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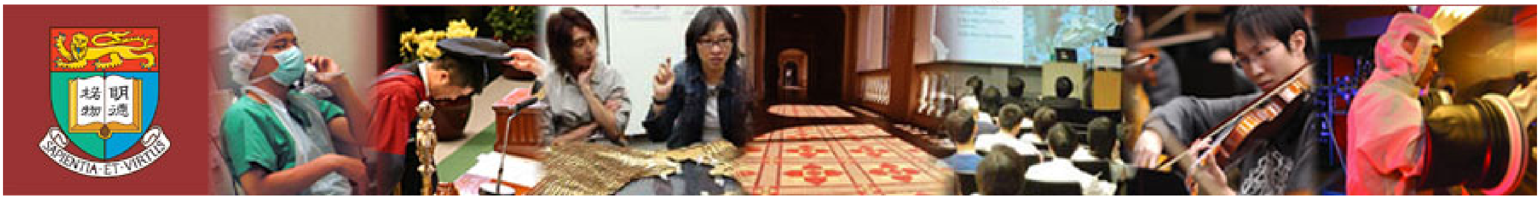

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The Effect of SARS on the Price of Re-entrants in Multi-storey Apartment Buildings

by

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The Effect of SARS on the Price of Re-entrants in Multi-storey Apartment Buildings

[Abstract]

Natural lighting and ventilation have long been a primary consideration in building design, particularly for those high-rise and densely packed apartment blocks where mechanical ventilation is normally secondary. In Hong Kong, there are prescriptive legal requirements governing the provision of natural lighting and ventilation in private buildings. This, coupled with developers' profit-maximizing incentives, often gives rise to re-entrant designs commonly found in apartment buildings in Hong Kong.

This paper aims to study the economic impacts of the disposition of re-entrants on property prices with reference to the revelation of the chimney effect of re-entrants after the occurrence of the mass community outbreak of Severe Acute Respiratory Disease (SARS) in Amoy Gardens in 2003. In this study, we use a hedonic pricing model to examine whether flats designed with a re-entrant is sold at a different price than those without a re-entrant. We draw a sample of property transactions from a popular single residential development with variations in re-entrant designs. A total of 357 transactions were collected, of which 90 were transacted after the SARS event. The model is capable to monitor any significance changes in the premium of re-entrant and its relationship with floor level before and after SARS.

Based on the hedonic pricing analysis, we found that the preference for re-entrants is floor-dependent. Before SARS, homebuyers were not fond of re-entrants on low floor levels, but they were willing to pay more for re-entrants as the floor level increases. Yet, the outbreak of SARS did not significantly change their preferences for re-entrants. The market is capable to capitalize the building design into property prices. Developers and designs should improve their building design to meet the ever changing needs of the market. This paper provides an empirical framework to examine how homebuyers price a particular design feature using property transaction data.

(301 words)

1. Introduction

In a densely populated urban setting, high-rise buildings compete with each other on natural sunlight and ventilation. Although electrical and mechanical building services can be employed to modify the indoor environment, natural lighting and ventilation is still the primary means for apartment building. In Hong Kong, the governing rules with regard to the provision of natural lighting and ventilation in private buildings are the Building (Planning) Regulations (B(P)R). The B(P)R stipulates that every habitable room (e.g. living and dining room, and bedroom) and kitchen shall be provided with natural lighting and ventilation through *prescribed windows*.[1] Other than fulfilling the requirements of glazed and openable window area, each prescribed window shall face into either (1) a street of at least 4.5m wide or (2) an uncovered and unobstructed space fulfilling the rectangular horizontal plane (RHP) and inclined angle requirements. For lavatories, the B(P)R requires that a window shall be provided and opened into *open air*.[2] As defined in the B(P)R, open air means a space which

- is uncovered and obstructed vertically;
- is at least 1.5m in any horizontal dimension; and
- in case of being enclosed on four sides, has a horizontal cross-sectional area of at least 1 m^2 for every 6m of the mean height of the walls enclosing the space.

Since the development density is extremely high in Hong Kong, it is rather difficult to have all prescribed windows facing a street of at least 4.5m wide. Most developments have to rely on the RHP requirement for their habitable rooms and kitchens. Moreover, except for a few recent exempted cases, open air has to be provided for lavatories. This means that developers have to find a design solution that maximizes their development profit and satisfies both site constraints and statutory requirements. Also, it is widely conceived that the values of good scenic views are higher in habitable rooms than in kitchens and lavatories. Intervening with each other, these factors induce the developers to provide windows for kitchens and lavatories in less prominent positions and/or increase the perimeter of building envelop for accommodating more windows.

