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THE UNIVERSITY OF HONG KONG

# AN EMPIRICAL STUDY OF THE IMPACTS OF REDEVELOPMENT PROJECT ON PROPERTY PRICES OF RESIDENTIAL BUILDINGS IN HONG KONG

THE FACULTY OF ARCHITECTURE

IN CANDIDACY FOR THE DEGREE OF

BACHELOR OF SCIENCE IN SURVEYING

BY

BUT WING KEUNG

HONG KONG

APRIL 2009

## Declaration

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

Signed: _____

Name: BUT WING KEUNG

Date: 14th APRIL 2009

# Abstract

Urban decay is the inevitable outcome of modernization of a city. In Hong Kong, many old urban districts, such as Mongkok, Wanchai, Kwun Tong, etc., are now suffering from a serious problem of urban decay. To deal with the problem, several redevelopment projects have been carried out by the URA in these years.

In this study, empirical results of the impacts of proximity to the URA urban renewal project on residential property prices are produced through investigating the Langham Place redevelopment project in Mongkok. The results show that the project has introduced positive effects on the neighborhood after the announcement and completion of the redevelopment but affected the prices negatively during its construction phase. The results also suggest that people are more eager to pay for a property situated closer to the centre of redevelopment.

The author tries to explain the results by a variety of factors as well as the phenomenon appeared in the subject area and concludes the study with limitations of methodology and areas for future study.

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# Chapter One

# 1. Introduction

## 1.1 Background of this study

In the past several decades, the economy and population grow rapidly in Hong Kong. Large scale urban development has been proceeding continuously. Undoubtedly, urbanization is one of the outcomes of rapid economic growth and it also symbolizes the prosperity of a city. At the same time, urbanization derives various social problems, such as overcrowding, environmental pollution, obsolescence of urban area, etc, resulting in a major issue faced by many modern cities in the World– urban decay.

In Hong Kong, the humid climate as well as extremely dense population burdens the buildings with heavy deterioration. If buildings lack for ongoing maintenance, they will rapidly decline and depreciate into slum. In spite of the modernization in Hong Kong, the problem of urban decay has never been solved. On the contrary, it is getting even worse in the past. According to the survey conducted by the Urban Renewal Authority (URA), there exist more than 15 thousand of old buildings with age over 30 years. In the future ten years, the number of these old building

will increase by 50%. (URA publication, 2008)

Building deterioration is not only a problem of structural aging, but a social problem. In Hong Kong, about 110,000 residents are now living in those premises which are not suitable for inhabitation. In order to make more profits, some landlords divided their old apartment with size less than 500 $ft^2$ into 10 pieces of room for leasing. Consequently, the kitchen and washroom have to be shared by more than 10 households, leading to serious environmental and sanitary problems.

To deal with the problem of urban decay and accelerate the process of urban renewal, the Legislative Council passed the establishment of Land Development Corporation (LDC) in 1988. However, due to insufficient resources and problem in site assembly, the Government, in 2001, set up the Urban Renewal Authority (URA) to replace the role of LDC and inherit the remaining projects.

The major approaches of the URA include redevelopment, rehabilitation, revitalisation and preservation. This dissertation will focus on the redevelopment since this approach plays a major role in urban renewal in Hong Kong. The aims of redevelopment are to replace the dilapidated building with newer one in order

to enhance the standard of living and quality of environmental condition in the subject area. Up to 2008, the URA has completed 37 redevelopment projects in various scales and districts. Here, the Langham Place redevelopment project will serve as a case study for investigating the impact of urban redevelopment project. The details of Langham Place project will be presented in the later chapter.

Apart from Statutory organizations, private sector should be another party contributed to redevelopment projects which tackle urban decay. The private sector, however, are primarily motivated by the profitability of the project and hence most of the urban renewal projects in Hong Kong were not contributed by private sector in the past. The involvement of private sectors in the large-scale Langham Place project illustrates its increasingly important role towards urban renewal projects.

As mentioned above, the objective of redevelopment includes replacing the dilapidated buildings in the area suffering urban decay. Additional to replacing, the URA redevelopment also includes public facility in the redevelopment plan, like open space, green areas and site for non-government organization. All these together must create a change of neighboring environment and exert externalities

to the nearby residential buildings. As the URA emphasizes, urban renewal can improve the living condition in the subject area as well as the whole community proximity to the site. It is seemingly that positive externality to the neighborhood should be resulted from the redevelopment project. However, it is possible that some unfavorable factors may be overlooked such as the opposite voice form local groups and other associated and unexpected risks which may bring along a negative impact on the community.

To study the impact of externality, prices of nearby residential properties should be investigated. According to Bulter (1982), property prices are attributed by several factors in which neighborhood characteristic is a major contributing component. It means that a change in neighborhood condition definitely affects the property value nearby and is in turn reflected on the its price.

## 1.2 Aims of study

This dissertation aims at investigating the impacts of the redevelopment project on the nearby residential property prices throughout the whole redevelopment period by using hedonic price model. The study will discuss the impacts related to urban

redevelopment and show how the change of local environment would affect the nearby residential prices due to proximity to the site.

Many literatures have examined the impact of urban renewal that may affect positively or negatively the surrounding district in foreign countries. However, few researches were done before in this aspect to explain the impact of urban renewal in Hong Kong. Therefore, this dissertation is expected to provide evidences in showing the possible impact resulted from urban renewal project and explain the observation in the area of study.

## 1.3 Objectives

The following four objectives are identified in order to achieve the aims of study.

1) To review the literatures that examine the relationship between the residential properties prices and different property characters
2) To study the background of the Langham Place redevelopment project in Mongkok
3) To construct a suitable hedonic model for the study by choosing relevant

functional form and variables.

4) To analyze the empirical results obtained from the hedonic model and the implication of the results

## 1.4 Methodology and scope of study

The property price is a composition of prices of several implicit values from a variety of property attributes. By using hedonic price model and regression analysis, the implicit price of each property attribute can be statistically quantified. Hence, the impact on nearby residential property due to a change in environmental condition caused by the urban redevelopment project can be examined.

Different impacts may be resulted from the project during different stages. In order to examine the respective impact of a stage, the whole timeline of the redevelopment project will be divided into announcement, construction and operation stages. Additionally, relevant property attributes, such as age, floor level, size, etc, are also investigated to provide a more comprehensive hedonic result.

In this dissertation, the Langham Place redevelopment project which is one of the

urban renewal projects will be focused. It is a large scale redevelopment project in terms of site area and capital invested that the whole redevelopment cycle lasts for more than 10 years. Hence, it requires transaction records of a long period in order to cover the whole redevelopment timeline.

Finally, the results generated from data sample will be used to test for the hypotheses proposed in the study. Explanations and implications of results as well as recommendation and limitation will be discussed in the later part.

## 1.5 Organization of study

This study comprises the following six chapters:

Chapter one is the introduction of the dissertation. It provides the background, the aims, the objectives and an outline of method employed in the research.

Chapter two is the literature review. This part will focus on the studies of urban renewal and its effects on neighborhood. Also, this chapter will discuss literatures related to the theory of hedonic price model as well as the related studies of the

relationship between residential property prices and various property price attributes.

Chapter three is the background of case study. In this chapter, background information about Langham Place redevelopment project will be presented. Moreover, the critical dates of the redevelopment cycle will be identified in order to examine the shift of impact throughout this period.

Chapter four is the hypotheses, methodology and data collection. First, with the identification of targets of the study, two hypotheses are proposed. Second, detail explanation of data collection, the construction of hedonic price equation and the selection of variables will be given. At last, expected results is summarized for comparison to the empirical results.

Chapter five is the empirical results and analysis. Empirical results will be presented with several regression statistics. Analysis of the empirical results will be produced in accordance to the aims of study.

At last, Chapter six gives a conclusion of the findings, a limitation of the study

and the area for further study.

# Chapter Two

# 2. Literature Review

## 2.1 Concept of Urban Renewal

"Urban renewal is the redevelopment or rehabilitation of the older parts of towns and cities, including their central business areas. In practice, urban renewal has often meant the displacement of an existing low-income population, creating space for more profitable office, commercial and luxury residential development or the provision of transport facilities." (Gibson, 1982)

"Urban renewal refers to a deliberate effort to change the environment through planned, large-scale adjustment of exciting city areas to present and future requirements for urban living and working."(Grebler, 1964)

It is the "elimination of substandard and other inadequate housing through the clearance of slums and blighted areas and the realization as soon as feasible of the goal of a decent home and suitable living environment, thus contributing to the development and redevelopment of communities." (Doxiadis, 1966)

According to British Government (1967), it is “a new phrase for an age-old process where the redevelopment and improvement of buildings and even whole areas as they become outworn, outgrown or outdated. It is a slow but continuous process.”

Some other researchers may have another view on the concept of urban renewal. Couch (1990) concluded that the processes of urban renewal include refurbishment or change in building usage. It can also relate to demolition, reconstruction or abandonment of building. Moreover, most of the urban renewal processes are accompanied by improvement of communal facility, such as public utilities, transportation, social facilities and infrastructure, according to the needs of that area.

Urban renewal is significant, especially the most developed cities facing a formidable problem of aging buildings and urban decay which leads to various socio-economic problems namely deteriorated living environment, unhealthy living conditions and increasing crime rate.

Urban renewal which solves the socio-economic problems and improves the

quality of life of residents in the urban area is the fundamental solution to urban decay. In launching an effective urban renewal project, both of economic and social factors, in addition to physical aspect, have to take into account during the urban renewal processes. Urban renewal should take an integrated approach as the entire physical, social and economic factors are interrelated. For instance, the uneven distribution of wealth (concentration of the poor in the urban decay area) leads to tremendous social problems such as increasing crime rate and unhealthy living environment. Lack of community amenities, services and infrastructures further deteriorate the living conditions. The property value subsequently decreases due to the poor living environment. (Yang, 2002) As the changes of the urban areas are resulted from the socio-economic changes in the area, solely focus on removal of physical obsolescence is not comprehensive and effective enough. (Couch, 1990)

## 2.2 Concept of Neighborhood

A neighborhood is “a predominantly residential area of a city that is (1) characterized by its own economic, cultural, and social institutions; (2) typified by some traditional of identity and continuity; and (3) inhabited by people who

perceive themselves to be residents of neighborhood and participants in its common life." (Hallman, 1987)

Hallman (1987) also defined a neighborhood as "a territory, a small area within a larger settlement" where the people contact and interact with each other on the "basis of propinquity, that is, nearness, regardless of any other social ties." "It contains dwellings occupied by people, and usually community facilities and buildings with other uses." (Hallman, 1987) Hallman also suggested the diverse functionality of neighborhood. It serves as a community, a market, a service area, a provider of shelter, an actual or potential level of government. The established social networks and set of institutional arrangements form the "collective life" in the neighborhood. (Hallman, 1987)

Hallman's viewpoints illustrate both the physical and social dimensions of neighborhood. These conceptual frameworks (physical and social aspects) are shared by other scholars. The similarity of housing and social characteristics and the cohesive sense of identity demonstrate the existence of neighborhood. (Megbolugbe and Linnemann, 1987) The geographic classification of neighborhood and the "social and planning concept" proposed by Suzanne Keller

(1968) are aligned with the conceptual framework.

The classification of neighborhood is based on the geographic scales used by residents. Three types of neighborhood are identified, namely immediate neighborhood, homogenous neighborhood and institute-oriented neighborhood. An immediate neighborhood refers to houses clustering adjacent to each other. A homogenous neighborhood refers to the neighborhood‘s housing which lays within the same market value range. An institute-oriented neighborhood refers to the area where a shared connected relationship is established by a local institution. (Suzanne Keller, 1968) The perception of neighborhood varies among individuals, some will think that neighborhood refers to those live close to them or live in the same building or housing estate (immediate neighborhood) while some will perceive neighborhood as those area connect to the same institution such as church(institute-oriented neighborhood).

Besides, geographical classification, the social connection and sense of community shared by the people is one of the important elements of a neighborhood. The residents in the neighborhood interact and contact constantly which deepens their sense of identity towards the neighborhood. The daily

face-to-face interaction fosters the development of a "collective life" and subculture shared by the social community. According to Suzanne Keller (1968), a neighborhood "affects and reflects people's feelings about living there and the kinds of relationship the residents establish."

