded coefficients. The followings statistics will be observed after computing the data sets in order to evaluate the significance and accuracy of the model.

5.4.1 The coefficient of Determination, R^2

This is a figure which indicates the proportion of variations in the dependent variable explained by the variations in the independent variables. It is often used as a measure of goodness of fit of the estimated model. It ranges from zero to one and the value of R^2 close to one shows a "good" overall fit of the estimated model. However, R^2 will increase continuously when more independent variables are added to the equation irrespective of whether these variables are significant.

So, the adjusted R^2, R^2 is used instead since it measure the proportion of variance of the dependent variable explained by the variances of independent variables. The degree of freedom[9] of the model will be taken into account, so, if the degree of freedom is small, the $\bar{R}^2$ would be adjusted downward.

5.4.2 F-Statistic

F-test is most commonly used to test the overall significance of a regression model and the significance of the R^2. It tests the null hypothesis in which none of the independent variable helps to explain the variations of the dependent variable about its mean and all the partial coefficients are equal to zero. By observing the F-statistic, if it is greater than the critical value from the Table of F-distribution, the null hypothesis would be rejected. So, in order to illustrate the estimated regression model is significant, it should find the null hypothesis is rejected (Wooldridge, 2003).

5.4.3 t-statistics and p-value

The t-statistics are commonly used to test the "significance" of the effect of the independent variable X_i on the dependent variable Y. Statistical significance means the probability that the statement "Y is affected by X_i" is true. The larger the value of t-statistic is, the higher the probability that b_i is non-zero, it implies the more accurate the estimate does.

Alternatively, p-values are usually be used to instead t-statistics because it shows the chance that the estimated coefficient is equal to zero. Usually, if it is shown that the chance of "b_i equals to zero" is equal or lower than 5%, it is said that b_i is significant

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[9] Degree of freedom (d.f.) associated with a calculated statistic is the number of available observations minus the number of constraints placed on the data by the calculation procedure

at the 5% level, which is commonly accepted as significant. The smaller the p-value is, the more significant the estimated coefficient is.

5.5 Statistical tool

The multiple regression models will be processed by computer software, EViews Version 3.0. After collecting and computing all the required data, the program would automatically run the regression analysis and also all the tests mentioned above. The results would be clearly in a table form.

5.6 Evolution of model

In part one of the empirical study, based on the literature review done in Chapter 2, a single-equation was constructed. The private residential property index (PRPI) will be regressed by some macroeconomic factors and some factors controlled by the government. The macroeconomic factors are believed to be the major determinants which affect the private housing prices and they are selected based on the previous research done in this field. Besides, key factors, which are controlled by the government and are believed to have significant relationship with the private housing prices, were also inserted to the equation. Once the equation had been decided, data of these variables would be collected. However, for those variables which cannot be measured directly, proxies would be used to represent them. After computing the collected data, relationship between these chosen factors and the private residential property index would be observed through the results.

In part two of the empirical study, the effects of certain government policies on the private residential property price were estimated by adding some dummy variable in

the regression model constructed in part one. According to the government policies review done in the Chapter 4, there are many discrete changes in government policies which are related to the residential property market over the past 20 years. In particular, some of the major policies will be chosen and investigation of their effects on the private residential property prices was done.

Once the results are obtained, the signs of the partial coefficients and the p-values of the independent variables will be recognized to study their effects on the private housing price, and to justify if they match with the initial expectations. Subsequently, the relative degree of influences of the significant independent variables would be further studied through comparing the absolute values of their partial coefficients.

Chapter 6 Empirical model

6.1 Introduction

Regarding the methodology mentioned in the previous chapter, the empirical model used in this study would be carried out in such way to find out the impacts of the government controlled factors and policies on the private residential prices. In this chapter, the empirical model of this study will be specified and illustrated in detail. After that, the anticipation of the results will be stated with justifications, while sources of data used will be identified in the last part.

6.2 Model Specification

In this study, the empirical study was divided into two parts and two issues were examined. Part one of the study investigated the effects of the government controlled factors on the private housing prices, while part two of the study investigated the impacts of the certain key government policies on the private housing prices. A time-series econometric model, multiple-regression model, was used in the study. The study investigated the variables series from the first quarter of 1985 to the fourth quarter of 2004.

Part I

In part one, although the aim of the study is to examine how the government controlled factors are affecting the private housing prices (if any), other factors which are not related to government intervention but have effects on the private housing prices would be considered together in the model. It would then maintain the integrity

of the model and the overall influences of the government controlled factors in determining the private property prices could be observed.

Basically, according to the literature review in the earlier chapter, the private housing prices are determined by the supply-side and demand-side factors. And for the situation in Hong Kong, it is also assumed that government controlled factors are also determinants of the private housing price. So, the private housing prices can be expressed as the following function form:

$$\text{Prices} = f(\text{Demand, Supply, Government controlled})$$

Thus, in the multiple-regression, the private housing prices were regressed by the above factors and the structure of the equation would be:

$$\text{Prices} = b_0 + \sum_{i=1}^{m} b_i\, D_i + \sum_{j=m+1}^{n} b_j\, S_j + \sum_{k=n+1}^{o} b_k\, G_k +$$

where b_0, b_i, b_j and b_k are the partial coefficients while the D_i, S_j and G_k are the demand-side, supply-side and government controlled factors respectively.   is the stochastic error term.

The model used the private residential price index (PRPI) to represent the average private housing prices and as the dependent variable. The PRPI excludes the all public housings such as HOS and PSPS, and it is the weighted average of the current prices of five classes of private properties[10] in Hong Kong. On the other hand, based on literature review in Chapter 2, the independent variables were decided and they were

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[10] According to the technical notes released by the Rating and Valuation Department, HKSAR, the private domestic units are sub-divided into five classes by reference to floor area, please see the details of classification in Appendix I.

classified into three groups as mentioned above. The independent variables included in the study were:

A. Supply-side variables

1) economic growth - measured by the quarterly real Gross Domestic Product (**GDP**);

2) mortgage rate - measured by the quarterly average mortgage rate (**MR**). These figure is built up by add 1.5% to the prime rate before 1999 but minus 2.25% from the prime rate from the first quarter of 1999 till now;

3) quarterly unemployment rate (**UNEM**) - which refers to the proportion of unemployed persons in the labour force;

4) population - measured by the number of Hong Kong residential population (**POP**)[11];

5) average income - measured by the quarterly Real Indices of Payroll per Person Engaged (**INCOME**)[12];

6) performance of stock market - measured by the quarterly Hang Seng Index (**HSI**) which is a barometer of the Hong Kong stock market;

B. Supply-side variable

7) private-sector supply of housing units - measured by the quarterly number of completed private flats (**PRSUPPLY**);

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[11] According to the Census and Statistics Department, HKSAR, "Hong Kong Resident Population" comprises the "Usual Residents" and the "Mobile Residents", details interpretation of these two types of residents are attached in Appendix II.

[12] Payroll covers wages and salaries, bonuses and gratuities, commissions, allowances and cash payments in other forms paid directly to employees. The real index, obtained by deflating the nominal index by the Composite Consumer Price Index, indicates changes in the purchasing power of labour earnings. Source: http://www.info.gov.hk/censtatd/eng/hkstat/concepts_methods/cm_wage_index.html

C. Government controlled variables

8) supply of land - measured by the total area of residential land (**LAND**) sold for private development by the government in every quarter;

9) supply of salable flats by the government - measured by the quarterly number of salable units (**HOS**) through Home Ownership Scheme and Private Sector Participation Scheme.

The reasons for choosing the above variables would be discussed in the later section. Based on the above variables, the multiple-regression equation was formulated as below,

$$\textbf{PRPI} = b_0 + b_1\textbf{GDP} + b_2\textbf{MR} + b_3\textbf{UNEM} + b_4\textbf{POP} + b_5\textbf{INCOME} + b_6\textbf{HSI} +$$
$$b_7\textbf{PRSUPPLY} + b_8\textbf{LAND} + b_9\textbf{HOS} +$$

where   is the stochastic error term. However, it is expected that there should be a time lag relationship between the amount of land supply (LAND) and the private housing prices (PRPI) since the prices would response to the fluctuations of the supply of land after a certain period of time. Hence, it is commonly believed that there is an eight-period time lag between these two variables, i.e. the private housing prices (PRPI) lag the amount of land supply (LAND) by eight periods (2 years). After computing the figures, this time lag should be adjusted through the statistics tool.