Given the floor plate and total gross floor areas, one of the most efficient ways to provide additional perimeter is to have recesses on the outer perimeter or vertical shaft within the building envelop. Communal areas, such as lift lobbies, staircases and corridors, are placed at the building core, whereas its wings radiate out from the core. To fulfill the RHP

[1] See Regulations 30 and 31 of the B(P)R.
[2] See Regulations 2 and 36 of the B(P)R. Note that some new residential developments were able to obtain exemption from this open air requirement, giving rise to the emergence of internal toilet designs.

requirements, the length of the base of the plane shall not be less than 2.3m. Therefore, it is advantageous to arrange lavatories and kitchens of adjacent flats as shown in Figure 1. The two neighbouring units are arranged in such a way that a deep and narrow recessed void is formed between them. This area is termed “re-entrant”, which is essentially a vertical open-air channel with three sides enclosed by the external wall and windows of adjoining units and the remaining side opened to outdoor air (see Figure 2). Both kitchens share the same RHP and the open air for the lavatories’ natural lighting and ventilation overlaps with the RHP. This explains why most re-entrants are around 2.3m wide. With such a configuration, on one hand, the re-entrant provides an open air outside a window to satisfy the requirements of natural lighting and ventilation for kitchens and lavatories. On the other hand, the enjoyment of scenic views in other habitable rooms is not affected. On top of the above, this area is also commonly used to accommodate, for example, the condensing units of spilt-type air-conditioners, and other building services ductworks, including the soil and waste drainage pipes.

[Take in Figure 1]
[Take in Figure 2]

Lightwells are an alternative design to re-entrants to provide natural lighting and ventilation for lavatories. However, it is very difficult for lightwell designs to fulfill the prescribed window requirements, particularly in tall buildings. This is because as the building grows taller, a larger area is required for the lightwell (see the third open air requirement stated above). Unless a site is very large, lightwell designs are normally less efficient, and hence the use of lightwells is less common in Hong Kong.

To sum up, the emergence of re-entrant design appears to be driven by developers’ profit maximization incentives as well as the building legislation in Hong Kong. However, from homebuyers’ perspective, are re-entrants good or bad? Did their preference for re-entrants change after SARS? To answer these questions, this paper will evaluate homebuyers’ preferences by studying the relationship between property prices and re-entrant designs. The next section reviews previous studies on the environmental effects of re-entrants. Following this, Section 3 describes our experimental design and Section 4 reports the results. Finally, Section 5 concludes this study.

2. A Review on the Environmental Effects of Re-entrants

Attributed by the popularity of the re-entrant or lightwell designs, a lot of research has been done on their environmental impacts such as day-lighting, natural ventilation, and perceived air quality. A review of previous research is given below.

On the issue of day-lighting, Kristl and Krainer (1999) studied how to enhance the illuminance from lightwell by applying reflective paints on the walls of it. They commented that the design of light well is encouraged as it functions as a complementary light source. From another perspective, Ng (2003) identified the current problems of window design in Hong Kong practice. He found that four common designs, even though fully compiling prescriptive rules in the building regulations, do not provide adequate daylight to the indoor spaces. Out of which, two are related to re-entrant; they are 1) windows placed inside deep re-entrant, and 2) windows placed in the RHP which is formed by two re-entrants closed to each other (see Figure 1).

As far as ventilation is concerned, two groups of local researchers, Chow *et al*. (1999, 2000, 2001, 2002) and Bojic *et al*. (2001, 2002), used the computational fluid dynamics (CFD) simulation to investigate the airflow characteristics, air temperatures and ventilation rates in re-entrant. They all showed that heat energy dissipated by condensing units of spilt-type air conditioners induces a thermal buoyant airflow. In addition, T-shaped re-entrant is better than the more common I-shaped re-entrant in terms of the energy performance of air-conditioners (Chow *et al*., 2000). Bojic *et al*. (2002) examined further on how the depth of re-entrant affect the environmental conditions inside the re-entrant. Their results suggested that the depth of re-entrant did not affect the mass-flow rate and temperature inside. To avoid the complication in computing a simulation, Kotani *et al*. (2003a) worked out a simple calculation model to predict the vertical temperature distribution and ventilation rates in light well. A wind tunnel test was also conducted to validate the calculation model.

Whilst most of the above research placed a heavy focus on the physical characteristics inside the re-entrant areas, there is a lack of research on how the occupants evaluate the living environment in buildings with re-entrant. Kotani *et al*. (2003b) is a recently published piece of work on this topic. They carried out a questionnaire survey from 1992 to 1994 and asked the occupants to evaluate the living environment in building with a lightwell. Based on a sample of less than 400 replies in four buildings, they claimed that the environment is satisfactory except for the air quality. However, the survey was conducted without a valid control group so that it is unable to conclude whether the respondents were more satisfied with flats with lightwells than those without.