As a sense of belonging and shared subculture and interests are created, it enhances the motivation for residents to work together and strive for a better development of the neighborhood. It creates the nature of shared participation and constant interaction in neighborhood. According to Downs (1981), mutual aids and values will be provided and reinforced in neighborhood through the ongoing interaction and transmission of information and influence. The extent of involvement and engagement to the neighborhood depends on the strength of the social ties created. For instance, the social tie is stronger in a homogenous community which means the residents have similar socio-economic background, or from the same ethnic and racial group.

Generally, neighborhood is a geographic area which serves as various functions; residents form social identity and cooperate to facilitate the economic, social and cultural development of the neighborhood. Neighborhood interacts with the living

environment, urban renewal projects which changes the living environment physically and socio-economically are highly related to the neighborhood development. Neighborhood would be influenced by the urban renewal positively or negatively in different dimensions which will be examined in the following sections.

## 2.3 Impact of redevelopment scale

The impacts of urban renewal on neighborhood are influenced by the scope and scale of the redevelopment. The larger- scale and the more comprehensive redevelopment will have greater impacts for both positive and negative as well as the short-term and long-term impacts. The project scale also affects the overall effectiveness of the redevelopment.

According to Urban Renewal Authority, "redevelopment will target old, dilapidated buildings with poor living conditions. These sites will be replanned and rebuilt to achieve clear environmental and social benefits such as open space and community facilities."

Most scholars agree with that a comprehensive redevelopment project is more effective for tackling the urban decay problem and achieving the initial objective of urban renewal than piecemeal redevelopment projects.

Adam and Hastings (2000) stated that the piecemeal redevelopment is not the ultimate solution for urban renewal as the small scale development tends to neighborhood density increase instead of decrease and it diminishes the potential of the environment improvement. Moreover, Tang (1992) mentioned that piecemeal redevelopment is insufficient to upgrade and improve the living environment in the redeveloping area. Harvey and Jowsey also shared the same view; they claimed that a comprehensive scale is better than a piecemeal for slum-clearance.

The advantages and effectiveness of a comprehensive redevelopment project outweigh a piecemeal one. The numbers of comprehensive redevelopment projects, however, are limited across the world. It is mainly because of the economic constraints and complexity of a large-scale and comprehensive renewal projects. Financially, a huge investment is required for clearing the sub-standard buildings and rebuilding the community. Compensation is needed for the affected

residents and owners of the buildings. Administratively, human capitals are needed for negotiate with the multiple ownerships of the buildings. And the complicated urban patterns in these problematic sites further hinder the launch of a comprehensive redevelopment. A comprehensive and effective redevelopment project is achievable but challenging. The Urban Renewal Authority claims that "this is a complex exercise in prioritising the competing claims between past commitments and future expansion, the urgent need for slum clearance and the gradual rejuvenation of old districts, compulsory redevelopment and voluntary rehabilitation, limited financial resources and high public expectations." (URA, 2008) Furthermore, URA states that "where possible, the URA will assemble larger areas of land for comprehensive planning." In order to enhance the effectiveness of the renewal projects, URA adopts an "area-based renewal planning approach" instead of "an individual project site based development approach". Under the area-based approach, the "Action Area" includes a cluster of redevelopment sites which will redesign and renew with a mix of rehabilitation, preservation and revitalisation measures

Besides, the URA, private developers also participate in redevelopment process. The major rationale and motivation for private developers to undergo

redevelopment projects is the economic incentive: the profit gains. In order to maximize the profits and minimize the cost, most private developers will carry out small in-situ and piecemeal redevelopment projects which building skyscrapers in the area replacing the old building without improving the community facilities and environment. These projects further complicate the urban patterns and enhance the difficulty for long-term large-scale development potential. However, in order to launch a comprehensive and effective renewal project, the role of private developers should not be underestimated. Cooperation and joint efforts with private developers which can leverage the synergies among developers and URA is critical in launching a successful and comprehensive renewal project. (Yeh, 1988)

## 2.4 Gentrification

### 2.4.1 Defining Gentrification

The term “gentrification” was first created by the urban geographer, Glass (1964), to describe the changing of neighborhood appeared in London that lower class residents were displaced by the immigration of higher class residents who refurbish the obsolete properties in the area. She described the

phenomenon as follows:

"One by one, many of the working class quarters of London have been invaded by the middle classes—upper and lower. Shabby, modest mews and cottages—two rooms up and two down—have been taken over, when their leases have expired, and have become elegant, expensive residences. Larger Victorian houses, down—graded in an earlier or recent period—which were used as lodging houses or were otherwise in multiple occupation - have been upgraded once again." (Glass, 1964)

Also, she suggested that "once this process of 'gentrification' starts in a district it goes on rapidly until all or most of the original working class occupiers are displaced and the social character of the district is changed." (Glass, 1964)

Some modern scholars does not restrict the term 'gentrification' only to explain for the residential phenomenon, but a wider context that also describe the similar situation happening in commercial and retail areas:

"How, in the large context of changing social geographies, are we to distinguish

adequately between the rehabilitation of nineteenth-century housing, the construction of new condominium towers, the opening of festival markets to attract local and not so local tourists, the proliferation of wine bars and boutiques for everything and the construction of modern and postmodern office buildings employing thousands of professionals, all looking for a place to live? ... Gentrification is no longer about a narrow and quixotic oddity in the housing market but has become the leading residential edge of a much larger endeavour: the class remake of the central urban landscape.'' (Smith, 1996)

### 2.4.2 Impact of Gentrification

For the home owner, increment of property prices is an obvious benefit from gentrification. This point has been examined in many researches that investigated into the price and rental increase in the area of gentrification. (Atkinson, 2002)

Rehabilitation of the neighboring physical conditions is another benefit of gentrification. This has been verified in many cases that building of undesirable conditions has been upgraded in the area of gentrification. In UK, lower income residents were willing to have their properties renovated by using government's

housing grant. (Hamnett, 1973)

Henig and Gale (1987) conducted survey in the district and has revealed that gentrification helps to improve the quality of communal services and shopping facilities that it is beneficial to original residents. However, these original residents may have been displaced before they can enjoy the completion of the improvement of local services and facilities.

## 2.5 Hedonic Price Theory

Hedonic price model is first developed by Rosen (1974) to study the hedonic price or a set of implicit prices of products which can be considered as a bundle of characteristics. According to him, hedonic price are defined as "the implicit prices of attributes and are revealed to economic agents from observed prices of differentiated products and the specific amount of characteristics associated with them."(Rosen 1974, p.34) He adopted econometrical analysis to explain the estimated implicit prices by using regression of the price of a product on various characteristics. However, he realized that, in most of the cases, structural interpretations of the model are unavailable. Therefore, the major objective of the

model is to demonstrate a production mechanism for the observations and to explain the meaning and interpretation of the implicit prices.

As suggested by Bulter (1982), constructing the true hedonic function for housing needs the identification of the relevant independent variables and the certain functional form. Including demander characteristics such as income as an independent variable is one of the misspecifications since income of the buyer should not be regarded as an implicit price of a property. Therefore, hedonic function must be restricted within the characteristics of the properties. However, there is a considerable number of housing characteristics. It would be problematic to include all the characteristics into the functional form. Bulter (1982) further suggested that we should include only those characteristics which can affect the determination of the transaction price. In other words, characteristics which provide utility to the buyers and are expensive to produce should be included.

### 2.5.1 Property price attribution

Mok et al. (1995) categorized the characteristics of the properties of the hedonic model into locational attributes, structural attributes and neighborhood attributes.

Thus, the functional form of the model can be represented by:

$$P = F (L, S, N)$$

Where P is the market price of the property

L is the locational attributes

S is the structural attributes and

N is the neighborhood attributes

#### 2.5.1.1 Locational attributes

The value of a property represents not only a set of structural attributes but also a set of locational specific characteristics. So, it is possible to estimate the value of a property by adding the locational factors into the hedonic model. (Cheshire and Sheppard, 1995) Therefore, the relevant locational factors of a particular property should be identified.

Accessibility to City Centre

In the study of Alonso (1964), the simple land rent model suggested that the value of a property is relatively higher when it is closer to the centre of city.

His assumption is that the buyers are only concern about the accessibility to his working place when determining to buy a property. If the property is located far from the place of working, a higher cost of commuting or transportation as well as a longer time is required. The price premium enjoyed by residents with longer distance to city centre is to compensate the extra transportation cost and travelling time. He suggested that the price gradient of two places decrease only if the cost or the time for travelling decreases by the means of improvement of facilities for transport. The model has provided a basis for the later researchers to examine the relationship of properties and accessibility.

Li and Brown (1980) focused on the impact of the accessibility of the residential properties to Boston (CBD of the district). It shows an important and statically significant adverse effect with the increase of distance to CBD and proved that it is a relative locational benefit to properties. The result of Mok et al. (1995) also shows an advantage with premises closer to the CBD. In the study, distance to CBD is included as a variable in constructing the functional form of the hedonic model. Direct distance is measured from the edge of the defined CBD to the subject residential properties and the

coefficient shows a negative sign which means property prices decrease with the increase of the distance from the CBD. However, Richardson et al. (1990) discovered that the impact of distance to CBD is weakened in 1980s than before due to the evolution of multi-centricity of Los Angeles.

Accessibility to transportation

According to So et al. (1997), the influence of transport on properties prices can be categorized into four major aspects which are availability of transport, transportation costs, travel time and convenience of transport. In the study, the transport accessibility is measured by the distances to the nearest MTR, buses and minibuses stations. The empirical result shows that the accessibility to minibuses and MTR is significant enough to impact on the housing price.

Moreover, improvement in mass transportation may reduce the price gradient of properties along the line of transport due to the decrease of costs of transportation and time (Chau and Ng, 1998). The result from Chau and Ng's study showed a negative impact of the electrification of KCR on the price gradient along the railway line that means the property prices is

increased after the improvement of KCR. Same result is confirmed by the study of Henneberry (1998). He discovered that upon the completion of a new transport system, it brought a positive impact on the property prices.

Accessibility to communal facilities

Darling (1973) tried to quantity the value of an urban water park by including distance to water as a variable to indicate that it is measurable and significant to affect the properties price. He explained that with the property closer to the water park, people could enjoy the recreational facilities easier. In another study of Brown and Pollakowski (1977), the empirical results show that the value of a property falls with distance from water due to the reduction of power to acquire open space by the home owner. Other variables such as accessibility to the main highways and school are also included in the research of Harrison and Rubinfeld (1978).

#### 2.5.1.2 Structural Attributes

Structural attributes refer to the factor affecting the value of the property itself. The most commonly used determinants of structural characteristics usually are size, age and floor level of the property. (So et al., 1997)

Age

Bible et al. (2002) studied the sale price of residential properties. As expected, the age variable shown is negative and significant, meaning that the older property the lower the price. Same results on the age variable are reconfirmed in many other researches. It is because new buildings incorporate newer and more modern facilities while old buildings require more frequent repair and maintenance. (Mok et al., 1995; So et al., 1997)

Size

It is obvious that a larger property can be sold at a higher price. However, when considered the price per square unit, Mok et al. (1995) found that the size and price per square unit shows a inverse relationship which means that price per square unit decrease when size increase. In other words, for a larger size property, the price property will still go up but with a decreasing rate. Wolverton (1997) also studied the relationship of lot size and unit price. The result indicated that unit price diminishes as lot size increase which follows the law of diminishing marginal utility to home owner. In the research of Huh and Kwak (1997), however, shows an opposite result to

Mok. They found that the unit price rises if more rooms contained in the properties in Seoul.

Floor level and view

According to Mok et al. (1995), properties located at higher level have higher prices due to a better environmental view. Chau and Ng (1998) controlled the factor of floor level by including this as an independent variable. The reason to have such control is that the floor level is an important determinant since the properties situated at a higher level would enjoy better views and quieter environment. Pollard (1980) investigated the views of landscape like lakes and parks. The study identified that the property with a view to these scene attribute to property price. Ho (1999) also studied the impact of different views on property prices. The empirical result indicates that sea view, river view or a racecourse view has positive effect. However, a view to reclamation site decreases the residential price. Therefore, both the floor level and the views of a property are interrelated and significant enough to affect the property price.

Other structural attributes like plumbing fixtures, concrete wall, roof

covering etc. are also included in another study despite the insignificant influences of these housing traits (Megbolugbe, 1989).