The above decided regression model will be estimated in linear-log specification. The merit of the linear-log transformation is the effect in regression computations of decreasing the relative size of observations with large variances, especially when the

regression includes variables in both level and different forms. It can simply be done by taking natural log for all selected variables and the finalized multiple-regression equation used is:

$$\textbf{ln PRPI} = b_0 + b_1 \textbf{ ln GDP} + b_2 \textbf{ ln MR} + b_3 \textbf{ ln UNEM} + b_4 \textbf{ ln POP} + b_5 \textbf{ ln INCOME}$$
$$+ b_6 \textbf{ ln HSI} + b_7 \textbf{ ln PRSUPPLY} + b_8 \textbf{ ln LAND} + b_9 \textbf{ ln HOS} +$$

Part II

In part two of the empirical study, some of the major government policies implemented in the past two decades was chosen and there influences on the private housing prices were estimated. Based on the review done in Chapter 4, the author spotted out different government policies which are related to the residential market. In particular, the study would like to estimate the effects on PRPI of the following policies implemented in 1994, 1997, 1998, 1999, 2001 and 2003:

1) June 1994 – Implementation of anti-speculation measures (Action Plan: Property Prices and Housing Supply, Jun 8 1994)

   The Government had introduced a package of measures to dampen property speculation and to strengthen consumer protection and the administration of its housing policy. In particular, the anti-speculation measures which dampened the demand of the market demand included:

   ▪ The quota for private sales of uncompleted flats was cut from 50% to 10% to release up to 10,000 more private domestic flats directly to home buyers each year;

   ▪ Resale of uncompleted flats before assignment was prohibited;

   ▪ The initial deposit was increased by 5% to 10% of purchase price;

- The amount of forfeiture was raised from 3% to 5% of the purchase price, if the buyer fails to sign the Sale and Purchase Agreement or enters into a Cancellation Agreement with the developer.

After the implementation of these measures, the overall property prices felt about 10-15% under the expectation of the Government.

2) October 1997 - Announcement of long term housing policies (Policy Address 1997 by the Chief Executive)

On Oct 8 1997, the Chief Executive presented his first Policy Address and announced the major long term housing policies. It is announced that the government would increase the supply of land and build supporting infrastructure to ensure that the target of constructing at least 85,000 flats (public and private) a year would be met. Moreover, it was targeted to sell 250,000 public rental flats to tenants over the next 10 years. All these policies were aimed to increase home ownership in the society and stabilize the housing market. This is one of the major housing policies in the past decades which tangibly stated the directions of the future housing development in the territory (Policy Address, 1997).

3) June 1998 - Suspension of land sales programme (Policy Address 1998 by the Chief Executive)

Due to the dire situation of the whole economy in 1998, there was a sharp drop in the property prices. The Hong Kong government announced a package of measures on 22 June 1998, which included some cuts in taxes. However, the most important one was the suspension of land sales for nine months (until

March 1999). This was intended to prop up the collateral value of the banking system, so as to reduce its anxiety about asset deflation.

4) February 1999 - Relaxation of HOS Resale Restriction (Press release by the Housing Authority, Feb 4 1999)

The HOS resale restriction period for Home Ownership Scheme (HOS)/Private Sector Participation Scheme flats was shortened from ten years to five years by the Housing Authority. Through this relaxation, the Housing Authority aimed to enhance the attractiveness of HOS and help promote mobility of flats, both in the open market and the secondary HOS market[13]. Although the resale of eligible HOS units is subjected to payment of a premium proportionate to the original discount, the flats are generally re-sold at a price lower than the market price.

5) September 2001 - Moratorium on the sale of HOS flats (HA Endorses Adjustments of HOS Programme, September 24 2001)

In response to the Government's statement on housing on 3 September 2001, the Housing Authority called for a moratorium of HOS sales for ten months (between September 2001 and June 2002) as to avoid an overlap between the HOS and the private residential property market and to stabilize the housing market. Furthermore, in November 2002, the Housing Authority announced the cessation of production and sale of HOS flats indefinitely from 2003

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[13] The Housing Authority (HA) established the HOS Secondary Market Scheme (HOSSMS) in June 1997 to increases the turnover of HOS flats so as to satisfy the society's need of subsidized home ownership. [Source:
http://www.housingauthority.gov.hk/en/residential/hossecondarymarket/0,,,00.html]

onwards (HA, 2002). This is a key policy which caused fluctuation in the supply of HOS in the past two decades.

6) November 2002 - Suspension of land sale programme (Statement on Housing Policy by Hon. Michael M.Y. Suen, Nov 13 2002)

In the end of 2002, the Secretary of the Housing, Planning and Lands Bureau announced nine measures to stabilize the residential property market. One of these measures was suspension of land sales programme from that date until the end of 2003. All the scheduled land auctions were stopped and the Application List was suspended with effect to that statement. In addition, it is announced that the supply of new land would only be triggered from the Application List after the end of 2003.

In order to study the effects of these policies implemented in 1994, 1997, 1998, 19999, 2001 and 2003, dummy variables were used to represent the above policies and insert to the equation which was constructed in part one. The followings are the arrangement of the incorporated dummy variables:

D94 = 1 for periods after the first quarter of 1994

D94 = 0 OTHERWISE.

D97 = 1 for the periods after the third quarter of 1997

D97 = 0 OTHERWISE.

D98 = 1 for the periods after the first quarter of 1998

D98 = 0 OTHERWISE.

D99 = 1 for the periods after the fourth quarter of 1998

D99 = 0 OTHERWISE.

D01 = 1 for the periods after the second quarter of 2001

D01 = 0 OTHERWISE.

D03 = 1 for the periods after the fourth quarter of 2002

D03 = 0 OTHERWISE.

While the above dummy variables could help to investigate the initial impacts of the implemented policies to the private housing market, their long term effects to the private housing market would also be investigated by the following dummy variables:

$S94 = D94 * (t - 38)$

$S97 = D97 * (t - 52)$

$S98 = D98 * (t - 54)$

$S99 = D99 * (t - 57)$

$S01 = D01 * (t - 67)$

$S03 = D03 * (t - 73)$

where t is the time-period[14] of the variables and 38 is the smallest value of t such that D94 = 1, 52 is the smallest value of t such that D97 = 1, and so on.

After integrating these dummy variables into the regression model constructed in part one, the following equation was obtained,

$$\mathbf{ln\ PRPI} = b_0 + b_1\ \mathbf{ln\ GDP} + b_2\ \mathbf{ln\ MR} + b_3\ \mathbf{ln\ UNEM} + b_4\ \mathbf{ln\ POP} + b_5\ \mathbf{ln\ INCOME}$$
$$+ b_6\ \mathbf{ln\ HSI} + b_7\ \mathbf{ln\ PRSUPPLY} + b_8\ \mathbf{ln\ LAND} + b_9\ \mathbf{ln\ HOS} + b_{10}\ \mathbf{D94} + b_{11}$$
$$\mathbf{D97} + b_{12}\ \mathbf{D98} + b_{13}\ \mathbf{D99} + b_{14}\ \mathbf{D01} + b_{15}\ \mathbf{D03} + b_{16}\ \mathbf{S94} + b_{17}\ \mathbf{S97} + b_{18}\ \mathbf{S98} +$$
$$b_{19}\ \mathbf{S99} + b_{20}\ \mathbf{S01} + b_{21}\ \mathbf{S03} +$$

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[14] The first quarter of 1985 is represented by 1, the second quarter of 1985 by 2, and so on.

where,   is a stochastic error term.

6.3 Expectations of results

In part one of the study, since the independent variables included in the regression equation are selected basic on previous research in this area, it is believed that all of them will have a significant effect on the dependent variables. Moreover, based on the literature review, the signs of the partial coefficient of the independent variables could be expected. In the following section, the expected signs of each partial coefficient will be discussed.

For part two of the study, the author would like to find out the effects of certain policies on the private housing prices. However, since no previous research pertaining to this matter can be found, there is no tangible idea to predict the signs of each partial coefficient of the dummy variables. Hence, the results of part two will not be discussed in this section but will be talked about in next chapter.

6.3.1 Expected signs of partial coefficient of independent variables

6.3.1.1 Gross Domestic Product (GDP)

According to the Census and Statistics Department, GDP is a measure of the total value of production of all resident producing units of a country or territory in a specified period before deducting allowance for consumption of fixed capital. It is an important indicator and is helpful for analyzing the overall situation and performance of the whole economy. Besides, it also implies the total domestic and aggregate income of people who work in the territory.