3. Methodology

Our study evaluates homebuyers' preferences on the design of re-entrants by making use of property transaction data for residential units with and without a re-entrant. The primary advantage of using property transactions, in lieu of a questionnaire survey, is that a very important part of one's wealth is put into housing, the buying of which should be underpinned more by rational and careful considerations than by impulse. In other words, the approach we take is to examine what homebuyers have actually done and purchased rather than their opinions or feelings.

3.1 SARS incident

In evaluating homebuyers' preferences for re-entrants, reference is also made to the tragic SARS incident in early 2003. The outbreak did not only lead to the discovery of a new type of virus in medical science, but it also alerted us the unprecedented speed at which a disease could spread to more than 25 countries. The story started in November 2002 when the first SARS infected case was reported in Guangdong, China. The virus travelled across the border and spread to neighbouring Hong Kong in early March 2003. According to the World Health Organization (WHO) website[3], the virus infected 8,096 people and resulted in 774 deaths out of the virus in 29 areas worldwide within a period of nine months. In light of the population size and geographic area, Hong Kong was the hardest hit. The tragic event ended up with 1,755 SARS confirmed cases (or over 20% of all cases) causing a tragic number of 299 deaths (or 39% of all cases).

SARS was notoriously known to be particularly vulnerable to health care workers. Nevertheless, a distinct feature of SARS cases in Hong Kong was a high percentage of cases which were not health care workers (see Table I). In other words, most of the people were infected in the community, e.g. within the housing estate. Environmental factors in the built environment were suspected to be conducive to the widespread of SARS. Renowned investigation reports (Department of Health, 2003; WHO, 2003) on the mass community outbreak in Amoy Gardens affirmed the above proposition. These findings showed that the re-entrant design was one of the contributing factors to the spread of SARS in Amoy Gardens. The narrow and deep re-entrant induced a strong updraft air movement and the infectious aerosols/droplets could travel within the re-entrant space (WHO, 2003, p.16). Therefore, although the stack effect was under thorough study by local researchers (as reviewed in Section 2), the potential health hazard posed by such design was only known after the SARS event. This led to a widespread concern on whether it is safe to live in a flat with narrow and deep re-entrant. Our investigation will focus on how this new piece of information on the re-entrant design leads to a change in the preference for housing, if any.

[Take in Table I]

3 http://www.who.int/csr/sars/country/table2004_04_21/en/

3.2 The hedonic price model

In this study, we use a hedonic pricing model to examine whether flats designed with a re-entrant is sold at a different price than those without a re-entrant. The general model can be represented by:

$$P_{it} = f\left(RET_i, X_i, Y_t\right) \qquad (1)$$

where P_{it} is the property price of flat *i*; RET_i is a measure of re-entrant design for flat *i*; X_i is a vector of structural and neighbourhood attributes (e.g. views, floor levels, and flat size) of flat *i*; Y_t is some macro factors for capturing general price changes; and $f(.)$ is a function. Simply put, the equation states that *X*, *Y*, and *RET* are the determinants of property prices.

Theorized by Rosen (1974), hedonic pricing models are a well established tool to study the implicit price of heterogeneous goods. They have been widely used in estimating the impact of environmental attributes on property prices (Chau *et al*. 2003), but seldom have they been applied to study building design.[4] The main reason is that building design is a qualitative building-specific attribute, making it very difficult to separate it from other important attributes, notably location.

Our solution to this problem is to draw a sample of property transactions from a popular single residential development with variations in re-entrant designs. One obvious advantage of using a single development is that its buildings 1) are located in close proximity, 2) are managed by the same property management company, and 3) share the same communal facilities. This automatically controls for the effects of many qualitative building-specific attributes. Furthermore, the selected development must have variations in re-entrant designs across buildings, or preferably across flats in each building so that we can extricate the implicit price of re-entrants and the change in price differentials, if any, after the SARS event. Finally, the development has to be popular in order to ensure that sufficient property transaction data is available for analysis.

In Hong Kong, City Garden, a housing estate on Hong Kong Island, satisfies the above sample selection criteria. Figure 3 shows the block plan of City Garden, which consists of 14 residential towers surrounding a local shopping centre. It is noted that, except for Block 11 which is T-shaped, all towers have a "cruciform" with re-entrants. In particular, Blocks 4-10 have a floor plan of six flats per storey - four of which have narrow and deep re-entrants, whilst the other two flats do not have any re-entrant (see Figure 4). This gives us a sample of flats with variations in re-entrant designs in the same block of building so that the effect of re-entrants can be estimated with building location being held constant. In addition, due to the disposition of City Garden, flats with re-entrants have a variety of views, facing the

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[4] Chau *et al*. (2004) is one of the few studies that used hedonic pricing models to examine building designs. They evaluated whether balconies add value to a property for its environmental filtering functions.

shopping centre, the harbour, or other buildings. As such, no particular view is correlated with the re-entrant design and the effect of re-entrants can also be separated from the effect of views.