#### 2.5.1.3 Neighborhood attribute

Neighborhood attribute is related to the impact or the externality acting on the property by the surrounding environment. Many empirical studies of the relationship between the annoying economic by-products of the surrounding development and their negative effects on the residential property have been examined in the past. Thayer, Albers and Rahmatian (1992), Reichert, Small and Mohanty (1992) and Nelson, Genereux and Genereux (1992) proved that landfills are unfavorable to residential property prices. In particular, the results from Thayer et al. (1992) showed a bigger negative impact for hazardous waste than for nonhazardous. Page and Rabinowitz (1993) studied the effect of groundwater pollution while Kohlhase (1991) dealt with toxic waste sites. Apart from the studies mentioned above, the effect of underground storage tanks on residential property values has also been investigated. Simons, Bowen and Sementelli (1997) included proximity to a registered tank with leakage problem as one of the independent variables. They concluded that the impact of this variable accounts for a 17% decrease

of residential sale prices.

Proximity to different kinds of amenities such as school, hospital and green belt also exerts some sorts of externalities to the property value. Huh and Kwak (1997) studied the effect of proximity to high-quality school, hospital and green belt on property prices. They showed that school quality influences on the property value positively and hospital influences negatively because of the traffic congestion generated as expected. However, an unanticipated result is that green belt exerts adverse impact on housing price. It is due to the development restrictions on green belt hindered development potential and that can offset its positive environmental effect.

Huang (1996) employed a hedonic model to study the influence of estate effect on property price. He concluded from the results that a property situated in estate development has a price premium over those single block development. It may be due to the reasons that estate development gives the opportunities for the developer to have a better overall planning to deal with the combination of block relationships, views, flat size, pedestrian movement, provision of facilities and landscaped space. Therefore, the

overall surrounding environment should be enhanced that eventually increase the property prices.

Some other studies focus on the effect of certain kind of special amenity in the nearby development. Galster and Williams (1994) examined the impact of homes for mentally disabled. Do, Wilbur and Short (1994) investigate on externalities produced by house of worship. Do and Grudnitski (1995) researched on the impact of the adjacent golf course. The empirical results showed that there is a 7.6% of price reduction to the sale price of properties.

Several variables of environmental pollution are also included in a series of studies. Sulphur dioxide and dust level are employed to estimate the air quality (Berry and Bednarz, 1979; Anderson and Crocker, 1971). On the other hand, relationship of housing price and cleanness of air is also investigated. (Nelson, 1978; Harrison and Rubinfeld, 1978). Moreover, the impact of loud noise generated from planes on the nearby properties has been shown negatively to the property price.

#### 2.5.1.4 Other attributes

In addition to locatioal, structural and neighborhood attribute, some social and cultural factors which cannot be classified into these three aspects also accounts for the determination of property prices.

The effect of superstition on property price is studied in Chau, Ma and Ho (2001). The results show that a lucky floor number such as '8' and '18' is a valuable attribute since the pronunciation of '8' is similar to prosperity in Cantonese that it can be sold at a higher price although no observable or material benefit for the tenants living in the property. However, they addressed that people are more willing to buy a property with a higher price during property booms but it is less valuable during the period of property slump.

Another study conducted by Chau, Ng and Hung (2001) found that developer's good will can affect the property prices in Hong Kong. The empirical result showed that this factor accounts for at least 7% of the property price. Therefore, the reputation of the developer should be considered as one of the price determinants that a premium should be

assigned to well-known developer and vice versa.

### 2.5.2 Control of time effect

Time effect refers to the difference of price level in the property market during different period of time. It is a macro economical factor which results from several causes include inflation rate, interest rate, government policy on property market, mortgage ceiling, etc.

As a matter of accuracy, proper controls over time effect should be employed in doing hedonic analysis. Several methods can be served as the controls of time effect. The first method is to collect the required data in a very short period of time, say, within one to two months. Such that, the effect of time is insignificant since the fluctuation of property market would be so small that this effect can be eliminated or avoided.

The second method is to include different period of time as dummy variables. In Wolverton (1997), the time effect is controlled by using dummy variable for different period of time. Thus, the time effect can be regarded as a factor to determine the property prices and the resulting coefficient can be used to

interpret its effect towards the property.

Price deflator is another method that used frequently by the researchers. Chau, Ma and Ho (2001) deflated the transaction prices by using the monthly indices produced by Rating and Valuation Department to obtain the real price of the properties in Taikoo Shing.

# Chapter Three

## 3. Background Information of case study

Background information about Langham Place redevelopment project will be discussed in the following sections

### 3.1 Poor living conditions before redevelopment

The living condition in the selected site for Langham Place redevelopment project was very poor before the commencement of construction. It is due to the mixing uses of residential, industrial and commercial in the same building, causing serious sanitary problem. Together with others environmental factors, such as frequent traffic congestions, air and noise pollution, insufficient of communal amenities, and inadequate planning for market facilities to accommodate the on-street wet goods hawkers, it further deteriorated the level of living in the area chosen for redevelopment.

The survey done by LDC in 1997 revealed that most buildings located in Mong Kok and Tai Kok Tsui district was deteriorated and unsuitable to be inhabited. More than a half of the buildings were over 30 years, and half of them are only 6 floors.

Facing the defective living condition in the selected area, LDC proposed to carry out a redevelopment scheme, which aimed to bring socio-economic benefits to the district.

In the Langham Place redevelopment project, there was a site for commercial, office and hotel developments, the deteriorated pre-war buildings were replaced by a modern commercial development with more public open space provided and the transportation network improved, like the public light bus terminus.

On the other hand, the project provided employment opportunities for the community as it enhanced the business activities.

However, there are still some drawbacks for the redevelopment projects despite its benefits to the district. For the residents lived in the area of the project, they needed to move out from their accustomed society, and lose their accommodation with low rent. For the businessmen running their traditional businesses there, they may lose their frequent customers once they moved away and have to seek a new location for continuity.

The negative effect of the project also appeared in the legal aspect. For the residents who were not well educated, they found difficulties when facing the legal documents and taking part in the legal procedures. They simply did not know their position and the ways to seek assistance from the government. Also, the project company was not transparent and accountable enough for the residents to participate in. Therefore, the affected residents were not able to understand the logic of the redevelopment as well as their rights or obligations.

Since the announcement of redevelopment plan of Argyle Street and Shanghai Street in 1989, the decay among the urban area of the project was speeded up because owners of the properties became less motivated in repairing and maintenance of their buildings. It caused an escalation of crime rate and more serious hygienic problems in the area.

## 3.2 Scheme of redevelopment

In the Langham Place redevelopment project, the comprehensive redevelopment, in addition to commercial uses, included government facilities, communal

amenities and area for public. The scheme involved several streets such as Soy Street, Mongkok Street, Argyle Street and the square between Shanghai Street and Canton Street, which are the areas needed to be redeveloped. It was planned in order to create more public area with retail and shopping facilities and underground pedestrian passage. Also, another objective of the redevelopment includes creating more effective enhancement to neighboring environment by providing public area and pedestrian paths for minor road.

The redevelopment project was approved officially by the Governor-in-Council on 13th July 1993 and followed by the beginning of acquisition in October 1993. Finally, the Master Layout Plan of the redevelopment was passed in March 1997. In December 1997, the resumption of properties and clearance processes were completed and the demolition work began in the next year. The construction was originally planned to be completed in 1998. However, the completion of construction has been delayed until the end of 2004 due to the difficulty in property acquisition. After the transformation of LDC to URA in 2001, the redevelopment project was handed over to URA.

Langham Place has introduced a remarkable changing process, with the ripple

effects on the old urban area in Mong Kok. After the completion of the redevelopment project, there has appeared a phenomenon that property prices and shops rentals have gone up. Also, refurbishments of obsolete buildings have been performed to attract more competitive commercial tenants. For all these results, the managing director of the project company named that “Langham Place Boom”.

In general, it seems that the area have developed a new image from its original nature to be a more modern and trendy district. The Langham Place redevelopment illustrates how old districts can be reenergized by a successful urban renewal project. It shows that not only the environment and communal facilities have been improved physically but also more business opportunities and economic activities have been created.

### 3.3 Neighborhood of the redevelopment site

The buildings located near the Langham Place, such as those in Portland Street, Reclamation Street and Shanghai Street, are very poor in physical conditions that they are usually obsolete, decayed and with unsatisfactory maintenance. Also, poor hygiene, insufficient repairs and unauthorized structures of the buildings have

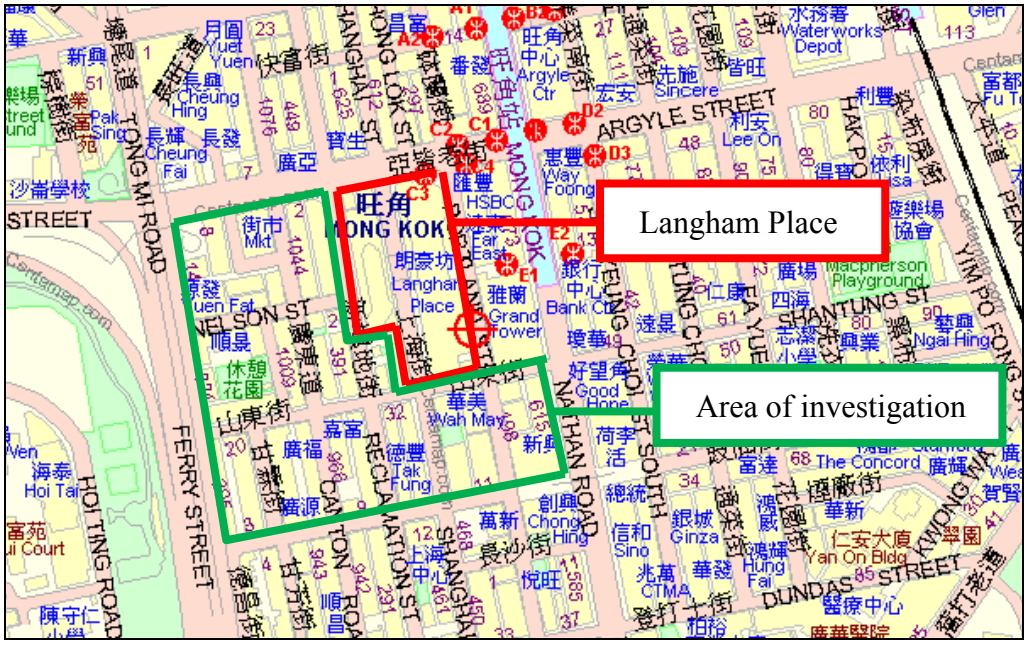
created a detrimental habitation for residents. In some particular cases, the buildings are too dilapidated but the property owners are still not eager to spend money for building maintenance.

Those buildings not only in poor conditions themselves, but also affected by other nearby low-class business activities. For example, the hanging signage and neon light signs of night clubs, karaoke, and massage service create light pollution.

In this old urban area, communal facilities and open spaces are barley found. Only some more modern and taller buildings are located in the place in between the old buildings somewhere. However, these new buildings make the visual condition undesirable in the district due to their fragmentary nature. Further away from the redevelopment site, buildings are generally newer in these areas that more residential buildings mix with commercial and retail uses providing more shopping facilities for the people in Mongkok.

## 3.4 Area of investigation

The location of Langham Place and the area for investigation are shown in Figure 3.1. Transactions will be collected from the resident buildings situated in the area of investigation. The building name and its address are listed in Appendix I




Source: www.centamap.com

Figure 3.1: Area of investigation

# Chapter Four

# 4. Hypotheses and Methodology

## 4.1 Hypotheses

### 4.1.1 Targets of study

This study is to examine the impact of Langham Place redevelopment project on the surrounding residential property prices. Since different impacts may be introduced throughout the whole redevelopment timeline. It is possible that in some stages the impact is positive but negative in other stages. Therefore, various stages will be investigated, including the announcement stage, construction stage and operation stage, in order to determine an overall impact for a large scale redevelopment project.

In this study, the focuses of the impact of the redevelopment project include two parts. The first is to look for the effect on residential property prices due to the improvement of neighborhood condition. It is likely that prices would be increased as a result of the large scale comprehensive development providing better communal facilities and centre for shopping. Another focus of this study is

the effect of proximity to the redevelopment area. For a property closer to the area, it is expected that the suffered impact is more significant. Therefore, this study will also examine the willingness of people to pay higher prices for more accessible to the renewed area.

Due to the change in characteristics of the redevelopment area in the project timeline, the impact will definitely vary accordingly. After the official announcement of redevelopment project, the market anticipated that redevelopment of the obsolete area can enhance the nearby area in many aspects. Although these improvements are not ye enjoyable by the resident, these will nevertheless contribute to the property value as people expect that the future standard of living is better since the announcement and ascertain of the redevelopment plan. The expected value is thus capitalized onto the residential property prices.