DiPasquale-Wheaton (1996) has already observed that, as the economy expands, the increase in total domestic income would lead to a greater demand for housing space. For a certain level of housing space, rents must be increased if the demand to use space is equal to the available space. Thus, these higher rents then lead to higher housing prices. In addition, Liow (2000) illustrates an increase in GDP implies economic growth and improvement in general wealth and thus income levels of local people. It is of little doubt that the economic considerations have been a crucial motivator to purchase one's own home and positive situation of the economy does stimulate the demand for home-ownership and also investment (Lee, 2003). Therefore, it is expected that the GDP of the economy is positively related to the private housing prices and the expected sign of the partial coefficient of **GDP** is positive.

6.3.1.2 Mortgage Rate (MR)

It is generally accepted that mortgage activity is an important issue for purchasing a property. Due to the high prices of residential properties, many home buyers are not able to pay for the full payment of their flats at the time of purchase. Thus, mortgage loan is a major instrument of housing finance and it is directly affecting the ability of the buyers to purchase a flat.

High mortgage rate implies high interest payment for the mortgage loan and thus, increases in the total cost for buying properties. Many studies have been done to put forward the premise that there is a negative relationship between the mortgage rate and the housing demand or the housing prices. For examples, Reichert (1990) uses a model of housing supply and demand in the USA to show that an increase in

mortgage rates significantly lowers the price of new homes sold. In addition, Baffoe-Bonnie (1998) also uses a vector auto-regression model to illustrate the housing prices are significantly negatively affected by the movement of mortgage rate nationally and in most regions of the USA. As a result, it should be believed that the increase in mortgage rate would dampen the private housing demand and hence, the private housing price. The expected sign of the partial coefficient of **MR** is negative.

6.3.1.3 Unemployment rate (UNEM)

The unemployment rate refers to the proportion of unemployed persons in the labour force. Generally, high unemployment rate implies a weaker economy and lower average financial ability of the population. It will negatively affect the demand of private housing since buyers who could afford to buy private units are reduced and the investor's confidence to the property market is insufficient. Reichert (1990) illustrates there is a negative impact of the unemployment rate on the private housing prices. On the contrary, Hartzel, *et al.* (1993) puts forward that high employment rate plays a significant role in investor's decisions, and thus has a positive effect on the determination of housing prices. Therefore, it is anticipated to have a negative figure of the partial coefficient of the unemployment rate.

6.3.1.4 Population (POP)

Basically, the demand for housing as a shelter is significantly affected by the population size. Population growth does put direct pressure on the demand for housing services, especially if the population growth stems mainly from the home buying are group with significant income (Reichert 1990). Moreover, a higher level of current population growth tends to raise current housing prices through the

expectation that higher future population levels will cause higher future housing prices (Potepan, 1994). Therefore, it is simply accepted that there is a positive relationship between the population sizes and housing prices, hence, the expected sign of the partial coefficient of **POP** is positive.

6.3.1.5 Income (INCOME)

According to Lamb (1999), it shows that income is one of the major determinants of the residential price movements since it strictly affect the financial ability of residential property buyers. Thus, increasing income in an area can be said to affect housing prices directly, through demand for housing services, and also indirectly, through rising expectations in the area for future price change.

Besides, since mortgage loan qualification is based on current income of the mortgagors, it will separately affect demand of residential properties (Philips and VanderHoff, 1994). So, it is expected that the signs of the partial coefficient of **INCOME** is positive.

6.3.1.6 Hang Seng Index (HSI)

Being an international financial centre, the stock market of Hong Kong is one of the major determinants which can greatly affect the economy as a whole. Besides, as mentioned before, real estate-related firms account for over 30% of Hong Kong's stock market capitalization. Ten of the top twenty companies listed are real estate or real estate-related companies (Tse and Webb, 2000). Therefore, it is generally believe that the performance of the real estate market is directly related to that of the stock market.

Okunev *et al.* (2000) examines the dynamic relationship that exists between the US real estate and S&P 500 stock markets by conducting both linear and nonlinear causality tests. It shows that the stock market does affect and determines prices and thus, returns in the real estate market. In addition, Gyourko and Keim (1992) have produced significant results verifying that the real estate and stock markets are integrated. Hence, in this study, it is reasonable to anticipate a positive sign of the partial coefficient of **HSI**.

6.3.1.7 Total supply of private residential units (PRSUPPLY)

As stipulated by the laws of supply and demand, an increase in supply of private residential units would lead to a decrease in the private residential property prices, while keeping other factors constant. A shortage in supply of private housing units would lead to a rise in private housing prices due to keen competition among the buyers in the market, while a surplus in supply of private housing units would lead to a fall in private housing prices. In fact, evidences can be found in the private residential market of Hong Kong. For example, after the Asian Financial Crisis, there was a serious problem of over-supply in private residential units. As a result, dramatic fall in the private residential property prices occurred. Therefore, it is expected the total supply of the private residential units is negatively related to the private housing prices and thus, the signs of the partial coefficient of **PRSUPPLY** should be negative.

6.3.1.8 Total supply of private residential land (LAND)

The total supply of private residential land reveals the future supply of private housing units as lands is like an essential raw material for housing production. Peng and Wheaton (1994) uses an econometric analysis to demonstrate the negative

relationship between the total supply of private residential land and the private residential property prices. When there are restrictions in the supply of residential land, it would lead to an anticipated reduction in overall housing supply. Hence, the housing market expects higher future housing rents. As a result, in a rational market, such an expectation is capitalized into higher current housing prices, and negative sign of partial coefficient of **LAND** is expected.

6.3.1.9 Total supply of Home Ownership Scheme flats (HOS)

The HOS flats have most of the attributes of private housing units and they are always considered as semi-private housing by the society. They will be eventually treated as private housing units after a certain years of purchase. As mentioned before, it is generally believed that the supply of HOS flats would significantly affect the healthy performance of the private residential market since the HOS flats are usually sold at a special price which is 40-50% lower than the current market price. To the best of author's knowledge, although there is no evidence or research to prove that the sales of HOS flats does distort or dampen the private housing price, many analysts in the market always claim so. The entire HOS policy is now seen by the private sectors as inappropriate government intervention in the real-estate market, which is creating "unfair competition" (Lee, 2003). Therefore, a negative relationship between the supply of HOS flats and the private housing prices is anticipated and the expected sign of the partial coefficient of **HOS** should be negative.

6.4 Source of data

In this study, data of the selected variables is collected from different sources separately. It is understood that the reliability of the data could seriously affect the

validity and soundness of the whole empirical study. So, all of the data used in this study is collected from convincing authorities from the government and the source of each variable will be introduced in the followings.

6.4.1 Private Residential Property Prices (PRPI)

The private residential property prices are measured by the average Private Residential Price Indices (PRPI) (1999 = 100). Private domestic units are defined as independent dwellings with separate cooking facilities and bathroom while all the domestic units built under subsidies of the government housing policies such as the HOS/PSPS, Sandwich Class Housing and Urban Improvement Scheme etc., are not included in the indices.

6.4.2 Gross Domestic Product (GDP)

The GDP is a measure of the total value of production of all resident producing units of a country or territory in a specified period, before deducting allowance for consumption of fixed capital. The GDP measured at constant (2000) market prices is used and the quarterly figures are all published on the website of the Census and Statistics Department of HKSAR.

6.4.3 Mortgage Rate (MR)

According to the Hong Kong Monetary Authority, the average mortgage rate is estimated by adding 1.5% to the prime lending rate in or before 1998 and minus 2.25% from the prime lending rate from 1999. The average quarterly prime lending rate is available on the website of the Hong Kong Monetary Authority.

6.4.4 Unemployment Rate (UNEM)

Seasonally adjusted unemployment rate is used in the study. The "Unemployment rate (seasonally adjusted)" refers to the unemployment rate adjusted for seasonal variations using the X-11 ARIMA method. Quarterly figures used are all obtained from the website of the Census and Statistics Department of HKSAR.

6.4.5 Population (POP)

The population estimates compiled under the "resident population" approach are used in the study, which is referred to as the "Hong Kong Resident Population". Under the "resident population" approach, visitors are not included in the Hong Kong Population and these figures are obtained from the Census and Statistics Department of the HKSAR. However, since only half-yearly figures are available from the data source, quarterly data is made by estimating a median between the half-yearly figures.