[Take in Figure 3]
[Take in Figure 4]

We exclude Blocks 1-3 and 11-13 from the sample because they have different typical floor plans. Block 14 is also truncated because it is on the other side of the road; its location characteristics may be different from the rest. For the remaining 7 blocks (i.e. Blocks 4-10), property transaction records were retrieved from January 1998 to November 2004 for analysis. The properties transacted during the SARS period, i.e. from March 2003, when the first case of SARS was confirmed, to June 2003, when WHO removed Hong Kong from the SARS list, are discarded because transactions were less frequent during that period; the market may not have consistent or sufficient information to price the property. Accordingly, a total of 357 transactions were used, of which 90 were post-SARS transactions. This provides us with sufficient data for hedonic analysis. Table II presents the descriptive statistics of the data.

[Take in Table II]

Based on Equation (1), a linear hedonic pricing model is formulated:

$$\begin{aligned} P_{it} = {} & \beta_1 RET_i + \beta_2 RET_i \times SARS_{it} + \beta_3 RET_i \times FLR_i + \beta_4 RET_i \times FLR_i \times SARS_{it} + \\ & \alpha_0 + \alpha_1 AGE_{it} + \alpha_2 SIZE_i + \alpha_3 SEA_i \times FLR_i + \alpha_4 SHOP_i \times FLR_i + \\ & \alpha_5 BLDG \times FLR_i + \alpha_6 FLR_i \times SARS_{it} + \alpha_7 MTR_i + \sum_{j=1}^{T} \chi_j TIME_{ij} + \varepsilon_{it} \end{aligned} \quad (2)$$

Table III describes the meaning of the symbols used in Equation (2). The focus of this study lies in β (i.e. the terms associated with *RET*), while the remaining variables are used for controlling other property attributes (i.e. X_i) and macro time factors (Y_t) The coefficients β_1 and β_3 measure the pre-SARS implicit price of re-entrants and its change with respect to floor levels, respectively. The coefficients of the interaction terms, β_2 and β_4, measure the changes in implicit prices, if any, after SARS. Since most property attributes including building age, flat size, floor level, views, distance to transportation, and time factors have been controlled, the difference in value, if any, between a flat with a re-entrant and a flat without any re-entrant should be attributable to re-entrant designs. In particular, after the renowned SARS investigation reports, the chimney effect of re-entrants was pinpointed as a contributory factor to the spread of SARS. Interacting *RET* with *SARS* enables us to test whether homebuyers would avoid flats with re-entrants, especially those on a higher floor level (i.e. whether β_2 and β_4 are negative).

[Take in Table III]

4. Results

After Ordinary Least Squares estimation, the results of the hedonic price model in Equation (2) are shown in Table IV . The R-squared value is 83% and is significant at the 1% level. This means that our model has explained a large proportion of the variability of the data.

[Take in Table IV]

The pre-SARS findings are discussed first. We found that the coefficients of *RET* and *RET*FLR* are -0.191 and 0.065, respectively. Both of them are statistically significant at the 10% level. This means that homebuyers were not fond of re-entrants on low floor levels, but they were willing to pay more for re-entrants as the floor level increases. For example, for two similar flats on the lowest floor (3/F), the one with a re-entrant was 19% cheaper than the other without. This is probably because the re-entrant flat is subject to poorer daylight and ventilation (Ng, 2003) and is usually less hygienic due to falling garbage from floors above. But these problems are less severe for upper-floor flats with re-entrants. To ease understanding, Figure 5 plots the implicit floor premium against floor levels.[5] It confirms that the implicit floor price for re-entrant flats increases at a slightly faster rate than that for flats without any re-entrant.

[Take in Figure 5]

Next, the post-SARS results are given by the coefficients of *RET*SARS* and *RET*FLOOR*SARS*, which are 0.163 and -0.070, respectively. Yet, both of them are not statistically significant and thus there is no evidence to support that homebuyers have changed their preferences for re-entrants after the SARS outbreak. There could be two probable explanations. First, homebuyers do not believe that re-entrants are more conducive to SARS transmission. The investigation reports were drafted in technical language. Layman may find it hard to fully understand the messages conveyed in these investigation reports. In addition, re-entrant was one but not the sole factor contributing to the spread of SARS. Homebuyers may think that the environmental setting for City Garden was somewhat different from Amoy Garden, hence downplay the potential health hazard of their re-entrant. Second, as exemplified by the research work of Chow *et al*. (1999, 2000, 2001, 2002) and Bojic *et al*. (2001, 2002), the stack effect of re-entrants has already been known to the public

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[5] Assuming a seaview flat, the log implicit floor price for “No re-entrant (before SARS)” is computed by 0.054*ln(*FLR*), whereas that for “Re-entrant (before SARS)” is -0.191+(0.065+0.054)*ln(*FLR*).