During the construction stage, expectation of future betterment is still effective on the nearby residential property. Apart from that, nuisances arising due to the construction activities proceeding in this period may also affect the property price. These nuisances including the production of air particulates, unpleasant

view, annoying sound, etc, will have an adverse effect on property price. The combining effects of anticipation as well as the construction activity could determine the property value in this stage. However, magnitude of each effect cannot be distinguished theoretically, hence, it is better to examine the result empirically in this dissertation.

After the completion of the redevelopment project, the anticipated benefits are now put into practice. With the finishing of construction activities, the nearby residential properties is expected to get rid of the disturbances resulted from the construction. Thus, the adverse effect on property prices is terminated and higher property prices should be reflected in the market. On the other hand, the prompt effect of the benefits of the redevelopment is now enjoyable by the residents in the nearby area. It in turn reflects onto the property market, leading to higher residential property prices. Under the full operation of Langham Place comprehensive development, all the worry about the unsuccess of the redevelopment is eliminated. It is possible that the increase in property prices attributed in this stage is much higher than the former two stages.

Therefore, two hypotheses can be concluded from above.

1) The nearby residential property prices will increase after the announcement and during the operation of Langham Place, but decrease when the project is under construction.

2) The proximity to the redevelopment area has positive impacts on the residential property prices, i.e. the closer to the redevelopment area, the higher the residential property prices.

Hedonic price model, the tool for investigating the impact of the redevelopment as well as testing the two hypotheses above, will be discussed in the following sections. The first hypothesis will be tested through the changes of residential property prices in response to the identified four distinctive stages, namely pre-announcement stage, announcement stage, construction stage and operation stage, by using corresponding dummy variables. The test for the second hypothesis will make use of a quantitative independent variable, distance to Langham Place, to estimate the impact on the property prices. Further explanation on the hedonic equation and variables will be given in the later section.

## 4.2 Hedonic price model

To investigate the value of a large scale redevelopment project adding to the neighborhood, there are many methods to do so. One method is to conduct a personal survey to ask about the willingness for people to pay extra for a property having such project nearby. However, this method is subject to inherent biases of each individual due to the fact that everyone has different value and preferences on certain object. Another method is to measure the value charged by the developer on the nearby property with the introduction of redevelopment project. But Hung (1998) realized that the conclusion of such method is insignificant since the price charged for the developer is not true transaction prices but largely due to administrative prices.

Therefore, hedonic price model should be employed in this study. It is because the model can study the actual market operation and the hedonic prices which are obtained empirically by actual payments on the properties. The following section will present the structure of hedonic price equation.

### 4.2.1 Structure of Hedonic Price Equation

As stated in Chapter 2, the hedonic price model study the interrelationship of the property prices and its different attributes which can be categorized into three major sections namely locational attributes (L), structural attributes (S) and neighborhood attributes (N). Locational attributes represent the accessibility to economical and communal facilities such as distance to Central Business District, shopping centres, other recreational facilities, etc. Structural attributes covers the characteristics of the property itself, including age, floor level, size, etc. Neighborhood attributes refer to the surrounding environmental effects such as the level of disturbances, pollutions, amenities, etc. Therefore, the market price (P) can be represented by the function

$$P = F ( L, S, N )$$

From the function above, Rosen (1974) stated that the marginal implicit prices or the hedonic price of any attributes is the partial derivative of the linear equation. When all other attributes are kept constant, the property value will be changes according to the change of one of the attributes. (Linneman, 1980) It shows that the marginal change of the property prices is related to any of the attributes and

the linear relationship is assumed as follow

$$P = a_0 + \Sigma\, a_f L_f + \Sigma\, b_g S_g + \Sigma\, c_h N_h + \varepsilon$$

$$\gamma P / \gamma L_f = a_f$$

$$\gamma P / \gamma S_g = b_g$$

$$\gamma P / \gamma N_h = c_h$$

where $P$ = individual property price

$L_f$ = variables of locational attributes f

$S_g$ = variables of structural attributes g

$N_h$ = variable of neighborhood attributes h

$a_0$ = constant term

$a_f, b_g, c_h$ = regression coefficients of corresponding variable

$\varepsilon$ = stochastic or error term

With other factors remain unchanged, the regression coefficients $a_f, b_g, c_h$ indicate the changes in Price (P) resulted from the change in one unit of $L_f$, $S_g$, $N_h$ respectively. Therefore, if there is a chane of one unit in $L_f$, $S_g$, $N_h$, the price (P) will change in one unit with the multiplication effect of $a_f, b_g, c_h$ respectively. For

instance, when $L_f$ increases by one, Price (P) is expected to go up by $a_f$. In fact, the regression coefficient $a_f$, $b_g$, $c_h$ are the implicit prices of the property attributes accordingly.

The error term is normally distributed with the mean zero and it is independent of $L_f$, $S_g$, $N_h$. It is a random error and represents all non-observable variables.

Normally, Ordinary Least Square (OLS) is used to measure the regression coefficients $a_f$, $b_g$, $c_h$ mentioned above. The technique estimates the parameters from the sample data so that the sum of squared errors is minimized. In the later part of this dissertation, the OLS is employed.

### 4.2.2 Choice of functional form

Identifying the correct dependent variable is a major step to determine the correctness of the hedonic relationship among the variables. Apart from that, the choice of functional form of the hedonic equation is also another important criterion. More than 80% of the inaccurate hedonic estimations of property value are contributed by inappropriate choice of functional form. (Linneman, 1980)

For the relationship of dependant variable and independent variables that can be deduced theoretically, the logic to determine the correct functional form is simple that just to reuse the pre-established form.

However, if the relationship cannot be deduced theoretically or there is no adequate information available for such decision, the choice of functional should be based on trial and error by the available observation. Generally, the procedures are to first assume a linear relationship to test the data. If the linear function fails to explain the observation, more flexible functional forms should be employed such as Box-Cox transformation or polynomial function.

The reason of using linear function at first is that linear function is usually useful due to the conformity in measuring the elasticity of demand of property attribute and the idea of treating the linear coefficients as the implicit prices. A hedonic function would be established in this dissertation. Several property attributes is included in the model such as age, floor level, size, other dummy variables, etc. As discussed in chapter 2, the sole impacts of these variables are identified to a certain extent, for instance, the higher the floor level, the higher the property price. So there exists an inverse relationship between price and the independent

variable floor level. However, the overall impact of these variables is hardly to be foreseen if a set of the variables is simultaneously contained. So, in this study, the method of choosing a functional form would be determined by first assuming that the hedonic relationship is more likely to be a liner form, followed by modification of the linear form according to the desirableness of the result obtained.

### 4.2.3 Test statistics

The significance of the empirical results in the study can be indicated by interpreting the test statistics. In studying hedonic results, some statistics such as the t-statistics, the coefficient, the coefficient of the determination $R^2$ and the F-statistics are more important and essential for the interpretation. They will be discussed in the following part.

#### 4.2.3.1 t-statistic

The t-statistic is used to observe whether the impact on the dependent variable (P) of each independent variable is significant or not. The value of t-statistic depends on the coefficient of the independent variable (b) and the standard error of the corresponding coefficient (Sb). The relationship is

expressed by

$$t = | b/Sb |$$

The chance of b = 0 is lower if the value of t is higher so that the accuracy for the estimation is higher. It should be noticed that if an independent variable is statistically significant, that means that the dependent variable (P) is more likely to be influenced by the independent variable. Moreover, the significance of an independent variable has no relationship to the magnitude of the impact on the independent variable (P). It means that the t-value can be very high (statistically significant) despite a very low value of b (small magnitude of impact).

The effect of the independent variable is statistically significant at ( 100% – α ) confidence interval if

$$| t | > T_{( 1-\alpha, df )}$$

Where α = probability of the coefficient equals to 0

df = degree of freedom

$T_{(1-\alpha, df)}$ = the critical value of t for a given α and df.

t = the value of t-statistic

For instance, if the absolute value of the obtained t-statistic is larger than the critical value of t in a given value of α (say, 5%) and df, it means that the variable is significant at a 95% confidence level or 5% level. Therefore, it can be seen that the higher the given value of α, the lower the critical value of t, thus the easier the independent variable to be statistically significant.

#### 4.2.3.2 Coefficient ($a_f$, $b_g$, $c_h$)

The coefficient of the independent variable estimates for the magnitude of the effect on the dependent variable (P). For linear hedonic function, the coefficient of an independent variable represents the change in value of the dependent variable (P) for a unit change of the corresponding independent variable. On the other hand, for logarithmic form, it represents the change in percentage of the dependent variable (P) for a unit change of the corresponding independent variable. The sign of the coefficient indicate whether the independent variable directly or inversely affect the dependent

variable (P).

#### 4.2.3.3 Coefficient of the determination ($R^2$)

It is a measure representing the percentage of variance in the dependent variable (P) that can be attributed to the change of the independent variables. Thus, it indicates the explanatory power of the regression model towards the variation of the dependent variable (P). The higher the $R^2$, the more the variation in dependent variable can be explained by the independent variables all together. Therefore, it can reflect the validity and overall significance of the model. For example, if the $R^2$ of the model equals to 0.6, it means that 60% of the change in dependent variable (P) results from the variation of dependent variables. The remaining 40% may be due to unknown. Usually, the value of $R^2$ would be higher if more independent variable is put into the model regardless whether these newly added variables are significant or not. A high value of $R^2$ can also reflect a high homogeneity of the nature of the sample data. ( Chau and Ng, 1998)

#### 4.2.3.4 Adjusted $R^2$

It has similar interpretation as $R^2$. It, however, takes into account both the

sample size and the number of independent variable in the model. Theoretically, the value of adjusted $R^2$ is generally smaller or just equal to that of $R^2$.

#### 4.2.3.5 F-statistic

F-statistic indicates the significance of the Coefficient of the determination ($R^2$). It is used to test whether there is one or more than one of the independent variables are significant to affect the change in dependent variable. If the value of F-statistic is greater than the critical value determined in the first place, it gives supplementary supports to the significance of the results.

## 4.3 Data

### 4.3.1 Source of data

The transaction data for the investigated residential buildings is obtained from the data base of the Economic Property Research Centre (PERC). The transaction records provide the transaction price, date of transaction and other

specific information of the property including the address, the issue date of occupation permit, floor level, gross floor area and useable floor area. One insufficiency of the records is that no information of the viewing of the property is provided. As discussed before, viewing of a property do affects its value. However, due to the dense building situation in Mongkok, this factor can be eliminated. Details will be discussed in the later part of this study. Another disadvantage is that there is no information on the distance to MTR station or other mass transportation. This factor can be overcome by measuring the distance directly on a scaled map.

### 4.3.2 Data Adjustment

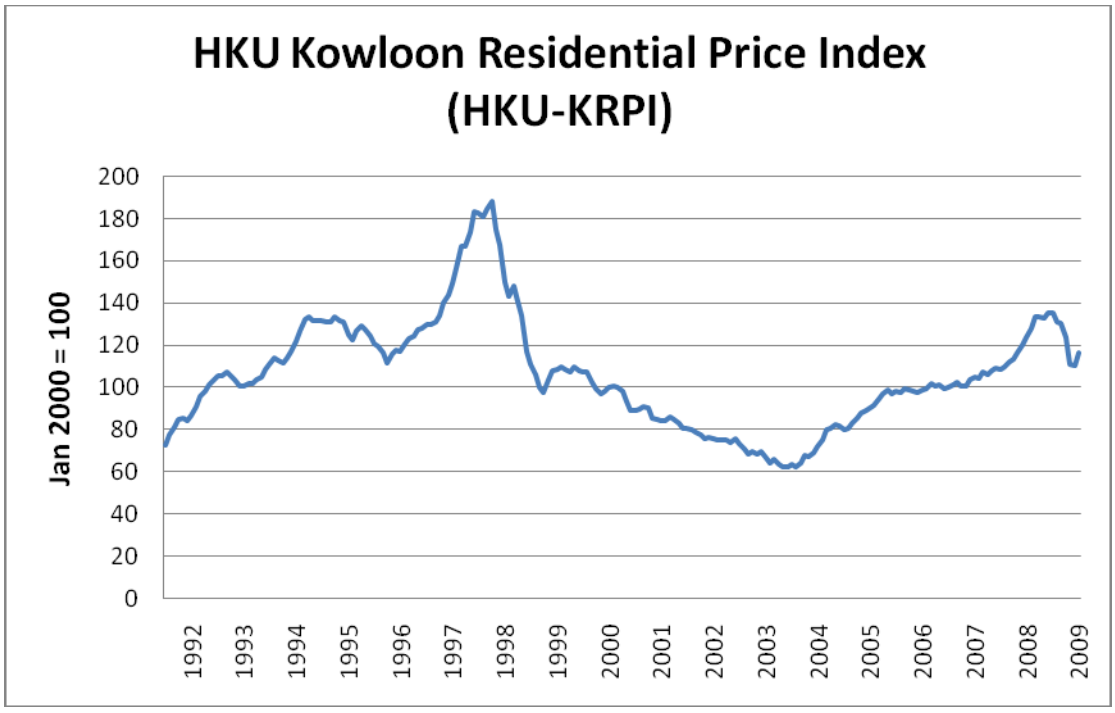
Since the transaction data obtained for this study will include a period of more than fifteen years, proper adjustment on the data should be employed to eliminate the time effect. As discussed in chapter 2, the property market is very volatile and certainly encountered several tops and bottoms within this period. The property value is thus affected due to many factors other than locational, structural and neighborhood attributes. The impact of time effect on property prices may be changed yearly, quarterly or even monthly. As a result, some tools for adjusting the data should be introduced.