6.4.4 Income (INCOME)

Real indices of average payroll per person engaged are used to measure the income. Payroll covers wages and salaries, bonuses and gratuities, commissions, allowances and cash payments in other forms paid directly to employees and the real index, obtained by deflating the nominal index by the Composite Consumer Price Index, indicates changes in the purchasing power of labour earnings. Quarterly indices are collected from the website of the Census and Statistics Department of HKSAR.

6.4.5 Hang Seng Index (HIS)

Hang Seng Index (31/7/1964 = 100) is used which is a barometer of the Hong Kong stock market. It is collected from the website of the Hang Seng Index Services

Limited which is a wholly-owned subsidiary of Hang Seng Bank and is responsible for compiling, publishing and managing the Hang Seng Index and a range of other stock indexes.

6.4.6 Total supply of private housing units (PRSUPPLY)

The total supply of private housing units in each quarter is measured by the amount of newly completed private housing units in that quarter. These figures are published in the Hong Kong Monthly Digest of Statistics which is the monthly publication of the Census and Statistics Department.

6.4.7 Total supply of private residential land (LAND)

The total areas (in M^2) of private residential land sold by the government in each quarter are used as a measure of the supply of private residential land. From the website of the Lands Department of HKSAR, all the land sales records together with their sales methods, transaction prices and the usages of the sold lands are published and downloadable.

6.4.8 Total supply of Home Ownership Scheme flats (HOS)

The amounts of new Home Ownership Scheme flats released for public application in each quarter are applied as a proxy to the total supply of HOS flats. Flats built by the Private Sector Participation Scheme are included and considered as one kind of HOS flats. These figures can be obtained from the website of the Hong Kong Housing Authority of HKSAR.

6.5 Summary

In conclusion, the two parts of the empirical study are summarized in the following tables. Table 6.1 shows the variables used in the regression model in part 1 and their expected signs of results. Table 6.2 summarized the dummy variables incorporated in the regression model in part 2.

Variables	Represented by	Measured by	Expected signs of partial coefficients
Dependent variable			
Private residential property prices	PRPI	Private residential price index (1999 = 100)	N.A.
Independent variables			
Demand-side factors			
Economic Growth	GDP	Real GDP at constant (2000) market price	+
Mortgage rate	MR	Average mortgage rate	-
Unemployment	UNEM	Unemployment rate (seasonally adjusted)	-
Income	INCOME	Real indices of payroll per person engaged	+
Population	POP	Residential population	+
Stock market performance	HSI	Hang Seng Index (31/7/1964 = 100)	+
Supply-side factor			
Supply of private residential units	PRSUPPLY	Newly completed private housing units	-
Government-controlled factors			
Supply of residential land	LAND	Total area of supplied residential land	-
Supply of HOS flats	HOS	New HOS flats released for application	-

Table 6.1 Summary of variables used in part I of the model

Dummy variables	Figurative policies	Nature of testing effects
D94	Anti-speculation measures	Short term
S94		Long term
D97	Announcement of long term housing policies 1997	Short term
S97		Long term
D98	Suspension of land sales programe 1998	Short term
S98		Long term
D99	Relaxation of HOS resale restriction	Short term
S99		Long term
D01	Moratorium on sale of HOS flats	Short term
S01		Long term
D03	Suspension of land sales programe 2003	Short term
S03		Long term

Table 6.2 Summary of dummy variables incorporated in part II of the model

Chapter 7 Results and analysis

7.1 Introduction

After the multiple regression model specified in the previous chapter is carried out by the computer software, various results are obtained. In this chapter, the results of the empirical study will be shown and illustrated. The significance of the model and the selected variables will also be verified. Moreover, the expected signs of the partial coefficient of the independent variables in part 1 will be checked to find out if they match with the results. After that, a comprehensive analysis will be given to the results of the empirical study. Finally, the implications of this empirical study will be brought in.

7.2 Results

Part I

With the help of computer statistics tools, the results of the multiple regression model are produced after computing all the required data. As mentioned in the previous chapter, the first regression equation is:

$$\textbf{ln PRPI} = b_0 + b_1 \textbf{ln GDP} + b_2 \textbf{ln MR} + b_3 \textbf{ln UNEM} + b_4 \textbf{ln POP} + b_5 \textbf{ln INCOME}$$
$$+ b_6 \textbf{ln HSI} + b_7 \textbf{ln PRSUPPLY} + b_8 \textbf{ln LAND} + b_9 \textbf{ln HOS} + b_{10} \textbf{D94} + b_{11}$$
$$\textbf{D97} + b_{12} \textbf{D98} + b_{13} \textbf{D99} + b_{14} \textbf{D01} + b_{15} \textbf{D03} + b_{16} \textbf{S94} + b_{17} \textbf{S97} + b_{18} \textbf{S98} +$$
$$b_{19} \textbf{S99} + b_{20} \textbf{S01} + b_{21} \textbf{S03} +$$

while, the results of this multiple regression analysis is shown in Table 7.1 below.

Dependent Variable: ln(PRPI)
Method: Ordinary Least Squares
Sample(adjusted): 1985:1 2004:4
Included observations: 80

Variable	Coefficient	Std. Error	t-Statistic	p-value
C	12.18951	11.05984	1.102141	0.2768
ln(HSI)	0.945362	0.108701	8.696901	0.0000
ln(UNEM)	-0.295615	0.124854	-2.367689	0.0227
ln(MR)	0.411680	0.131297	3.135495	0.0032
ln(GDP)	0.543525	0.350588	1.550325	0.1287
ln(INCOME)	1.155157	0.401872	2.874442	0.0064
ln(POP)	-2.281228	1.079611	-2.113010	0.0407
ln(LAND)	-0.045579	0.021648	-2.105411	0.0414
ln(HOS)	-0.017994	0.017867	-1.007107	0.3198
ln(PRSUPPLY)	0.030908	0.044518	0.694292	0.4914
R-squared	0.927169	F-statistic		57.99443
Adjusted R-squared	0.911182	Prob(F-statistic)		0.000000

Table 7.1 Results of regression model in part I

It is believed that the multiple-regression model has a good overall fitness since it has a high adjusted R-squared of 0.9112. This figure is close to 1 implies that this model has a high explanatory power as a high proportion of variations in the dependent variable are explained by the variations in the independent variables. Moreover, having a very high F-statistic of 57.99 indicates the probability to accept the null hypothesis is extremely low. Besides, by observing the figure of "probability (F-statistic)" in Table 7.1, the zero result suggests that the probability to accept the null hypothesis is zero and that means the probability of having all partial coefficients of the independent variables equal to zero is denied.

Through observing the p-values of each independent variable, the significance of their partial coefficients will be known. As mentioned in Chapter 5, the coefficient is generally accepted as significant if its p-value is smaller or equal to 0.05, which is said to be significant at the 5% level. In this study, the standard of "significance" of

results is set at this 5% level. Table 7.1 shows that the **HSI**, **MR** and **INCOME** have significant positive effects on the **PRPI**; **UNEM, POP** and **LAND** are significantly negatively related to the **PRPI** while **GPD**, **PRSUPPLY** and **HOS** are insignificantly in explaining PRPI. The explanation to these results will be discussed in the later part.

Part II

In this part, altogether twelve dummy variables have been added to the regression equation used in part 1. A new equation is constructed to find out the influences of certain government policies on the private housing prices. As mentioned in the previous chapter, the adjusted multiple regression equation is:

$$\textbf{ln PRPI} = b_0 + b_1 \textbf{ ln GDP} + b_2 \textbf{ ln MR} + b_3 \textbf{ ln UNEM} + b_4 \textbf{ ln POP} + b_5 \textbf{ ln INCOME}$$
$$+ b_6 \textbf{ ln HSI} + b_7 \textbf{ ln PRSUPPLY} + b_8 \textbf{ ln LAND} + b_9 \textbf{ ln HOS} + b_{10} \textbf{ D94} + b_{11}$$
$$\textbf{D97} + b_{12} \textbf{ D98} + b_{13} \textbf{ D99} + b_{14} \textbf{ D01} + b_{15} \textbf{ D03} + b_{16} \textbf{ S94} + b_{17} \textbf{ S97} + b_{18} \textbf{ S98} +$$
$$b_{19} \textbf{ S99} + b_{20} \textbf{ S01} + b_{21} \textbf{ S03} +$$

The results of the regression model in part 2 are shown in Table 7.2.