prior to the occurrence of SARS. This could possibly be the case that homebuyers were aware of the sharing of air channel within the re-entrant space and its associated health consequence. As such, the market could have already implicitly capitalized this negative health hazard in the before SARS property prices. Thus, the hedonic price of re-entrant did not react with SARS. The only significant effect identified is an overall increase in the implicit floor premium by 10.5% after SARS, irrespective of the presence of re-entrants or not (see Figure 5).[6]

Generally speaking, the coefficients of other control variables show plausible signs. The coefficient of *SIZE* is highly significant at the 1% level with expected positive signs. This means that a higher price was associated with flats of a larger size. For views, we found a significant floor premium for flats facing the Victoria Harbour, implying that homebuyers preferred high-level flats with the harbour view. The floor premiums for the shopping centre view and the building view are positive yet insignificant. The coefficient of *AGE* turns out to be insignificant, probably because the two phases of City Garden was completed at a similar time period and their depreciation effect has been largely absorbed by the time dummies. Also, the effect of distance to MTR station is insignificant because Blocks 4 to 10 are in close proximity to each other. The travelling time to and fro MTR station does not differ much.

5. Conclusion

In this paper, we have explored the popularity of re-entrant design with reference to developers' profit maximization incentives and the prescriptive building legislation in Hong Kong. We have also evaluated, from homebuyers' perspective, whether re-entrants are good or bad. Based on the hedonic pricing analysis, we found that the preference for re-entrants is floor-dependent. Before SARS, homebuyers did not prefer re-entrants on low floor levels, but they were willing to pay more for re-entrants as the floor level increases. Yet, the outbreak of SARS did not significantly change their preferences for re-entrants. Further research is needed to understand this phenomenon.

Perhaps a more important message from this research is that the market has capitalized building design into property prices. Given these findings, developers and designers will know better which types of building design are more marketable and welcome by homebuyers. Then, they can further improve their design to meet the changing needs of the market.

[6] Similarly, the log implicit floor price for "No re-entrant (after SARS)" is computed by (0.054+0.105)*ln(*FLR*), whereas that for "Re-entrant (after SARS)" is -0.191+(0.065+0.054+0.105)*ln(*FLR*). Insignificant coefficients are not included in the calculation.

References

Bojic, M., Lee, M. and Yik, F. (2001) "Flow and temperatures outside a high-rise residential building due to heat rejection by its air-conditioners", *Energy and Buildings*, **33**, 737-751.

Bojic, M., Lee, M. and Yik, F. (2002) "Influence of a depth of a recessed space to flow due to air-conditioner heat rejection", *Energy and Buildings*, **34**, 33-43.

Chau, K.W., Wong, S.K. and Yiu, C.Y. (2004) "The value of the provision of a balcony in apartments in Hong Kong", *Property Management*, **22**(3), 250-264.

Chau, K.W., Yiu, C.Y., Wong, S.K. and Lai, L.W.C. (2003) "Hedonic price modelling of environmental attributes: a review of the literature and a Hong Kong case study", in *Understanding and Implementing Sustainable Development* (eds. LWC Lai and FT Lorne), Nova Science, 87-110.

Chow, T.T., Lin, Z. (1999) "Prediction of on-coil temperature of condensers installed at tall building re-entrant", *Applied Thermal Engineering*, **19**, 117-132.

Chow, T.T., Lin, Z. and Wang, Q.W. (2000) "Effect of building re-entrant shape on performance of air-cooled condensing units", *Energy and Buildings*, **32**, 143-152.

Chow, T.T., Lin, Z. and Wang, Q.W. (2001) "Flow analysis of condenser cooling air delivery via building light well", *Applied Thermal Engineering*, **21**, 831-843.

Chow, T.T., Lin, Z. and Wang, Q.W. (2002) "Effect of condensing unit layout at building re-entrant on spilt-type air-conditioner performance", *Energy and Buildings*, **34**, 237-244.

Department of Health (2003) *Main Findings of an Investigation into the Outbreak of SARS at Amoy Gardens*, http://www.info.gov.hk/info/ap/pdf/amoy_e.pdf, April 2003, Hong Kong Government.

Kotani, H., Satoh, R. and Yamanaka, T. (2003a) "Natural ventilation of light well in high-rise apartment building", *Energy and Buildings*, **35**, 427-434.

Kotani, H., Narasaki, M., Sati, R. and Yamanaka, T. (2003b) "Environmental assessment of light well in high-rise apartment building", *Building and Environment*, **38**, 283-289.

Kristl, Z. and Krainer, A. (1999) "Light wells in residential building as a complementary daylight source", *Solar Energy*, **65**(3), 197-206.