Dummy variables for different time interval may be included in the hedonic model to serve as a control over the time effect. The number of dummy variable need to be added is proportional to the length of time of the data base. As a lot of dummy variables are required for a long period, especially for quarterly and monthly time intervals. Therefore, this method should be feasible only for a model with a relative short term. Another approach can be adopted for a model with longer period of time.

For the data collected in this study, price deflator is introduced to adjust the transaction prices at different time levels to a common base to eliminate the time effect on different period. Here, the price deflator used is The University of Hong Kong Kowloon Residential Price Index (HKU-KRPI) constructed by The Department of Real Estate and Construction, The University of Hong Kong. (Chau, 2006) HKU-KRPI is a monthly price index which traces the changes in price levels of the transaction of residential properties in Kowloon from 1991. (Chau, 2006)

Instead of using quarterly or yearly price index, this monthly index can provide a

more accurate adjustment due to the volatility of the property market in Hong Kong. As one-year interval is too long that if the adjustment made may not fully reflect the actual change in price level in a particular short period when a transaction is proceeded. Also, index with quarter as a time interval has the same disadvantage although it would be more accurate since the time interval is shorter. Therefore, monthly price index would be most appropriate for the adjustment of time effect.




Source: Department of Real Estate and Construction, The University of Hong Kong. (Chau, 2006)

Figure 4.1: HKU Kowloon Residential Price Index

### 4.3.3 Data control

One of the disadvantages of using EPRC data is that it does not incorporate any locational and neighborhood details about the properties. In order to minimize the effect of this drawback, samples with similar characteristics about locational and neighborhood factors are collected.

## 4.4 Selection of Variables

The importance and significance of different variables have been mentioned in the previous chapter. In the following part, several variables will be selected from those available to construct the hedonic model.

As already discussed before, all the variables that could affect the price of the properties should be included in constructing a hedonic model. Typically, most of these variables can be categorized into three types of property attributes namely locational, structural and neighborhood attributes. It is correct that the more the variables added in the equation, the higher the prediction power of a model would be. However, the model would become very complex if too many variables are included into it. Also, abundant observations are necessary for supporting a high

number of variables to determine a more reliable empirical result. (Chau and Ng, 1998)

As pointed out by Chan (2002), there are theoretically unlimited numbers of variable to determine the price of a property. In order to keep the model accurate and maintain the simplicity of the equation, only the appropriate and decisive variables should be included in the hedonic model.

In this study, selection of variables is generally based on the factors mentioned above. The decisive property attribute is drawn from the discussion in the former part. The following table shows the variables selected for inputting the hedonic equations.

| **Types of Variable** | **Symbol** | **Description** |
|---|---|---|
| Dependent Variable | RP | Real transaction price per sq.ft. of the property |
| Quantitative Independent Variable | AGE | Age of the building |
| | FL | Floor level of the property |
| | GFA | Gross Floor Area |
| | DIST_MTR | Walking distance to the nearest exit of MTR station |
| Dummy Independent Variable | AN | Announcement of the project |
| | CONS | Construction of the project |
| | OP | Operation of the development |

Table 4.1: The variables selected for the hedonic equation

Form the table above, you can notice that some of the locational and neighborhood variables discussed before are excluded in the selection. It is because the sample data is obtained from the same area, thus it has already controlled and minimized the differential effect of those locational and neighborhood attributes.

Moreover, the sea-view is also excluded from the table. The logic behind is that properties in the subject area do not enjoy any sea-view due to the fact that the buildings are relatively short, closely packed, and distant from sea.

The variables included in the table would be discussed in the following section

### 4.4.1 Dependent variable

"……the determination of the correct specification of the hedonic relationship requires not only that the correct dependent variable be identified but also that the correct independent variables and functional form be utilized." (Megbolugbe ,1989)

Real transaction price per square foot at Jan 2000 (RP)

The RP is the real transaction price of the property in Hong Kong dollar per $ft^2$ of gross floor area at constant Jan 2000 price. As discussed before, the real transaction price is adjusted by deflating the nominal price with the monthly based HKU Kowloon Residential Price Index. The calculation of real price can follow the equation:

Real price = Nominal Price x 100 / Price index

The figure of nominal price can be easily obtained from the records of EPRC.

Then, the deflated real transaction price would be used as the independent variable in this model.

### 4.4.2 Quantitative Independent Variable

#### 4.4.2.1 Age (AGE)

It refers to the age of the property when the transaction was performed or when the Agreement for Sale and Purchase (ASP) is signed. In this dissertation, year would be used as the unit of the variable. It can be calculated from the date the occupation permit issued to the date of transaction performed or the ASP signed. The issuing date of occupation permit represents the completion of the construction of the property and the property would start to be occupied and inhabited by the user. Both the date of transaction and issue of occupation permit are recorded in the data base of EPRC.

With the growth of the age, the building becomes more depreciated and hence more cost is required for the repair and maintenance in order to keep a satisfactory quality and safety condition. These factors cause a property

less attractive to buyer, thus the property value should be decreased. Therefore, the sign of coefficient of 'AGE' should be negative.

#### 4.4.2.2 Floor Level (FL)

This variable refers to the storey that the property situated at in a building. For example, if a property is located at the $5^{th}$ floor of a building, the number of 'FL' would be input as '5'.

In most of the cases, properties situated at a higher position in a building generally cost higher. As discussed in the previous chapter, it may be due to quieter environment, less pollution and better view provided by a position. In a result, people are willing to pay more for these factors. Therefore, it is expected that the effect of floor level is positive to the property price and hence the coefficient of FL should be positive.

#### 4.4.2.3 Gross Floor Area (GFA)

Many literatures in the past had used the numbers of room as a proxy of the size of a property. However, GFA per $ft^2$ would be employed in the model

since it provides a more accurate measure to the actual space that enjoyed by the user. According to Building (Planning) Regulation 23(3), the gross floor area is defined as '*the area contained within the external walls of the building measured at each floor level (including any floor below the level of the ground), together with the area of each balcony in the building, which shall be calculated from the overall dimensions of the balcony (including the thickness of the sides thereof), and the thickness of the external walls of the building*' which is different form usable floor area in the way that UFA does not comprise the common area such as staircases, lift shafts and lobbies, communal toilets, etc. These common areas are also enjoyable and beneficial to the user, hence, it attributes to property prices. Therefore, instead of UFA, GFA is chosen in this study. The figure of GFA is stated in most of the transaction records from EPRC.

In general, people will pay more for a larger home. It is no doubt that the property price increases when the size increases. However, if considered the effect of increasing area on the unit price of the property, the result would be different. Mok et al. (1995) discovered that the price per $ft^2$ for larger property is slightly less than that for a much smaller one. This finding can

be supported by the reason the law of diminishing marginal utility to home owner proposed by Wolverton (1997). Therefore, the price per $ft^2$ and the size should be inversely related. The coefficient of 'GFA' is expected to be negative.

#### 4.4.2.4 Walking distance to the nearest exit of MTR station (DIST_MTR)

It refers to the walking distance of each property to the nearest exit of MTR station in meters. The distances can be measured on the scaled Mongkok map directly with the aid of Google Map and related tools on the internet. Walking distance is used rather than the direct distance because it indicates the actual distance required to travel in order to reach the station exit. In other words, the variable is a representation of the convenience of the building to access to the facility.

The coefficient of 'DIST_MTR' should be negative because the accessibility to MTR station is lower for a longer distance. Thus, the property prices should also be lower.

#### 4.4.2.5 Walking distance to the shopping centre (DIST_SC)

Like DIST_MTR, it represents the walking distance from the building to shopping centre. The distance can be measured by the same method used above. Also, it is measured in meter and indicates the actual distance for a person to travel to the shopping centre.

### 4.4.3 Dummy Independent Variable

Dummy independent variables are employed to identify certain kinds of characteristics of the property or the qualitative factors of the model. Only 0 or 1 would be allocated for these dummy variables. In this model, they are employed for separating different stages of the redevelopment project into announcement stage, construction stage and operation stage. Actually, there are four stages and the one not mentioned above is the pre-announcement stage. However, only three dummy variables are required because the three stages are compared with the pre-announcement stage. Thus, the effect introduced by the redevelopment project can be estimated by the model.

#### 4.4.3.1 Announcement stage (AN)

The ‘AN’ would be allocated as ‘1’ if the date of transaction is situated within the period after the official announcement of the redevelopment project and before the start of construction. Otherwise, ‘0’ would be allocated. The period for ‘AN’ as ‘1’ is from July 1993 to December 1997 in the redevelopment project.

#### 4.4.3.2 Construction stage (CONS)

The dummy variable ‘CONS’ separates the period before and after the start of construction. It would be allocated as ‘1’ if the date of transaction falls within the construction period. For other period, ‘0’ would be input. The construction lasted from Jan 1998 to July 2004. Therefore, the ‘CON’ for all the transaction performed within this period would be marked as ‘1’

#### 4.4.3.3 Operation stage (OP)

Same as the formers, ‘OP’ is also a time dummy used to divide the time line into two stages. ‘OP’ would be assigned as ‘1’ if the date of transaction is proceeded in the period that the redevelopment has been operated after the completion of construction. This would be the period begins from July 2004.

## 4.5 Descriptive Statistics

The table below shows a descriptive statistics for the variables used in data.

| Variable | Min | Max | Mean | Std. Dev. |
|---|---|---|---|---|
| RP | 730 | 5202 | 209.445 | 657.6 |
| AGE | 0 | 44 | 25.49726 | 10.58083 |
| FL | 1 | 30 | 10.62774 | 7.21993 |
| GFA | 277 | 1640.4 | 453.4596 | 138.5693 |
| DIST_MTR | 94.47 | 484 | 363.5382 | 68.97332 |
| DIST_SC | 24.9 | 375.7 | 278.4615 | 74.66074 |
| AN | 0 | 1 | - | - |
| CONS | 0 | 1 | - | - |
| OP | 0 | 1 | - | - |

Table 4.2: Descriptive Statistics for Equation Variables

## 4.6 Hedonic Equation

In order to examine whether the redevelopment project exerts positive or negative externalities on the nearby residential properties price in various stages, the following equation is constructed for the purpose of study.

$$\mathbf{RP} = k_0 + k_1\mathbf{AGE} + k_2\mathbf{AGE}^2 + k_3\mathbf{FL} + k_4\mathbf{FL}^2 + k_5\mathbf{GFA} + k_6\mathbf{GFA}^2 + k_7\mathbf{DIST\_MTR} + k_8\mathbf{DIST\_MTR}^2 + k_9\mathbf{DIST\_SC} + k_{10}\mathbf{DIST\_SC}^2 + k_{11}\mathbf{AN} + k_{12}\mathbf{CONS} + k_{13}\mathbf{OP}$$

The square term of each quantitative independent variable is added to increase the flexibility of the functional form and to show the diminishing and magnifying effect of the independent variables on the dependent variable so that the accuracy of the model is enhanced. It means that if the sign of coefficient of the independent variable and its square term is opposite to each other, then the magnitude of the impact will have a diminishing effect when the independent variable is increased. For instance, if variable 'AGE' is in negative sign but '$AGE^2$' in positive, the adverse effect of AGE on property price will increase with a decreasing rate for a higher value of AGE. On the other hand, if they are both negative in sign, the negative effect of AGE will increase with an increasing rate for a higher value of AGE

## 4.7 Expected results

The announcement, construction and operation dummy are the three major

independent variables to be tested in this dissertation. As discussed previously, these dummies are expected to have different impact on property prices due to the changing status of the redevelopment site. Before the announcement of redevelopment, the site was only an obsolete area with low level of living and poor environmental condition. After the official announcement, the market realized that the redevelopment plan would enhance and improve the condition of the subject area. Then, the surrounding area would be benefited by the improvement and this effect was thus capitalized onto the property prices to reflect the positive externality. It is true that there was not any actual construction on this stage and the nearby properties could not enjoy any benefit immediately, however, market expectation was generated in the sense that there would be a future improvement on the area. Therefore, the sign of announcement dummy is expected to be positive.