Dependent Variable: ln(PRPI)
Method: Ordinary Least Squares
Sample(adjusted): 1985:1 2004:4
Included observations: 80

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-277.4572	61.07957	-4.542553	0.0001
ln(HSI)	0.257790	0.167969	1.534753	0.1357
ln(UNEM)	0.140585	0.149595	0.939774	0.3551
ln(MR)	0.014703	0.139264	0.105576	0.9166
ln(GDP)	0.234780	0.296255	0.792493	0.4345
ln(POP)	17.58907	4.284434	4.105342	0.0003
ln(INCOME)	0.459167	0.359613	1.276839	0.2118
ln(LAND)	-0.020245	0.016017	-1.263990	0.2163
ln(HOS)	0.023796	0.020530	1.159085	0.2559
ln(PRSUPPLY)	0.014654	0.034820	0.420837	0.6770
D94	-0.151302	0.031716	-4.770530	0.0000
S94	0.086691	0.114226	0.758945	0.4540
D97	-0.617556	0.169755	-3.637929	0.0011
S97	0.155678	0.075616	2.058800	0.0486
D98	0.964111	0.320864	3.004734	0.0054
S98	-0.127210	0.080283	-1.584529	0.1239
D99	-0.331125	0.124986	-2.649285	0.0129
S99	0.058868	0.038461	1.530598	0.1367
D01	0.017044	0.151474	0.112522	0.9112
S01	0.032771	0.048300	0.678487	0.5028
D03	-0.158176	0.116151	-1.361808	0.1837
S03	0.021698	0.050647	0.428412	0.6715
R-squared	0.978076	F-statistic		61.60623
Adjusted R-squared	0.962199	Prob(F-statistic)		0.000000

Table 7.2 Results of regression model in part II

After integrating the dummy variables into the regression model, the adjusted R-squared is further increased to 0.9622 and the F-statistic continuous to reject the null hypothesis. Nearly all the independent variables used in part 1 are then turned to be insignificant except the population, which is significantly positively related to the PRPI. Besides, results of those twelve dummy variables are produced.

As shown in Table 7.2, S97 and D98 have significant positive impacts on the PRPI; D94, D97 and D99 are significantly negative to the PRPI while S94, S98, S99, D01, S01, D03 and S03 are insignificant in explaining PRPI.

7.3 Analysis of the findings

In this section, the empirical findings in both parts of the empirical study will be analyzed. For part one of the empirical study, explanations will be given to all included variables which are insignificantly in explaining the PRPI. After that, for those significant variables which have the actual signs of their partial coefficients contradict with the expected signs, justifications will be given.

For part two of the empirical study, focus will be put on the significance and the signs of the partial coefficients of the incorporated dummy variables, which are reflecting different government policies. The effects of each chosen policies on the PRPI will be discussed.

Part I

In this multiple-regression model, three out of nine independent variables are found to be insignificant while two out of six significant variables have contradictions with their expected results. Before explaining the empirical findings, the results obtained are summarized in the following Table 7.3:

Independent Variables		
Insignificant variables		
GDP		
HOS		
PRSUPPLY		
Significant variables	Expected signs of coefficient	Actual signs of coefficient
MR	-	+
UNEM	-	-
POP	+	-
INCOME	+	+
HSI	+	+
LAND	-	-

Table 7.3 Summary of results in part I

7.3.1 Insignificant variables

7.3.1.1 Gross Domestic Product (GDP)

As discussed in previous chapter, GDP is claimed to be one of the major determinants of private residential property prices by previous research. However, the result of this study shows that GDP is irrelevant to the influencing the private residential property prices. This finding can be explained in two ways, firstly, the situation and culture of the Hong Kong private housing market is different from other countries. When the property buyers make their purchasing decision, they usually pay relatively less attention to the overall economic situation of the territory (i.e. movement of GDP) than other macro-economic factors such as mortgage rate and unemployment rate. As a result, the demand of the private housing would not be significantly distorted by the change of GDP and thus the PRPI is not considerably affected by the GDP

Besides, home buyers may not used GDP as an indicator of the economic performance of the territory, they may use other proxies like inflation rate and

unemployment rate to instead. Therefore, the result shows that GDP is insignificant in explaining PRPI.

7.3.1.2 Total supply of private residential units (PRSUPPLY)

As mentioned before, the private housing prices are determined by the demand and supply of private housing market. However, the empirical result shows that the total supply of private residential units is not sufficient to explain the variation of the PRPI. This result may be due to the following two reasons.

Firstly, Lionel (1965) puts forward the allegation that the housing supply is inelastic in response to the performance of residential property market in short run. As the development process of housing projects is long and it is usually involved a few years, it is unlikely to adjust the total supply of private housing units promptly in response to the change in demand of the market. Therefore, the private housing prices usually are not significantly affected by the supply of private housing units in short run.

Secondly, the figures of newly completed private residential units in each quarter are used in this study to represent the total supply of private housing units, the deteriorate of the result may be caused by the insignificance of these figures to reflect the actual supply of private housing units in each quarter. This can be explained by the practices of the developers. In Hong Kong, most of the developers have their own sales strategies to sell their developed properties. They will control the actual quantity of their new properties for sales by considering various factors such as the performance of the whole private housing market and mortgage rate. In other words, the newly completed private housing units is not necessarily equal to the amount of new private

housing units released for public sales in the market. Hence, the result would be insignificantly related to PRPI due to the figures used are not conclusive enough.

7.3.1.3 Total supply of Home Ownership Scheme flats (HOS)

The total supply of Home Ownership Scheme flats is shown to be inconsequential in explaining the private residential property prices in this study, this is completely contrast to the expected results from the current market. Recently, many analysts and developers claimed that the supply of HOS flats will seriously impede the development of the private housing market (SCMP 23/8/2000, SCMP 30/6/2001, SCMP 4/9/2001), while the Secretary for Housing, Planning and Lands Bureau, Mr. Suen in 2002 admitted that the government would cease the sales of subsidized housing units (HOS) in order to minimize the intervention to the private market. Probably, noise is produced in the market which has assumed the sales of HOS flats would negatively distort the private housing demand and prices. However, the empirical result in this study shows that there is no significant relationship between the supply of HOS flats and the private housing prices (Suen 2002b).

One of the reasons for this finding may be the eligibility of HOS applicants is set effectively in order to select the "real" needful group to purchase the flats. Although the HOS flats are sold at a great discount, about 40-50% less than the current market price, the total family income of eligible buyers are restricted by the Housing Authority. The criteria are set to ensure that the buyers are the needful group who are not able to afford the private housing units in the open market. So, in other words, the total demand of the private housing market would not be affected by this needful

group who are turned to the subsidized housing market (HOS). Thus, the supply of the HOS flats does not show any important relationship with the private housing prices.

7.3.2 Significant Variables

For those significant variables; the unemployment, income, Hang Seng Index and supply of private residential land are matched with their expected results and anticipation made in the previous chapter. However, mortgage rate and population are inconsistent with the predicted outcome as the expected signs of their partial coefficients are different from the results obtained in this study. The rationale of these contradictions will be discussed in the following part.

7.3.2.1 Mortgage rate (MR)

Mortgage rate is expected to have negative impacts on private housing prices at first; however, the empirical results show a contradictory finding. This finding can be explained through consideration of the total private housing demand. If the mortgage rate increase, the total cost of buying property will eventually increase since higher interest payment is needed to pay for the mortgage loan. However, it will reduce the demand for home-owning instead of affecting the total demand in the private housing market. As quoted by Tse (1996c), Rosenthal *et al.* (1991) suggests that mortgage lending policy tends to constrain the demand for owner-occupied housing. However, any reduced demand for home-owning due to more stringent credit terms is expected to shift to demand for rental accommodations in private housing market rather than be absolutely eliminated. Hence, a higher mortgage rate will discourage home ownership which will then be switched to renting, but leaving total housing demand unaffected.

Therefore, an increase in mortgage rate will consequently lead to an increase in demand in private rental housing market. On the other hand, this increase in private rental housing demand will lead to a raise in rent of private housing units, which will then be transformed to an increase in private housing prices.