Ng, E. "Studies on daylight design and regulation of high-density residential housing in Hong Kong", *Lighting Research and Technology*, **35**(2), 127-139.

Rosen, S. (1974) "Hedonic prices and implicit markets: product differentiation in pure competition", *Journal of Political Economy*, **82**, 34-55.

World Health Organization (WHO) (2003) *WHO Environmental Health Team Reports on Amoy Gardens*, http://www.info.gov.hk/info/ap/who-amoye.pdf, May 2003.

Table I: Summary of probable SARS cases
with onset of illness from 1 November 2002 to 31 July 2003

Areas	**Cumulative number of cases**	**Number of cases which were not health care workers (%)**
Canada	251	142 (57)
China	5327	4325 (81)
HKSAR	**1755**	**1369 (78)**
Taiwan	346	278 (80)
Singapore	238	141 (59)
Vietnam	63	27 (43)
Others (in 23 areas)	116	Not Available

Source: http://www.who.int/csr/sars/country/table2004_04_21/en/

Table II: Descriptive statistics of property transaction data

	Mean	Std. dev.	Min	Max
City Garden (Nos. of Transaction = 357)				
Property price (HK$mil.)	4.36	1.30	1.65	7.90
Age (months)	194.56	31.83	140.00	262.00
Floor level	14.69	7.79	3.00	28.00
Flat size (ft^2)	1,033.22	210.77	641.00	1,368.00
Distance to MTR station (m)	471.95	35.18	418.72	534.01
Seaview (%)	0.49	-	-	-
Shopping centre view (%)	0.32	-	-	-
Building view (%)	0.18			
Flats with re-entrants (%)	0.64	-	-	-

Table III: Definitions of the variables

Variable	**Definition**
P_{it}	The log transaction price (in HK$mil) of property *i* at time *t*
RET_i	A re-entrant dummy which equals 1 when property *i* has a re-entrant, and zero when it does not has any re-entrant
$SARS_{it}$	An event dummy which equals 1 if property *i* was transacted after the SARS outbreak, and zero if it was transacted before SARS

AGE_{it}	The log age (in months) of property *i* at time *t*
$SIZE_i$	The log gross floor area (in square feet) of property *i*
FLR_i	The floor level of property *i*
SEA_i	A view dummy which equals 1 when property *i* possesses a panoramic Victoria Harbour view, and zero otherwise
$SHOP_i$	A view dummy which equals 1 when property *i* possesses a view facing the shopping centre, and zero otherwise
$BLDG_i$	A view dummy which equals 1 when property *i* possesses a view facing other buildings, and zero otherwise
MTR_i	The log distance (in metre) between property *i* and the MTR station
$TIME_{ij}$	A monthly time dummy which equals 1 if property *i* was transacted at time *t*, and zero otherwise (the base period is time 0, i.e. January 1999)
α, β and χ	Coefficients to be estimated
ε_{it}	The error term

Table IV: Estimation results of Equation (2)

Variable	Coefficient	Std. Error	t-Statistic	Prob.	
RET	-0.1908	0.0957	-1.9942	0.0471	**
RET x SARS	0.1634	0.1523	1.0729	0.2843	
RET x FLR	0.0654	0.0365	1.7911	0.0744	*
RET x FLR x SARS	-0.0700	0.0609	-1.1499	0.2512	
Constant	-5.0461	0.8085	-6.2415	0.0000	***
AGE	0.0960	0.1457	0.6585	0.5108	
SIZE	0.8303	0.0487	17.0410	0.0000	***
SEA x FLR	0.0542	0.0318	1.7032	0.0897	***
SHOP x FLR	0.0335	0.0319	1.0509	0.2943	
BLDG x FLR	0.0321	0.0332	0.9658	0.3350	
FLR x SARS	0.1048	0.0509	2.0562	0.0407	**
MTR	0.1119	0.1744	0.6418	0.5215	
R-squared	0.8282	F-statistic		14.4666	***
Adjusted R-squared	0.7710	Prob(F-statistic)		0.0000	

Note: Time dummy results are not reported here but can be made available upon request.

* significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level

Figure 1: Typical arrangement for adjacent flats in a "cruciform" plan

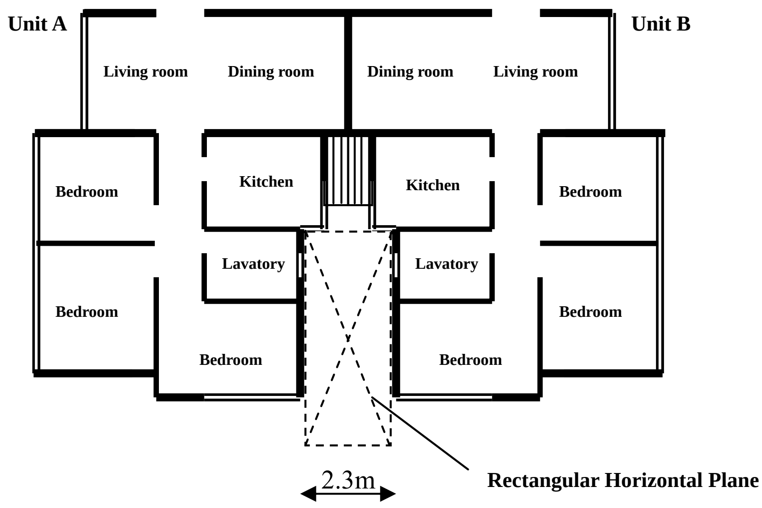


Figure 2: A re-entrant (the shaded part) in a "cruciform" plan

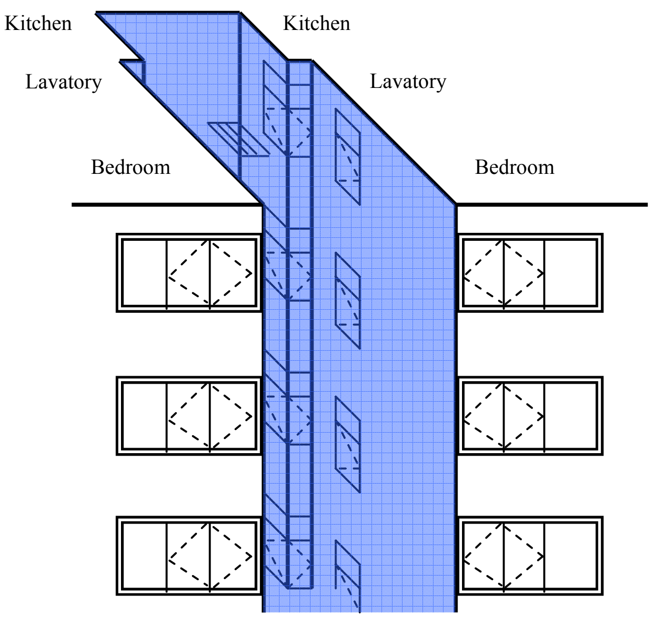
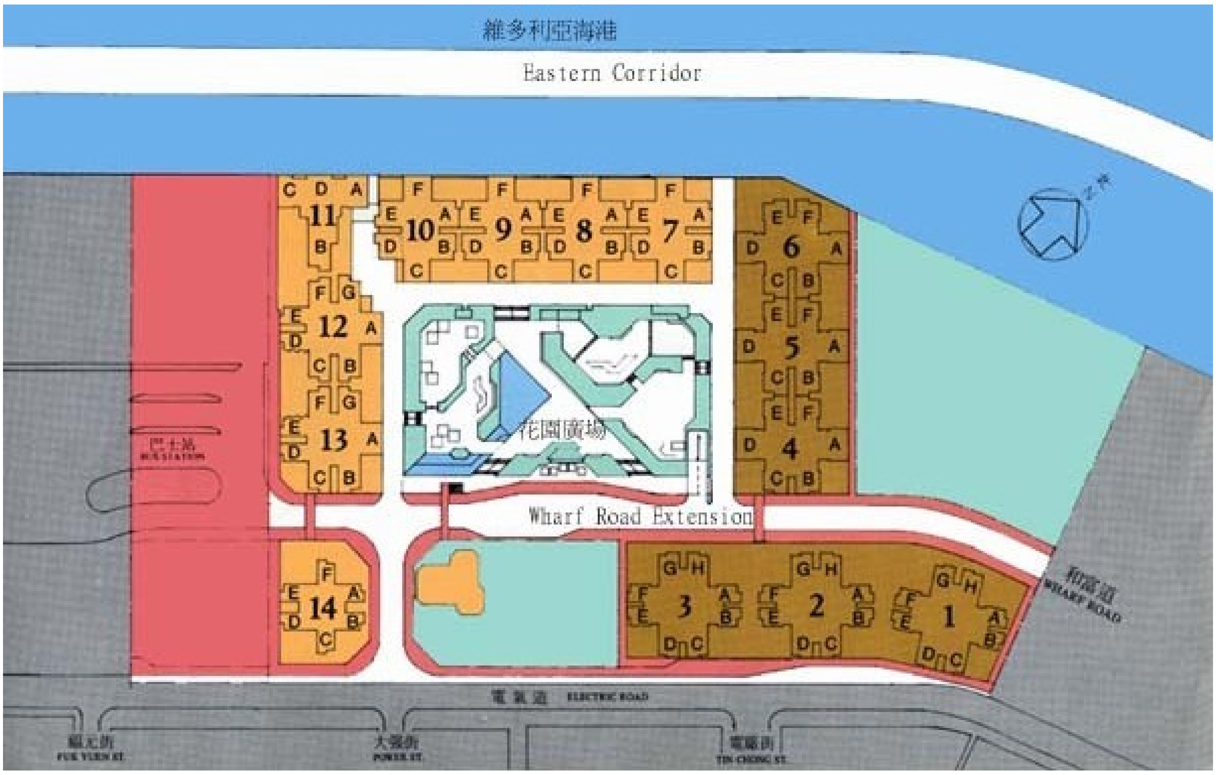