The next stage is the construction stage. The effect of a large scale construction project on nearby property prices has well been discussed in the former chapter. When the redevelopment proceeded to construction, it is expected that the nuisances produced from the construction site would exert a negative impact on nearby properties. Again, the negative externality should be capitalized on the

property prices to reflect the decrease in neighborhood condition. Also, it is sure that the negative externality would be greater for a project having a long period of construction. In this case, the construction stage of the redevelopment lasted for five and a half year. Significant nuisances must be generated in this period. Therefore, the coefficient of CONS should be negative in sign.

At last, the project came to operation stage after the completion of construction in July 2004. The shopping centre has started operations and the accompanying facilities have also functioned in this stage. Improvement in amenity and environmental condition are expected introduce positive influence on nearby properties. Therefore, the coefficient sign of OP is likely to be positive in sign.

The floor level is expected to have positive impact due to better living environment at higher level of the building. However, marginal utility provided to home owner would not be much different as the floor level increased to a certain level. It means that the increase in margin utility would increase more for $2^{nd}$ to $3^{rd}$ than $29^{th}$ to $30^{th}$. Therefore, it is expected that the higher floor level produces positive influence but with a decreasing rate. So, the square term of floor level would show a negative sign.

On the other hand, age, size and distance to MTR station are expected to have negative impact to the residential property prices. As age of the building increases, certain forms of damages should be generated due to natural depreciation or usage by people. Hence, the living standard in older building should become poorer and cost required for maintenance also decreases the value of the property. For the size, it is expected to be negative due to the diminishing of utility when the size of a property increases. As for the distance to MTR station exit, it is certain that a longer traveling distance represents more time are required. Since time is definitely valuable to everyone, especially people in Hong Kong, therefore the coefficient should be negative in sign. For these variables, the sign of their square terms is much easier to be estimated. As a property should deserve at least some value, it is impossible to become null when the age, size or distance to MTR increases. Therefore, the only possible conclusion for the sign of these square terms is opposition to their respective variables. That means the effect of these factors on property prices is decreasing with decreasing rate.

Next one is the distance to the shopping centre. This variable represents the overall effect of the level of proximity to the redevelopment site. Since the impact of this

variable is not coherent throughout the whole redevelopment period due to the changing stages of the site. So, it cannot be predicted theoretically.

The table summary of the independent variables is as follows.

| **Type of variables** | **Symbol of independent variables** | **Expected coefficient sign** |
|---|---|---|
| Quantity independent variable | AGE | - |
| | $AGE^2$ | + |
| | FL | + |
| | $FL^2$ | - |
| | GFA | + |
| | $GFA^2$ | - |
| | DIST_MTR | - |
| | $DIST\_MTR^2$ | + |
| | DIST_SC | - |
| | $DIST\_SC^2$ | + |
| Dummy independent variable | AN | + |
| | CONS | - |
| | OP | + |

Table 4.3: Expected coefficient signs of independent variables

# Chapter Five

## 5. Empirical results and Implications

In this chapter, the empirical results of the hedonic model will be presented and interpreted with the annalistic statistics mentioned before. The coefficient sign, magnitude, and significance of each independent variable will be discussed one by one.

The aim of the hedonic model is to estimate the impact of the Langham Place redevelopment project on the prices of proximal residential property. The model employed three time dummies to represent the redevelopment period covered from the pre-announcement stage to the operation stage. Therefore, the results of these time dummies as well as the effect of proximity to the redevelopment will be discussed with greater details.

In this study, a total of 1824 transaction records taken from 24 buildings from 1991 to 2009 are used in the model for the estimate. It is observed that most of the results are consistent with the previous expectation. However, some are not as expected. Implications of the empirical results and possible reasons for the discrepancy will be discussed in the following sections.

## 5.1 Empirical results of the model

The hedonic results of the Ordinary Least Square (OLS) method of the equation below are generated and presented in Table 5.1.

$$\mathbf{RP} = k_0 + k_1\mathbf{AGE} + k_2\mathbf{AGE}^2 + k_3\mathbf{FL} + k_4\mathbf{FL}^2 + k_5\mathbf{GFA} + k_6\mathbf{GFA}^2 + k_7\mathbf{DIST\_MTR} + k_8\mathbf{DIST\_MTR}^2 + k_9\mathbf{DIST\_SC} + k_{10}\mathbf{DIST\_SC}^2 + k_{11}\mathbf{AN} + k_{12}\mathbf{CONS} + k_{13}\mathbf{OP}$$

Dependent Variable: RP

Method: Least Squares

Sample(adjusted): 1 1824

Included observations: 1824 after adjusting endpoints

| Variable | | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|---|
| AGE | ** | -68.77706 | 3.564803 | -19.29337 | 0.0000 |
| $AGE^2$ | ** | 0.869886 | 0.080507 | 10.80515 | 0.0000 |
| FL | ** | 22.16656 | 4.991101 | 4.441218 | 0.0000 |
| $FL^2$ | | 0.008688 | 0.181096 | 0.047976 | 0.9617 |
| GFA | ** | -3.215827 | 0.309341 | -10.39575 | 0.0000 |
| $GFA^2$ | ** | 0.001659 | 0.000241 | 6.895272 | 0.0000 |
| DIST_MTR | ** | -4.110542 | 1.157831 | -3.550209 | 0.0004 |
| $DIST\_MTR^2$ | ** | 0.007984 | 0.001983 | 4.026344 | 0.0001 |
| DIST_SHOP | * | -1.547572 | 0.774179 | -1.998984 | 0.0458 |
| $DIST\_SHOP^2$ | | 0.001133 | 0.001990 | 0.569547 | 0.5691 |
| AN | * | 86.23360 | 35.57113 | 2.424258 | 0.0154 |
| CONS | ** | -165.8909 | 33.23395 | -4.991611 | 0.0000 |
| OP | * | 92.86399 | 37.74484 | 2.460309 | 0.0140 |
| C | ** | 4780.331 | 189.0866 | 25.28117 | 0.0000 |
| R-squared | | 0.625359 | F-statistic | | 232.4072 |
| Adjusted R-squared | | 0.622668 | Prob(F-statistic) | | 0.000000 |

Note: * significant at 5% level ** significant at 1% level

Table 5.1: Empirical results for the hedonic equation

The adjusted R-squared and R-squared are used to show the explanatory power of the hedonic model. The value of the adjusted R-squared and R-squared is 0.623 and 0.625 respectively. It indicates that about 62% of the variation of the dependent variable (property price/ $ft^2$) can be explained by the independent

variables in the hedonic model. The explanatory power of the model can be regarded as satisfactory although the prediction power of the model can be improved by a further 38%.

The F-statistic and its p-value indicate the significance of the coefficient of $R^2$. The above results show a 0.000000 p-value of F-statistic, which is substantially lower than 0.01 (the pre-established value required for 1% significant level), meaning that significance of the hedonic model is at 1% level. Therefore, the model is highly statistically significant.

Except the square term of floor level ($FL^2$), all the coefficient's signs of the independent variables agree with the expected one. The explanation of the inconsistence of the sign of $FL^2$ would be given afterwards.

The pre-established t-values representing 5% and 1% significant level are 1.96 and 2.576 respectively. The results show that, except $FL^2$ and $DIST\_SHOP^2$, most of the independent variables can fall within these two significant levels, in particular, AGE, $AGE^2$, FL, GFA, $GFA^2$, DIST_MTR, $DIST\_MTR^2$ and CONS fall within 1% significant level.

## 5.2 Impacts of independent variable on unit property prices

### 5.2.1 AGE and $AGE^2$

Both AGE and $AGE^2$ fall within 1% significant level. The coefficient of AGE presents a negative sign but $AGE^2$ is shown with a positive sign. It indicates that the impact of age on property prices is negative with a decreasing rate of influence, confirming with the expected results that the decreasing trend is due to the law of diminishing utility described in the previous chapter.

### 5.2.2 FL and $FL^2$

The coefficient of FL is 22.16656 and is statistically significant at 1% level. It shows that the floor level is directly related to the unit property price. Although, unexpectedly, the $FL^2$ is shown with a positive sign which is same as FL, the conclusion that the impact of floor level subject to increasing trend cannot be drawn since the t-value of $FL^2$ is only 0.047976 which does not fall within even 50% significant level. So, it can be considered as statistically insignificant.

### 5.2.3 GFA and $GFA^2$

Consistent with the expected results, the size of property has positive impact on its unit price. The coefficient of GFA and $GFA^2$ is -3.215827 and 0.001659 respectively and are both statistically significant at 1% level. It indicates that larger the size of a property, lower the unit price. The rate of impact also shows a decreasing trend since the sign of $GFA^2$ is negative and can also be explained by the reasons proposed in the previous chapter.

### 5.2.4 DIST_MTR and $DIST\_MTR^2$

Both the result of DIST_MTR and its square term show that these two variables are significant at 1% level. Also, the outcomes of coefficient sign are both as expected, showing that unit property price is inversely related with walking distance to the nearest MTR station. It is reasonable and consistent to the results expected in the previous chapter.

### 5.2.5 DIST_SC and $DIST\_SC^2$

The coefficient of DIST_SC and its square term are -1.547572 and 0.001133 respectively. The signs are as expected. Only variable DIST_SC falls within 5% significant level but not its square term. Therefore, the result cannot provide

enough evidence to prove that whether the rate of impact of walking distance to the redevelopment is increasing or not. However, the inverse relationship between unit property price and distance to redevelopment is confirmed from the findings. Hence, the second hypothesis '*The residential property price will be higher for a property more proximal to the redevelopment area*' cannot be refuted.

### 5.2.6 AN

The regression result shows that the announcement time dummy positively affects the unit property price and is statistically significant at 5% level. The result confirmed that after the announcement of the redevelopment project, it will bring people about the expectation of improvement in neighborhood condition. The expectation is converted into money term and reflected on the residential property prices.

### 5.2.7 CONS

The coefficient of construction time dummy is -165.8909 and is significant at 1% level. It indicates that construction activities generated during this stage exert negative impact on nearby residential property. Actually, in the construction

stage of the redevelopment project, the announcement and construction impact are both effective that these two factors affect the resident property prices simultaneously. As announcement effect is positive, it can be concluded that the negative construction factors override all other positive effects resulted from the expectation of improvement. Also, the magnitude of the announcement effect during construction stage may not be comparable to what the extent generated in the preliminary announcement stage since the information was no longer fresh enough to maintain a continuous positive influence on property price. Therefore, the result is reasonable that nuisances produced during construction activities exert negative externalities on property price.

### 5.2.8 OP

From the result, the operation time dummy is significant at 5% level and affects the unit property prices positively. Apart from that the Langham Place becomes a new shopping centre to the residents, it also provides some amenities such as car parks and cinema. The improvement resulted from the redevelopment enhanced the residential property prices that is confirmed by the result. Combining the regression results of variables AN, CONS and OP, it is found that the first hypothesis '*the nearby residential property prices will increase after the*

*announcement and during the operation of the redevelopment project, but decrease when the project is under construction*' cannot be refuted.

## 5.3 Implications of the results

According to the regression results, it is confirmed that there exists neighboring externality of a large scale redevelopment project that can impact on the residential prices with different sign of effect at different stages. From the result, we can see that Langham Place served as a good example to show that people may pay a higher premium to buy a property when the neighboring condition is ready to be improved. Once the redevelopment is announced, expectation of future betterment of the living standard in the area is generated simultaneously. This can be confirmed from the results that nearby residential property prices increase right after the announcement of the project.