7.3.2.2 Population (POP)

Based on the expectation mentioned in Chapter 6, the population is expected to be positively related to the private housing prices. However, the result shows that they are negatively related. Firstly, this may due to the special condition in Hong Kong which has a low population growth rate in the past decade. As shown in Figure 7.1, the slope of the population in recent years is becoming gentler and nearly horizontal.

Figure 7.1 Population in Hong Kong 1985 - 2004
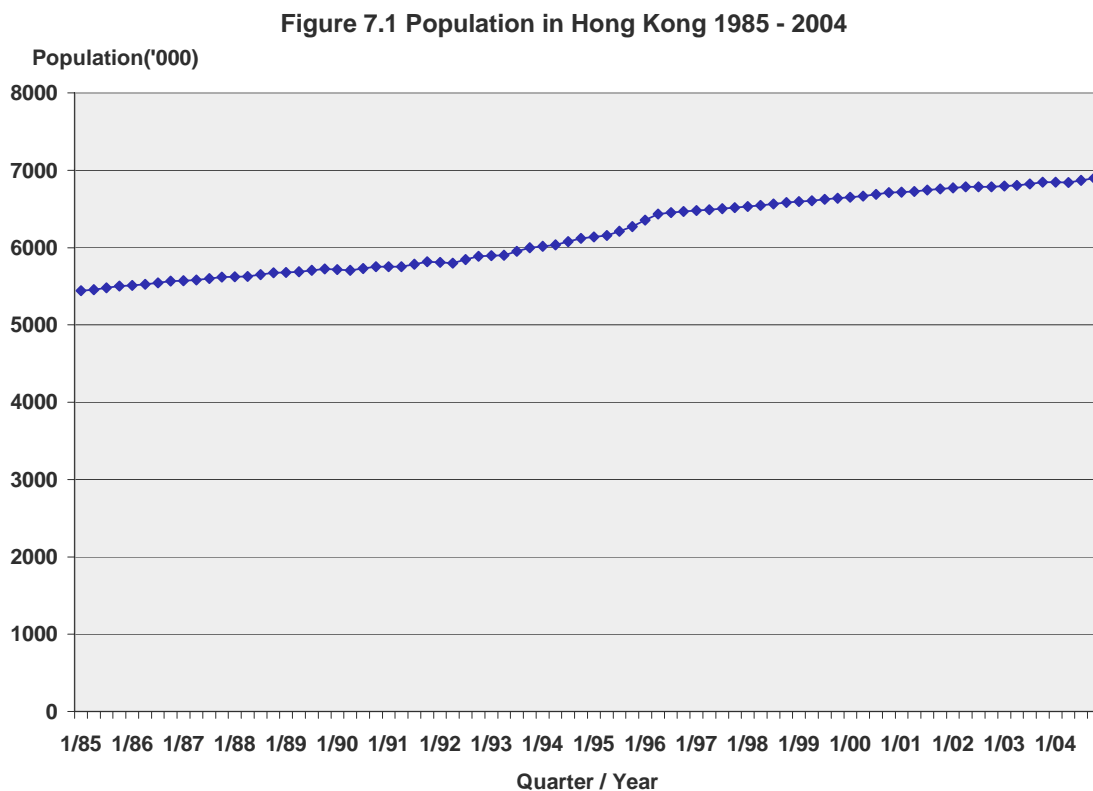
[Source: Census and Statistics Department, HKSAR]

The problem of aging population is one of the hot issues in Hong Kong recently, which shows that the birth rate is Hong Kong is plummeting from the replacement birth rate of 2.1 children per woman of child-bearing age to about 0.8 in the past decade (the lowest of any country in the world) (SCMP, 12/3/2005).

However, when the population growth rate is decreasing, the economy of the territory continues to develop rapidly. The demand for private housing units increases greatly regardless to the slow population growth because the demand in the private housing market is mainly driven by those who are not buying housing units as accommodation necessity, such as property investors and home buyers who are aiming for improvement in quality of living. Thus, this may be a reason of the negative relationship between the population and the private housing prices.

Furthermore, this result may be caused by the dramatic private housing development in areas near the border between Hong Kong SAR and Mainland China such as Shenzhen and Huanggang. The average flat value in Shenzhen is about HK$700 per sq. ft, while in Yuen Long in Hong Kong this value is HK$2,000 per sq ft (Wong, 2002). The private housing market which offers attractive prices of flats in the in Shenzhen becomes very keen competitor to the private housing market in Hong Kong. Moreover, with the implementation of 24-hour border access policy which realizes 24-hour operations at border Huanggang to Lok Ma Chau, the demand of private housing flats in Mainland by Hong Kong residents increased rapidly. According to a survey done in this area, it shows that Hong Kong residents bought 22,000 to 23,000 units on the mainland in 2004, which is 10 per cent increased from 2003 (Ng, 2005). Hence, the demand of private housing units in Hong Kong is reduced although there

is a growth in population. This may also be one of the reasons which lead to the contradiction in the relationship between population and PRPI.

Part II

In the second part of the empirical study, the aim is to find out the effects of certain government policies on the private residential property prices. The chosen policies are introduced in Chapter 6 and they are represented by different dummy variables in this multiple-regression model.

The results in part 2 show that most of the independent variables, which are shown to be significant in part 1, become less significant or even insignificant in the model incorporated with various dummy variables. This may be caused by the distortion brought by the implementation of these government policies during the period. Since some of the government policies imposed may become dominant factors in affecting the demand or supply of the private housing market, they may change the views and considerations of the potential property buyers completely. Thus, the results of the independent variables are changed and distorted in this part.

However, the effectiveness of various kinds of government policies can be tested and results of each policy will be illustrated in the following section. The empirical results of these dummy variables are summarized in Table 7.5:

Dummy variables	Significance of coefficients (at 5% level)	Signs of coefficient
D94	√	-
S94	×	
D97	√	-
S97	√	+
D98	√	+
S98	×	
D99	√	-
S99	×	
D01	×	
S01	×	
D03	×	
S03	×	

Table 7.4 Summary of results in part II

7.3.3 Implementation of anti-speculation measures (June 1994)

The effects of this policy are denoted by dummy variables D94 and S94. The significant negative coefficient of D94 infers that the anti-speculation measures imposed in the mid-1994 had successfully dampened the private housing market and caused a drop in private housing prices initially. However, the coefficient of S94 is not significant which suggests this policy did not give any significant impact on the private housing prices subsequently. That means this policy is only effective to dampen the speculation activities once it was imposed, yet, it is not so effective to serve its purpose thereafter.

7.3.4 Announcement of long term housing policies (October 1997)

Dummy variables D97 and S97 are used to test the effects of this policy on PRPI and the coefficients of them are shown to be significant. It is observed that the magnitude of the negative coefficient of D97 is relatively large, which implies that this policy

resulted in a serious initial collapse in private housing prices when it was first announced. Nevertheless, the positive coefficient of S97 suggests that, while the initial effect was quite large, it dampened off over time; the market was recovered gently as time goes by.

7.3.5 Suspension of land sales programme (June 1998)

D98 and S98 are incorporated in the model to examine the influences of this policy on PRPI. The relatively large and significant positive coefficient of D98 deduces that the suspension of land sales at that period of time did significantly boost up the private housing market at the beginning. Unfortunately, as revealed by the insignificant coefficient of S98, the effect of this policy is not significant to vary the private housing prices afterward.

7.3.6 Relaxation of HOS Resale Restrictions (February 1999)

The estimation of this policy is done by observing the dummy variables D99 and S99. The coefficient of D99 is found to be significantly negative, which implies that the relaxation of HOS resale restrictions did initially dampen the property prices in private housing market. However, it can find that this effect did not last for long after the time of accomplishment of this policy since the coefficient of S99 is insignificant. This result once again shows that the sales or re-sales of HOS flats are not significantly interfere with the private housing market in long term.

7.3.7 Moratorium on the sale of HOS flats (September 2001)

This policy is represented by dummy variables D01 and S01. Both of the coefficients of them are shown to be insignificant in explaining PRPI. From these results, it can be

concluded that the moratorium on the sale of HOS flats in since 2001 did not have a significant effect on private housing prices. Therefore, the effectiveness of this policy is unsatisfactory since this is one of the nine policies imposed by the government which are aimed to stabilize and recover the private residential property market.