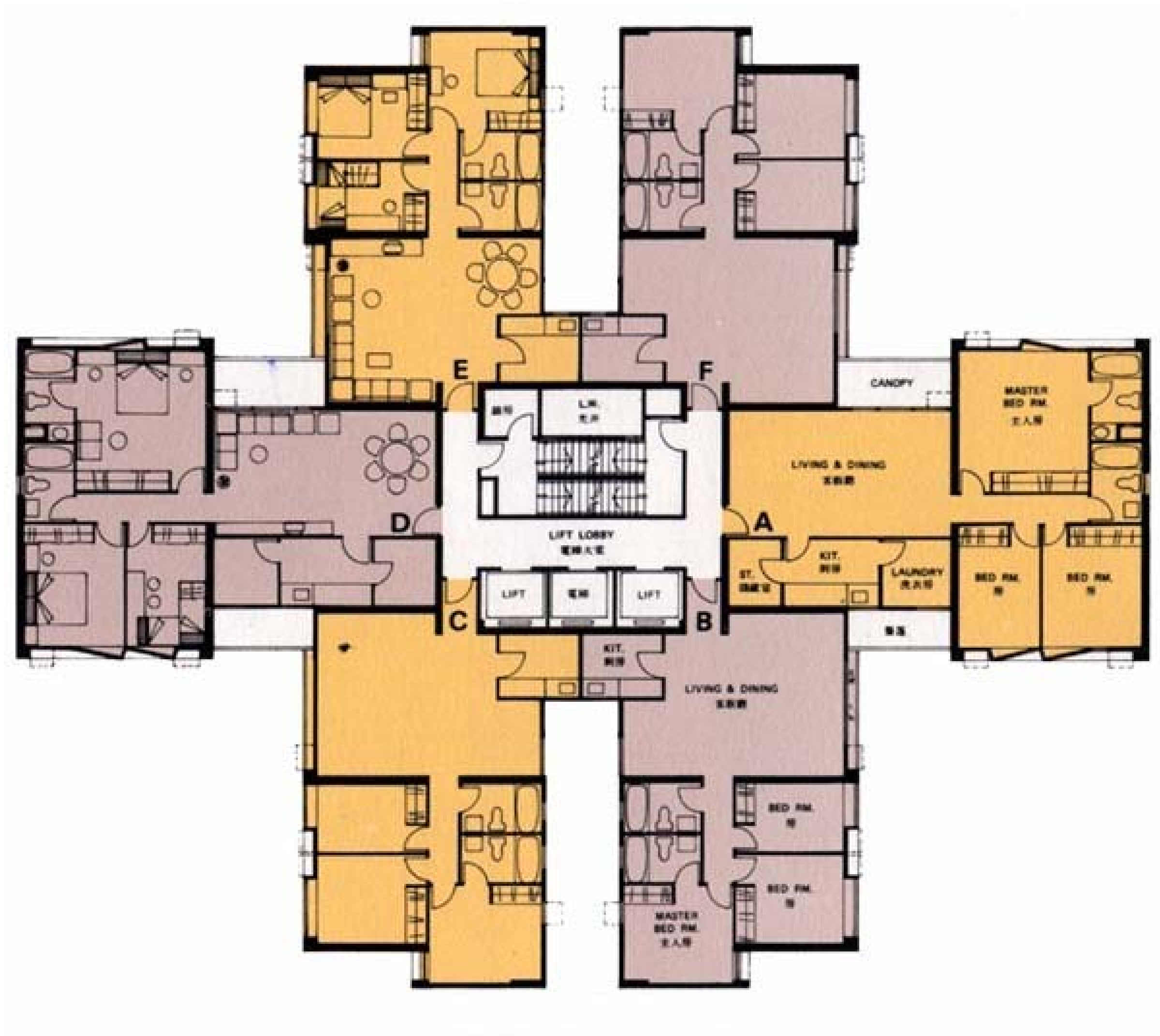


Figure 3: Block plan for City Garden



Source: Bo Fung Property Agency (http://www.bo-fung.com.hk/)

Figure 4 Typical floor plan for City Garden (Blocks 4 to 10)



Source: Bo Fung Property Agency (http://www.bo-fung.com.hk/)

Figure 5: Price-floor premium for flats with re-entrant (before and after SARS)