Although no actual benefit is enjoyable during the announcement stage, it is easy to understand that the information of redevelopment can boost up the residential property prices since some property buyers would like to speculate on such information to gain profits. It is just similar to what is happening in the stock

market of Hong Kong.

The expectation of future betterment resulted from the redevelopment project may not be able to persist throughout the whole redevelopment period. From the results, the effect of the Langham Place on property prices becomes negative. The reasons for the transition of impact can be attributed to the obsolescing of good news. The good news in the announcement stage becomes old news, thus, the property prices stopped increasing any further more. Besides, nuisances caused by the construction activities during the construction stage also exert negative impacts on residential property prices. These two factors provide an explanation to the results that the redevelopment project negatively affects the prices of property.

The result also indicates that, after the completion of redevelopment project, positive impact is once again exerted on the residential property. Under the operation of Langham Place, the expected benefits are realized and reflected on the property prices. Form people's point of view, Langham Place has injected new energy not only to the redeveloped site, but the whole obsolescent district. The living environment as well as the conditions for running businesses has been highly improved. Many international and high ranking brands which are new to the

area brought along consuming and commercial activities to the surrounding area. They provided a favorable chance for starting business there, making Langham Place and its neighborhood the centre of business in Mongkok district. These criteria can definitely attract tourists from all over the world to further improve the tourism in the district.

The increase in economic activities due to enhancement of environment has raised the land rent in the nearby commercial area. As we know that, Portland Street near Langham Place is a place where agglomerated many abnormal businesses such as Marjong clubs, massage services, and pornographic works. These businesses may not be able to take the advantage of the increment in pedestrian flow since it is different for the target consumers and the nature of the businesses that Langham Place attracts more youngsters while Portland Street focuses on elders. The original businesses agglomerated in Langham Place should be inevitably replaced by the other businesses that are more competitive and more similar with the nature of business in Langham Place. Moreover, the police force also assists in the removal of illegal businesses originated in Portland Street due to the reason that Langham Place attracts a large number of youngsters who are not suitable to come into contact with that kind of business, reducing the crime rate in that area. These

factors triggered a purification in the Portland Street after the operation of Langham Place. As a result, the resident property prices increase since the improvement of living condition caused by the purification. In fact, the purification proposed here can be regarded as a certain kind of gentrification of which the impacts discussed in chapter 2 are consistent with what happening in Portland Street.

Another factor deserved to be mentioned is the reduction in supply of residential property in the district caused by redevelopment. Unlike many other projects, the comprehensive development of Langham Place does not include any residential nature. The residential units originally situated in the area were removed. Thus, the supply of residential units is decreased that residential property prices should be increase correspondently.

# Chapter Six

# 6. Conclusion

## 6.1 Summary of findings

The aim of the this dissertation is to examine the impacts of a redevelopment project on surrounding residential property prices by using Langham Place redevelopment project as a case study. It is found from the literatures review on the neighborhood effects that property prices are affected by the neighboring conditions. A betterment in neighboring condition can enhance the nearby residential property prices and vice versa.

Two hypotheses are tested by adopting the hedonic price model which includes sample data of 1824 transactions dated from 1991 to 2009 in the district. The hedonic price model consists of various independent variables of property attributes such as age, floor level, size, etc, and three dummy variables to investigate the effect of the redevelopment project on different periods including the announcement stage, construction stage and operation stage. The results suggest that most of these property attributes are consistent with the expected results drawn from the literatures regarding the effects of a variety of property

attributes on residential property prices.

The empirical results of the hedonic model suggest that the nearby residential property is positively affected by the redevelopment project after its announcement and operation, but negatively affected during construction stage. This confirms with the first hypothesis regarding the externality caused by a redevelopment project on residential property prices in different stages.

The results also suggest that people are willing to pay a higher premium for the property located closer to the centre of redevelopment. The finding confirms with the hypothesis proposing that residential property price is higher when it is more proximal to the redevelopment project. To conclude, both two hypotheses to be tested are not refutable by the empirical results reviewed in this dissertation.

It is also discovered that the benefits of a redevelopment project will be reflected on the property prices as an implicit value of the property whenever the project is announced or constructed. Expectation of improvement in living standard will drive the market to re-estimate the value the property ought to be. However, the neighborhood effect of a redevelopment project can also be negative in some stage

notwithstanding its beneficial impact. In this case, empirical results show that there is a switch of positive to negative effect when the project is under construction. The reasons of such transition can be resulted from the change in focuses on the nature on a project in different stages.

Moreover, it is discovered from the results that level of proximity of residential property to the redevelopment project is also another determinant for the attribution of value. People are generally likely to pay a higher premium for a property closer to a living environment with better conditions.

## 6.2 Limitations of study

Firstly, some relevant independent variables may be omitted in the hedonic equation. The reasons are that it is necessary to keep the model simple and maintain a reasonable explanatory power. Also, it is due to the inaccessibility of the data. For example, the property's orientation is not available in the EPRC's transaction records that it is impossible to obtain such data by investigating the property one by one since it would be very difficult and time demanding. Moreover, the view of the property is also not available from the sources of EPRC. Reasons

are similar to the unavailability of the property's orientation.

Secondly, the choice of functional form may also affect the accuracy of the results. In the study, liner equation is employed to test the hedonic model. It is possible that other functional forms can provide results with better fitness.

Furthermore, transaction records are only available from 1991 which is later than the unofficial announcement of the redevelopment plan in 1989. Therefore, this study is unable to investigate the impact of the unofficial announcement of the plan due to lacking of data. However, this study can still provide empirical evidence on the impact of the redevelopment project after the official announcement that the redevelopment affects property prices positively.

## 6.3 Area for further study

In this dissertation, a case study of Langham Place is employed to test the hypotheses regarding to the impact of redevelopment project. It is suggested that future study can focus on other types of urban renewal projects such as rehabilitation of buildings, revitalization of decayed area or preservation of historical structures to examine whether the results found from this study can be

applicable commonly.

Also, many redevelopment projects have been taking place in these years such as the Kwun Tong Town Centre project and the Sai Yee Street Project. Investigation of these projects can be started from the period of unofficial announcement stage that the result can supplement to what inadequate in this study.

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## Appendix I Sources of Data

| Building Name | Address |
|---|---|
| EAST OCEAN COURT | SHANGHAI ST 525-529 |
| KAM HING HSE | CANTON RD 1004-1012 |
| KO HO BLDG | CANTON RD 1038-1040 |
| KWONG FOOK MAN | CANTON RD 977-991/SHANTUNG ST 28-30 |
| KWONG FU BLDG | KAM LAM ST 22-40/SHANTUNG ST 24-26 |
| KWONG FUNG BLDG | KAM LAM ST 1-19/SOY ST 1-3 |
| KWONG HING BLDG | CANTON RD 959-973/SOY ST 7A-B |
| KWONG WING BLDG | SHANTUNG ST 18/FERRY ST 301-311 |
| KWONG YU BLDG | KAM LAM ST 21-39/SHANTUNG ST 20-22 |
| KWONG YUEN BLDG | KAM LAM ST 2-6/SOY ST 5-7 |
| NEW ASIA BLDG | ARGYLE ST 4-6 |
| ON MAY MAN | ARGYLE ST 6A-C/SHANGHAI ST 595-599A |
| PO LUN BLDG | PORTLAND ST 175-181 |
| SHUN HING BLDG | FERRY ST 314-324B |
| SHUN KING BLDG BLK A | NELSON ST 2-2K/FERRY ST 325-334B |
| SHUN KING BLDG BLK B | NELSON ST 2-2K/FERRY ST 325-334B |
| SUN HING BLDG | NATHAN RD 603-609A/PORTLAND ST 174-178 |
| SUN MING BLDG | SHANGHAI ST 484-488 |
| SUN TAI MAN | SHAM CHUN ST 1-6 |
| TAK FUNG BLDG | RECLAMATION ST 374-388 |
| TUNG SHING MAN | CANTON RD 950-954/SOY ST 9 |
| WAH MAY BLDG BLK B | SHANGHAI ST 518-522/SHANTUNG ST 36-36B |
| WING CHEONG BLDG | RECLAMATION ST 404-412/SHANTUNG ST 27H-J |
| YUEN FAT BLDG | NELSON ST 1-1E/NAM TAU ST 15-25 |

## Appendix II The University of Hong Kong Real Estate Index Series

| January 2000 = 100 (rounded off to 1 decimal place) | | | | | |
|---|---|---|---|---|---|
| **Year** | **Month** | HKU-ARPI | HKU-HRPI | **HKU-KRPI** | HKU-NRPI |
| | | | | | |
| **1991** | **1** | - | - | **-** | - |
| | **2** | - | - | - | - |
| | **3** | - | - | - | - |
| | **4** | - | - | - | - |
| | **5** | - | - | - | - |
| | **6** | - | - | - | - |
| | **7** | 68.2 | 62.2 | **72.7** | 71.4 |
| | **8** | 73.9 | 66.6 | **77.8** | 78.7 |
| | **9** | 78.5 | 71.1 | **81.5** | 84.3 |
| | **10** | 81.6 | 73.7 | **85.1** | 87.6 |
| | **11** | 82.8 | 74.7 | **85.4** | 89.6 |
| | **12** | 81.2 | 73.3 | **84.2** | 87.3 |
| **1992** | **1** | 82.8 | 75.3 | **86.9** | 87.8 |
| | **2** | 87 | 80.6 | **91.3** | 90.6 |
| | **3** | 90.9 | 84.1 | **96.1** | 94.4 |
| | **4** | 93.8 | 87.1 | **98.7** | 97.4 |
| | **5** | 96.3 | 89.3 | **101.4** | 99.9 |
| | **6** | 98.5 | 92 | **103.5** | 101.8 |
| | **7** | 99.3 | 91.2 | **105.6** | 103.3 |
| | **8** | 100 | 92.1 | **105.6** | 104.2 |
| | **9** | 99.7 | 91.2 | **107.2** | 103.2 |
| | **10** | 98.5 | 91.3 | **105.5** | 101.1 |
| | **11** | 97.4 | 90.1 | **103.8** | 100.6 |
| | **12** | 95.3 | 87.9 | **100.9** | 99.1 |
| **1993** | **1** | 93.9 | 87.2 | **100.8** | 96 |
| | **2** | 94.5 | 87.7 | **101.8** | 96.5 |
| | **3** | 95.2 | 88.4 | **101.8** | 97.6 |
| | **4** | 96.5 | 90.8 | **103.7** | 97.3 |

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|---|---|---|---|---|---|
| | **5** | 98.2 | 92.8 | **105.1** | 98.9 |
| | **6** | 102.3 | 97.5 | **108.8** | 102.5 |
| | **7** | 106.5 | 103 | **111.4** | 106.5 |
| | **8** | 108.3 | 105.6 | **114.4** | 106.8 |
| | **9** | 108 | 105.5 | **112.7** | 107.3 |
| | **10** | 106.9 | 104.6 | **111.9** | 105.6 |
| | **11** | 108 | 105.3 | **114.2** | 106.4 |
| | **12** | 110 | 107.5 | **116.9** | 107.7 |
| **1994** | **1** | 116.4 | 116.5 | **121.8** | 112.3 |
| | **2** | 121.6 | 123.2 | **126.7** | 116.1 |
| | **3** | 127.8 | 130.2 | **132.3** | 121.9 |
| | **4** | 131 | 134.3 | **133.7** | 125.5 |
| | **5** | 128.6 | 131.2 | **131.8** | 123.4 |
| | **6** | 129.4 | 132 | **132** | 124.8 |
| | **7** | 127.3 | 128.5 | **131.8** | 122.7 |
| | **8** | 127.9 | 129.6 | **131.1** | 123.7 |
| | **9** | 128.1 | 129.5 | **130.9** | 124.6 |
| | **10** | 128.7 | 130 | **133.3** | 124 |
| | **11** | 127.7 | 127.7 | **131.8** | 124.6 |
| | **12** | 125.7 | 127.9 | **131.3** | 119.1 |
| **1995** | **1** | 120.8 | 120.7 | **125.2** | 117.7 |
| | **2** | 116.8 | 115.7 | **122.7** | 113.7 |
| | **3** | 121.8 | 121.4 | **126.9** | 118.4 |
| | **4** | 123.4 | 123.4 | **129** | 119.3 |
| | **5** | 122.3 | 122 | **127.2** | 119 |
| | **6** | 117 | 119.5 | **124.6** | 108.7 |
| | **7** | 115.6 | 116.4 | **120.8** | 110.9 |
| | **8** | 113.7 | 113.4 | **119.8** | 109.6 |
| | **9** | 110.7 | 109.1 | **116.7** | 108.1 |
| | **10** | 107 | 106 | **112** | 104.3 |
| | **11** | 109.2 | 107 | **115.9** | 106.7 |
| | **12** | 110.5 | 108.5 | **117.8** | 107.3 |