7.3.8 Suspension of land sale programme (November 2002)

Dummy variables D03 and S03 are used to study the influences of the suspension of land sales in 2003 on the private housing prices. Regrettably, both of the coefficients of D03 and S03 are found to be insignificantly related to the private housing prices. As this policy is also one of the nine policies imposed by the government aiming to stabilize and recover the private housing market, the effectiveness of this policy is not work in an expected way. However, this policy was carried out in just two years before, the long term effects of this policy may not be observed in this study since the period available for observation after the implementation of this policy is not long enough.

7.4 Implications of the empirical results

Part I

The empirical results of the study show that the six out of nine chosen independent variables, i.e. mortgage rate, population size, income, unemployment rate, Hang Seng Index and the supply of land for private housing development, are significantly related to the private residential prices. The GDP, supply of HOS flats and the total supply of private housing are, however, found to be insignificant in explaining the private housing prices. As the objective of this study is to investigate the effects of government policies on the private housing market, the major implications of this

study are: substantial policies on land supply would cause significant impacts and intervention in the private housing prices, while allegation about the negative effects produced by the HOS flats on the private housing prices, is found to be irrational.

7.4.1 Land supply

As shown in the results of this study, the amount of land supply for private residential development is an important determinant of private housing prices. Excess or shortage in the supply of land for private housing development will cause distortion in private housing prices. Therefore, it is time for the government to withdraw the "invisible" hand in the land sale market and let the market decide the quantity of land sale by market mechanism. The induction of the Application System in 1999 is a good advancement in land sale policy. Since then, the developer can play a rather active role in the land sale activities. It can guarantee that the disposed land is matched with the demand in the market. However, it is important to ensure there is enough transparency in the land sale process, as it could maintain a fair, open and reasonable land sale system which favors the development in the market.

7.4.2 Supply of subsidized saleable flats (HOS)

On the other hand, the supply of HOS flats is claimed to have negative effects on the private market recently, since it is believed that the special discount prices of these flats would compete with the private housing units in the market. However, this allegation is found to be invalid in this study. The time-serious data analysis shows that there is no significant relationship between the supply of HOS flats and the private housing prices.

Nevertheless, the government should implement regulations to ensure that the allegations will not be realized. For example, the HOS market interferes with the private market only if their target groups are overlapped. It is essential for the government to review the eligibility of applicants for HOS flats. As admitted by Donald Tsang, the then Chief Secretary for Administration, the income limit reduction in the restrictions of HOS applicants did not go far enough to remove the overlap between the HOS and private housing market. This is one of the reasons that the sale of HOS flats continues to put additional pressure on the private market (Tsang, 2001). Besides, the Housing Authority should have flexibility in the supply of HOS flats; certain adjustment in the HOS supply is required in response to the environmental change in the market. For instance, certain reduction in the supply of HOS may be appropriate in these years, because the private market prices has fallen to a more affordable level.

Part II

In the second part of the study, six policies carried in 1985-2004 were chosen to investigate their effects on the private housing prices. The empirical results show that four of these policies did have influence on the private housing prices, while two of them did not. As all these policies were carried out by the government for different objectives and purposes, these results can give some idea on the effectiveness and the efficacy of these policies.

7.4.3 Implementation of anti-speculation measures (June 1994)

For the anti-speculation policy imposed in 1994, it is found that the policy was effective at the beginning when it was imposed. It had served its purported purpose

and managed to cool down the private prices initially. Though, this effect did not persist after the implementation. In fact, the government had tried to cope with the keen speculation activities for several times during the 1990s. However, the facts showed that the government failed to solve the problem and seemed useless in this aspect.

Probably, as suggested by Ho and Kwong (2002), the government should try to tackle the speculation activities by levying heavy tax on short-term capital gains. Since the vital goal of speculation is short-term gains, this tax burden would focus on dampening the activities of speculators, but not the potential home buyers.

7.4.4 Announcement of long term housing policies (October 1997)

The LTHS announced in 1997 had shown to exert pressure on the private housing prices. The private housing prices dropped significantly after the announcement, and this effect was weakened after a certain period. At that time, as the government had planned to increase the home ownership rate, it had announced an increase in the supply of both of the public and private housing market. In addition, the future housing plans of the government were also announced. Therefore, this empirical result implies that there is a close relationship between the actions of the government on the public housing and the private housing market.

7.4.5 Suspension of land sale programme (June 1998)

Supply of land for private housing development was one of the determinants of private housing prices. In concurrence, the suspension of land sales in 1998 was shown to have negative impacts on private housing prices initially. This policy was

aimed to boost up the property market as it was seriously distressed by the Asian Financial Crisis. The empirical result shows that this policy was effective in serving its purpose at first, but it was become useless afterward. Probably, the ineffectiveness of the policy some time after its implementation was due to the pessimistic sentiment brought by the Asian Financial Crisis.

7.4.6 Relaxation of HOS Resale Restrictions (February 1999)

Besides, the secondary market of HOS flats is also considered as interference to the private housing market by the private sectors recently, the relaxation of the re-sale period of HOS flat in 1999 by the Housing Authority had threatened them. The empirical results suggests that the initial execution of this policy did have a negative impact on the private housing prices. However, this impact was found to be insignificant after the implementation. Due to the sluggish economy consequence of the Asian Financial Crisis, the private housing prices fell and narrowed the price gap between private housing and HOS flats. It is believed that the initial distortion caused by this policy was due to the psychological factor of the potential buyers, who had lost their confidence in the private market.

7.4.7 Moratorium on the sale of HOS flats (September 2001)

As discussed before, the supply of HOS flats is shown to have no influence on the private housing market. Again, this policy was shown to be insignificant in explaining the private housing prices, and no major impact was caused to the movement of private housing prices after its implementation. It is suggested that this policy was ineffective in the stabilization of the private housing market. Nevertheless, it

increased the government intervention in the private housing market and wasted government resources.

According to the Housing Authority, the stock of unsold newly completed HOS/PSPS flats is about 13,500. It is costly and wasteful to keep these brand new flats in stock since the management fee for these flats is expensive and the flats would depreciate continuously even though there is no occupancy. Therefore, review on this policy is urgently needed by the government in order to make a proper decision for the arrangement of this stock.

7.4.8 Suspension of land sale programme (November 2002)

This policy is also shown to have no significant impact on the private housing prices when it was imposed or after it had been imposed. Although the supply of land is proved to have significant influence on the private housing prices, the insignificant result shown in this section may be due to a technological problem. Since the policy was carried out only last year, the time-series data used in this model is not long enough to have a significant observation to this policy. Therefore, the result here is not sufficient to violate the relationship between land supply and private housing price.

Chapter 8 Conclusion

8.1 Conclusion

The aim of this study is to determine out the effects of government policies on the private housing prices. In particular, the empirical model of this study has tested the effects of two government controlled factors, i.e. supply of land for private housing and supply of HOS flats, on the private housing prices. The supply of land for private housing is shown to have negative effects on the private housing prices, while the supply of HOS flats is shown to be insignificant in explaining the private housing prices. These can be explained by the supply and demand forces in the private housing market. As supply of land for private housing is a key factor which influences the production of private housing units, it plays an influencing role in controlling the private housing prices. However, it is found that the supply of HOS flats would not affect the demand for private housing units since these two types of housing are looking for different target groups, so, the supply of HOS flats is irrelevant to the changes in private housing prices.

On the other hand, some of macro-economic factors are usually considered as the major determinants of private housing prices, seven of them were chosen and incorporated in the empirical model of this study. The empirical results suggest that the mortgage rate, income and Hang Seng Index are positively related to the private housing prices, while the unemployment rate and population size are negatively related to the private housing prices since they are significant in affecting the demand of private housing units. However, the total supply of private housing units and Gross Domestic Product are found to be insignificant in explaining the private housing

prices, as they are comparatively not remarkable in affecting the demand and supply forces in private housing market due to the dominance of other macro-economic factors.

Commonly, government policies related to the housing market are believed to have influence on the private housing prices. Therefore, six government policies which were carried out in 1985-2004 were chosen and the timing of the implementation of these policies was tested.

The empirical findings show that the anti-speculation policy in 1994 had a positive impact on the private housing prices initially, while the announcement of Long Term Housing Strategy in 1997 had exerted forces to depress the private housing prices at the beginning of the policy. However, this impact has subsequently relinquished.

There were two policies about the suspension of land sale programme in 1998 and 2003; the first one was shown to have significant negative initial impact on the private housing prices, while the latter was found to be insignificant in affecting the private housing prices. Furthermore, the moratorium on the sale of HOS flats has proved to have insignificant impact on the private housing prices, while the relaxation of HOS resale restrictions was observed to have significant negative impact on the private housing prices initially.