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|---|---|---|---|---|---|
| **1996** | **1** | 110.3 | 109.7 | **117.2** | 105.8 |
| | **2** | 113.8 | 113 | **120.9** | 109.5 |
| | **3** | 117.2 | 116.4 | **123.1** | 113.8 |
| | **4** | 119.4 | 119.3 | **124.4** | 115.9 |
| | **5** | 121.9 | 121.8 | **127.4** | 117.9 |
| | **6** | 122.9 | 122.8 | **127.9** | 119.4 |
| | **7** | 124.1 | 123.7 | **129.8** | 120.2 |
| | **8** | 124.2 | 123 | **130** | 121.3 |
| | **9** | 126.2 | 125.5 | **130.9** | 123.6 |
| | **10** | 129.6 | 129.3 | **134.4** | 126.4 |
| | **11** | 134.5 | 134.3 | **139.9** | 130.8 |
| | **12** | 140.7 | 141.8 | **144** | 137.2 |
| **1997** | **1** | 148.1 | 149 | **149.3** | 146.3 |
| | **2** | 155.8 | 155.6 | **156.7** | 155.3 |
| | **3** | 166.1 | 162.2 | **166.8** | 169.8 |
| | **4** | 169.3 | 163.3 | **167** | 177.5 |
| | **5** | 173.2 | 167.9 | **173.7** | 178.5 |
| | **6** | 184.4 | 179.1 | **183.4** | 190.8 |
| | **7** | 182.8 | 177.6 | **182.5** | 188.6 |
| | **8** | 181.6 | 177 | **180.8** | 187 |
| | **9** | 183.7 | 179.7 | **184.2** | 187.7 |
| | **10** | 187.1 | 182.8 | **188** | 190.9 |
| | **11** | 172.9 | 168 | **174.7** | 176.9 |
| | **12** | 163.1 | 157.5 | **167.2** | 166.2 |
| **1998** | **1** | 146.5 | 145.2 | **149.6** | 145.5 |
| | **2** | 138.9 | 136.2 | **143.1** | 138.8 |
| | **3** | 144.8 | 142.1 | **148** | 145.3 |
| | **4** | 138.8 | 138.5 | **140.7** | 137.8 |
| | **5** | 131.3 | 130.2 | **134.3** | 130.2 |
| | **6** | 114.2 | 112.3 | **117.2** | 113.9 |
| | **7** | 108.9 | 106.3 | **111.2** | 110.1 |
| | **8** | 105.2 | 102.1 | **106.4** | 107.6 |

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|---|---|---|---|---|---|
| | **9** | 98.6 | 94.3 | **100.2** | 102.1 |
| | **10** | 95.6 | 92.9 | **98** | 96.7 |
| | **11** | 102.9 | 100.7 | **104.1** | 104.4 |
| | **12** | 107.5 | 106 | **108.2** | 108.5 |
| **1999** | **1** | 107.8 | 106 | **108.8** | 109.1 |
| | **2** | 107.2 | 103.9 | **109.8** | 108.8 |
| | **3** | 107.8 | 105.5 | **108.8** | 109.4 |
| | **4** | 108 | 107.4 | **107.7** | 108.8 |
| | **5** | 109.5 | 109.1 | **109.7** | 109.8 |
| | **6** | 108.5 | 107.5 | **108.3** | 109.6 |
| | **7** | 107.7 | 106.9 | **107.7** | 108.5 |
| | **8** | 107 | 106.7 | **107.6** | 106.8 |
| | **9** | 102.3 | 100.7 | **102.7** | 103.7 |
| | **10** | 99.3 | 98.9 | **99.6** | 99.6 |
| | **11** | 97.4 | 97.3 | **97.5** | 97.4 |
| | **12** | 99.3 | 100 | **98.6** | 99.2 |
| **2000** | **1** | 100 | 100 | **100** | 100 |
| | **2** | 101.1 | 101 | **100.9** | 101.4 |
| | **3** | 100 | 100.8 | **100.2** | 99.1 |
| | **4** | 98 | 99.3 | **98.3** | 96.4 |
| | **5** | 94 | 95.5 | **93.7** | 92.6 |
| | **6** | 88.4 | 89.3 | **89.1** | 86.9 |
| | **7** | 89.2 | 89.8 | **89.4** | 88.5 |
| | **8** | 90.1 | 91.7 | **90.2** | 88.4 |
| | **9** | 91 | 92.7 | **91** | 89.1 |
| | **10** | 90.8 | 91.2 | **90.6** | 90.6 |
| | **11** | 85.8 | 85.4 | **85.9** | 86.2 |
| | **12** | 85 | 86.1 | **85.1** | 83.8 |
| **2001** | **1** | 84.2 | 84.7 | **84.4** | 83.6 |
| | **2** | 82.7 | 83 | **84.2** | 81.2 |
| | **3** | 86.2 | 88.4 | **86.1** | 83.8 |
| | **4** | 85.2 | 86.2 | **85.2** | 84.2 |

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|---|---|---|---|---|---|
| | **5** | 82.7 | 82.6 | **83.1** | 82.4 |
| | **6** | 82.4 | 83.1 | **81.1** | 82.5 |
| | **7** | 81.6 | 82.7 | **80.6** | 81.1 |
| | **8** | 80.2 | 80.8 | **80** | 79.8 |
| | **9** | 78.7 | 78.4 | **78.9** | 78.8 |
| | **10** | 76.7 | 76.1 | **77.6** | 76.6 |
| | **11** | 76.1 | 76.6 | **76.1** | 75.6 |
| | **12** | 76.3 | 77.1 | **76.9** | 75.1 |
| **2002** | **1** | 76.9 | 77.2 | **76.1** | 77.1 |
| | **2** | 76.9 | 78.1 | **75.6** | 76.7 |
| | **3** | 76.5 | 77.4 | **75.5** | 76.3 |
| | **4** | 76.1 | 77.5 | **75.4** | 75 |
| | **5** | 75.7 | 77.6 | **74.5** | 74.6 |
| | **6** | 76.1 | 77.3 | **75.8** | 75 |
| | **7** | 74.4 | 75 | **73.5** | 74.5 |
| | **8** | 73 | 74.1 | **71.4** | 73 |
| | **9** | 70.3 | 72.5 | **68.7** | 69 |
| | **10** | 68.9 | 69.5 | **70.1** | 67.3 |
| | **11** | 68.5 | 69.8 | **68.9** | 66.7 |
| | **12** | 68.9 | 69.3 | **70.1** | 67.7 |
| **2003** | **1** | 67.3 | 68.7 | **67.2** | 66 |
| | **2** | 65.6 | 66.8 | **64.8** | 64.8 |
| | **3** | 65.5 | 66.8 | **66.2** | 63.6 |
| | **4** | 63.2 | 65.3 | **63.7** | 60.5 |
| | **5** | 60.9 | 61 | **62.8** | 59.4 |
| | **6** | 62.2 | 64.5 | **63** | 59.1 |
| | **7** | 62.3 | 64.1 | **63.7** | 59.4 |
| | **8** | 61.7 | 63.5 | **62.7** | 59.1 |
| | **9** | 64 | 65.7 | **64.7** | 61.7 |
| | **10** | 68.2 | 71.7 | **68.2** | 64.5 |
| | **11** | 69.2 | 73.1 | **67.4** | 66.3 |
| | **12** | 70.4 | 74.6 | **69.3** | 66.8 |

| | | | | | |
|---|---|---|---|---|---|
| **2004** | **1** | 74.1 | 78.7 | **72.6** | 70.3 |
| | **2** | 78 | 83.9 | **75.7** | 73.5 |
| | **3** | 82.8 | 89.5 | **80** | 77.8 |
| | **4** | 83.8 | 90.6 | **80.7** | 78.9 |
| | **5** | 84.5 | 91.2 | **82.9** | 78.4 |
| | **6** | 82 | 86.4 | **82.3** | 77 |
| | **7** | 82.3 | 88.2 | **80.1** | 77.5 |
| | **8** | 82.6 | 87.3 | **81.1** | 78.6 |
| | **9** | 84.7 | 90.8 | **83.2** | 79.2 |
| | **10** | 88.4 | 95.2 | **86** | 83 |
| | **11** | 89.4 | 96.4 | **88.2** | 82.9 |
| | **12** | 89.9 | 97 | **89.1** | 83 |
| **2005** | **1** | 90.7 | 97.5 | **90.3** | 83.7 |
| | **2** | 92.9 | 100.9 | **91.9** | 85.1 |
| | **3** | 96 | 103.5 | **94.9** | 88.8 |
| | **4** | 98.7 | 107 | **97.4** | 90.9 |
| | **5** | 99.9 | 107.5 | **99.3** | 92.2 |
| | **6** | 99.1 | 107.1 | **97.5** | 91.6 |
| | **7** | 99.1 | 106.6 | **98.2** | 91.8 |
| | **8** | 99.4 | 107.6 | **97.7** | 91.9 |
| | **9** | 100.5 | 108.7 | **99.6** | 92.5 |
| | **10** | 101.7 | 112.6 | **99.1** | 92 |
| | **11** | 99.3 | 108.6 | **98.7** | 89.8 |
| | **12** | 97.9 | 106.3 | **98** | 88.8 |
| **2006** | **1** | 99 | 108.8 | **98.9** | 88.7 |
| | **2** | 100.1 | 110.9 | **99.9** | 88.7 |
| | **3** | 101.5 | 112.3 | **101.9** | 89.7 |
| | **4** | 101.5 | 113.1 | **101.1** | 89.5 |
| | **5** | 102.4 | 114 | **101.2** | 91 |
| | **6** | 100.6 | 113.5 | **99.9** | 87.4 |
| | **7** | 98.7 | 108.8 | **100.4** | 86.7 |
| | **8** | 100.6 | 112.5 | **101.6** | 87.2 |

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|---|---|---|---|---|---|
| | **9** | 101.9 | 115.1 | **102.4** | 87.3 |
| | **10** | 101.4 | 115.2 | **100.7** | 87.2 |
| | **11** | 101.1 | 115.1 | **100.8** | 86.4 |
| | **12** | 102.1 | 116.1 | **103.7** | 85.8 |
| **2007** | **1** | 103.1 | 117.4 | **105** | 86.5 |
| | **2** | 103.4 | 117.8 | **104.6** | 87.1 |
| | **3** | 105 | 119.4 | **107.4** | 87.8 |
| | **4** | 106 | 122.2 | **106.1** | 88.6 |
| | **5** | 106.9 | 122.5 | **108.3** | 89.2 |
| | **6** | 108.7 | 125.2 | **109.5** | 90.4 |
| | **7** | 108 | 124.1 | **108.7** | 90.1 |
| | **8** | 109 | 125.5 | **110** | 90.7 |
| | **9** | 110.7 | 127 | **112.1** | 92.1 |
| | **10** | 113.2 | 131.6 | **113.6** | 93.1 |
| | **11** | 118.1 | 139.8 | **116.3** | 96.2 |
| | **12** | 122.7 | 145.9 | **120.1** | 99.6 |
| **2008** | **1** | 128.6 | 154.5 | **123.7** | 104.3 |
| | **2** | 132.5 | 159.5 | **128.3** | 106.6 |
| | **3** | 137.7 | 166.6 | **133.7** | 109.3 |
| | **4** | 135.1 | 159.9 | **133.6** | 109.7 |
| | **5** | 135.8 | 161.8 | **133.1** | 109.8 |
| | **6** | 137.6 | 164.4 | **135.2** | 110.4 |
| | **7** | 136 | 161.2 | **135.3** | 109.4 |
| | **8** | 132.6 | 156.7 | **131.3** | 107.7 |
| | **9** | 131.9 | 155.4 | **130.3** | 107.8 |
| | **10** | 121.7 | 138.8 | **123.8** | 102.1 |
| | **11** | 109.9 | 125.3 | **111** | 92.7 |
| | **12** | 109.4 | 124.3 | **110.7** | 92.8 |
| **2009** | **1** | 112.4 | 126.7 | **116.3** | 95 |

Source: Department of Real Estate and Construction, The University of Hong Kong. (Chau, 2006)