All in all, it may be concluded that government policies related to housing do have influence on the private housing market and distort the private housing prices, although some of them were not aimed or intended to do so. It is understandable that

certain government intervention is needed in the housing market, as there still are a certain number of low-income and middle-income families who are financially incapable of affording housing in the private market. However, the government should adjust its role in the housing market in order to avoid impeding the "free" development of private housing market.

Frequent reviews on the housing policies are important as they could help make appropriate amendment promptly in response to any changes in the market environment. This is so as to match the government assistance with the real needs in the housing market effectively and to have a better allocation of government resources.

8.2 Limitations of this study

The limitations of this study are twofold:

8.2.1 Inadequacy of data

The data used in the empirical model is inadequate in reflecting the real situation entirely. As there should be in reality some time-lapse between the dependent variable and each independent variable in reality, the relationship shown in the regression model may be degraded. It is suggested that the lead-lag correlation between the dependent variable and each independent variable should be determined before performing the regression analysis, which can help to produce a more effective regression equation for the study.

8.2.2 Insufficient length of time-series data

The length of the time-series data used in this study is twenty years. Quarterly data is used and there are altogether 80 observations within the period 1985-2004. Basically, with the sample size of 80 is generally accepted as a sufficient sample size of analysis. However, when observing the effects of certain government policies which were carried out in recent years, it is found that the available time-series data after the implementation of the policies is not long enough to give a significant analysis. For example, the long term effect of the suspension of land sale programme in 2003 could not be studied accurately since up to now, only eight quarterly data is available after the execution of this policy.

It is suggested that the effects of the government policies which were carried out in the recent five years should be studied again sometime later, so that a more accurate and precise investigation can be made.

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Appendix I

Population and Vital Events

Concepts and Methods

Since August 2000, the "resident population" approach has been adopted in place of the "extended de facto" approach for compiling Hong Kong population figures. Revised population figures backdated to 1996 have been compiled. The population estimate compiled under the "resident population" approach is referred to as the "Hong Kong Resident Population". The "Hong Kong Resident Population" comprises "Usual Residents" and "Mobile Residents".

"Usual Residents" refer to two categories of people: (1) Hong Kong Permanent Residents who have stayed in Hong Kong for at least three months during the six months before or for at least three months during the six months after the reference time-point, regardless of whether they are in Hong Kong or not at the reference time-point; and (2) Hong Kong Non-permanent Residents who are in Hong Kong at the reference time-point.

As for "Mobile Residents", they are Hong Kong Permanent Residents who have stayed in Hong Kong for at least one month but less than three months during the six months before or for at least one month but less than three months during the six months after the reference time-point, regardless of whether they are in Hong Kong or not at the reference time-point.

Under the "resident population" approach, visitors are not included in the Hong Kong Population.

For details of the method of compiling population estimates of Hong Kong, please see the feature article entitled "Compiling Population Estimates of Hong Kong" published in the February 2002 issue of the *Hong Kong Monthly Digest of Statistics*.

The birth, death and natural increase figures in the Frequently Asked Statistics section are compiled using known births and known deaths. Birth rate and death rate are calculated by relating the known births and the known deaths in a year to their corresponding mid-year population.

Expectation of life at birth is the number of years of life that a person born in a given year is expected to live if he/she were subjected to the prevalent mortality conditions as reflected by the set of age-sex specific mortality rates for that year.

Total fertility rate refers to the average number of children that would be born alive to 1 000 women during their lifetime if they were to pass through their childbearing

ages 15-49 experiencing the age specific fertility rates prevailing in a given year.

Child dependency ratio refers to the number of persons aged under 15 per 1 000 persons aged between 15 and 64.

Elderly dependency ratio refers to the number of persons aged 65 and over per 1 000 persons aged between 15 and 64.

Overall dependency ratio refers to the number of persons aged under 15 and those aged 65 and over per 1 000 persons aged between 15 and 64.

A registered marriage is defined as a voluntary union of life of one man and one woman to the exclusion of all others which has been contracted in accordance with the Marriage Ordinance. Re-registration of couples who had either customarily married in Hong Kong before the Marriage Reform Ordinance was enacted in October 1971 or had married outside Hong Kong, are also covered in the statistics. Marriage statistics are restricted to registered marriages only.

Median age at first marriage is an indicator of the average age of persons at their first marriage such that 50% of these persons are above this age while the other 50% are below it.

A domestic household consists of a group of persons who live together and make common provision for essentials for living. These persons need not be related. If a person makes provision for essentials for living without sharing with other persons, he/she is also regarded as a household. In this case, the household is a one-person household.

This page was last reviewed on 1 November 2004.

Source: Census and Statistics Department (Website). Available from: http://www.info.gov.hk/censtatd/eng/hkstat/concepts_methods/cm_pop_index.html

Appendix II

Technical Notes

Property Types
Premises are categorised according to the use for which the occupation permit was originally issued, unless known to have been subsequently structurally altered. Otherwise, no specific check is made on current use and no attempt has been made to distinguish those domestic units used for non domestic purposes and vice versa.

Private Domestic units are defined as independent dwellings with separate cooking facilities and bathroom (and/or lavatory). They are sub-divided by reference to floor area as follows:

Class A - saleable area less than 40 m2

Class B - saleable area of 40 m2 to 69.9 m2

Class C - saleable area of 70 m2 to 99.9 m2

Class D - saleable area of 100 m2 to 159.9 m2

Class E - saleable area of 160 m2 or above

Domestic units built under the Private Sector Participation Scheme, and all units built under the Home Ownership, Buy or Rent Option, Mortgage Subsidy, Sandwich Class Housing, Urban Improvement and Flat-for-Sale Schemes are not included. Data relating to rental estates built by the Housing Authority and Housing Society, units sold under the Tenants Purchase Scheme, and Government owned quarters are also excluded. ***From January 2004 onwards, domestic completions are exclusive of village houses***.

Floor Areas
The floor area for a domestic unit is its 'saleable area'. 'Saleable area' is defined as the floor area exclusively allocated to the unit including balconies and verandahs but excluding common areas such as stairs, lift shafts, pipe ducts, lobbies and communal toilets. It is measured from the outside of the exterior enclosing walls of the unit and the middle of the party walls between two units. Bay windows, yards, gardens, terraces, flat roofs, carports and the like are excluded from the area. The floor area for non-domestic accommodation is its 'internal floor area'. 'Internal floor area' is defined as the area of all enclosed space of the unit measured to the internal face of enclosing external and/or party walls.

Completions
Completions of private sector premises comprise those premises deemed completed by virtue of the issue of an occupation permit. Public sector and village house completion figures are not included.

Rental and Price Indices

As explained above average rents and prices may change from one period to another not only because of value changes but also because of variations in quality. The rental and price indices, on the other hand, are designed to measure rental and price changes with quality kept at a constant. Movement of indices may therefore differ from changes in the average rents and prices for the same period.

The rental and price indices are derived from the same data that are used to compile average rents and prices. The indices measure value changes by reference to the factor of rent or price divided by rateable value of the subject properties rather than by reference to the rent or price per square metre of floor area. In effect, by utilizing rateable value, allowance is made not only for floor area but also other qualitative differences between properties.

Following a General Revaluation of rateable values, the new rateable values are matched with the old ones for the purpose of maintaining the index series. The component index (the index for a property class or grade) has been derived from analysis of all transactions effective in a given period. The composite index for a certain type of premises is compiled by calculating a weighted average of the component indices. The weights for compiling the composite index for each type of non-domestic premises are based on the total floor area of components in respect of the current and previous 11 months. For domestic premises the weights for both rental and price indices are based on the number of transactions effected in the current and previous 11 months.

Monthly, quarterly and annual indices are shown. Quarterly and annual indices are the simple average of the monthly indices in respect of the relevant period. The indices, especially the rental indices, will tend to understate market trends. Although all rents are analysed on a net basis, allowances will not be made for the "value equivalent" of other contractual terms that are unknown to the Department. In a "tenants market" for example, landlords are normally prepared to make concessions to tenants such as refurbishment or the granting of extended rent-free periods. If rents were adjusted to reflect standard terms of agreement, the rents as adjusted would tend to be lower than the quoted rents when the index is moving downwards and vice versa.

Source: Rating and Valuation Department (Website). Available from: http://www.info.gov.hk/censtatd/home.html