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Availability, Affordability and Volatility: the case of Hong Kong Housing Market

Charles Ka Yui Leung and Edward Chi Ho Tang*

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Abstract

Housing prices in Hong Kong have gained international attention. This study suggests that the housing supply may be insufficient. Consistent with previous studies, we confirm that merely increasing the land supply may not increase the housing supply. We also find preliminary evidence for widening income inequality, which, when combined with unavailability, can lead to unaffordability in the housing market. Given the current housing supply elasticity with respect to price, Hong Kong is not more volatile than major cities in the United States. Thus, improving housing availability and thereby increasing housing supply elasticity, could effectively decrease housing price volatility.

Keywords: Land policies, housing availability, housing affordability, housing volatility, Granger causality

JEL Classification: E30, R21, R31, R52

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1. Introduction

Despite its small size, less than 10% of New York City in area, Hong Kong has attracted international attention for its economic activities. Friedman's (1997) praise of Hong Kong's "free market practice" is one example.¹ More recently, as housing prices in Hong Kong have reached new heights, the Chief Executive, Mr. C. Y. Leung proposed several measures to "stabilize the housing market." As the Wall Street Journal (2013) reported,

"Free market policies transformed Hong Kong from a city of refugees to a prosperous regional hub in the space of a generation. Now Chief Executive Leung Chun-ying thinks he knows better than the market...The most serious example concerns the property market, which was a focus of this week's speech. Mr. Leung is bowing to populist pressure to label fast-rising house prices a market failure and do something about it..."

In Mr. Leung's view, the market is failing to correctly match supply of apartments to the demand, which also incorrectly pricing apartments that are on the market. So he proposes an expansion in public-housing units (building 100,000 units for the five years starting 2018), the creation of massive development areas near the border with China, and reclamation projects that would create new islands on which to build apartment towers..."

In fact, the Hong Kong government may have some empirical grounds for its worries. Here we present some intuitive graphs and delay more formal analysis to later sections. Figure 1a demonstrates that Hong Kong house prices reached a new height in 2013Q3, even after

¹ Friedman (1997) claims that "...Economists and social scientists complain that we are at a disadvantage compared with physical and biological scientists because we cannot conduct controlled experiments. However, the experiments that nature throws up can be every bit as instructive as deliberately contrived experiments. Take the fifty-year experiment in economic policy provided by Hong Kong between the end of World War II and this past July, when Hong Kong reverted to China.... In this experiment, Hong Kong represents the experimental treatment; Britain, Israel, and the United States serve as controls. Immediately after World War II, Hong Kong had a population of about 600,000. A colony of Britain, it did not receive its freedom after the war as most other colonies did.... After the Communists took control of mainland China, a flood of refugees came to Hong Kong. Over the next fifty years, the population exploded. Today it is more than six million.... I take Britain as one control because Britain, a benevolent dictator, imposed different policies on Hong Kong from the ones it pursued at home.... Nonetheless, there are some statistics, and in 1960, the earliest date for which I have been able to get them, the average per capita income in Hong Kong was 28 percent of that in Great Britain; by 1996, it had risen to 137 percent of that in Britain. In short, from 1960 to 1996, Hong Kong's per capita income rose from about one-quarter of Britain's to more than a third larger than Britain's. It's easy to state these figures. It is more difficult to realize their significance. Compare Britain—the birthplace of the Industrial Revolution, the nineteenth-century economic superpower on whose empire the sun never set—with Hong Kong, a spit of land, overcrowded, with no resources except for a great harbor. Yet within four decades the residents of this spit of overcrowded land had achieved a level of income one-third higher than that enjoyed by the residents of its former mother country....I believe that the only plausible explanation for the different rates of growth is socialism in Britain, free enterprise and free markets in Hong Kong. Has anybody got a better explanation? I'd be grateful for any suggestions."

correcting for inflation. Figure 1b shows that the house-price-to-wage ratio has increased rapidly since 2004. In comparison, the US market is much more stable.² As the house price-to-wage ratio is often used as a measure of affordability, Figure 1b might suggest that housing affordability is an issue that needs to be considered in Hong Kong. Clearly, it is dangerous to draw any conclusion with one data plot. We will re-examine the affordability issue in more details in some later section. It suffices to say that based on our econometric analysis, un-affordability is indeed an issue. And the un-affordability, along with other stylized facts in the Hong Kong housing market, will be shown to connect to the fact of limited housing supply.

[Figures 1a and 1b about here]

Housing policy discussions in the context of Hong Kong are interesting for several reasons. First, as housing supply is related to the land market, and land ownership in Hong Kong is public, any “housing supply deficiency” or “land shortage” is apparently the responsibility of the Hong Kong government. Thus, it is reasonable for the Hong Kong government to consider policy options to “correct” problems in the housing market. Second, Hong Kong’s boundary is fixed by the Basic Law of Hong Kong, and in that sense the supply constraint is potentially a very binding constraint.³ More generally, Hong Kong, like many growing cities, is confronted with the following set of questions. Does the housing market function effectively? Will house prices become “too high”? Should the government intervene in the housing market? If so, what kind of interventions should the government take? Thus, the lessons drawn from Hong Kong might also be relevant to other cities, especially other Asian cities.

Clearly, we are not able to address all of these questions in one paper. Here, we clarify some “stylized facts” regarding the Hong Kong housing market, and hopefully separate the “facts” from the “myths” that are present in the media.⁴ For instance, as we mentioned earlier, due to the Basic Law of Hong Kong, Hong Kong cannot expand her boundary like other cities. Some people therefore assert that the resulting limited supply of land drives the high house prices. Interestingly, Figure 1c shows that only 5% of the land in Hong Kong is currently used for residential purposes, whereas more than 60% is categorized as “woodland/wetland.”⁵ As land is a major input of housing construction, severe land use restrictions could be translated into high

² However, the Hong Kong government is not alone. Roubini (2013) claims that “In emerging markets, bubbles are appearing in *Hong Kong, Singapore, China...*” Even Dr. Chang-Yong Rhee, IMF’s director of the Asia and Pacific Department, asserted in a press conference held in Hong Kong that “Some adjustments are necessary,” for the Hong Kong housing market (The Standard, 2014b). More discussion on this point is provided in later sections.

³ For the description of the boundary, please refer to the Basic Law (Instrument 11): http://www.basiclaw.gov.hk/en/basiclawtext/images/basiclaw_full_text_en.pdf

For a discussion of supply constraint in the economics literature, see Saiz (2010), among others.

⁴ It is common in economics to clarify “stylized facts.” Among others, see Ambler et al. (2004), and Jones and Romer (2010).

⁵ Among others, refer to Turner et al. (forthcoming) for a discussion of land use regulation and welfare.

land prices, and hence high house prices. This paper addresses that point by examining the land supply issues in Hong Kong. As explained below, simply developing more land for residential and commercial purposes may not be sufficient to immediately “cool down” the property market.

Another popular explanation for the high house prices in Hong Kong focuses on the composition of the new housing supply. Figure 1d shows that the supply of small units (class A) as a share of new housing units has dropped significantly over the years. More generally, there is a tendency for developers to allocate more weight to larger and more luxurious housing units, whereas the “need for smaller units” may be under-served, and hence overall house prices increase. Below, we discuss why profit-maximizing developers may not supply “enough” small units to the market even if the demand is there.

[Figures 1c and 1d about here]

The last explanation is related to Hong Kong’s unique position as a regional financial center. As the Hong Kong dollar is pegged to the U.S. dollar, the very low nominal interest rate imposed by the U.S. translates into a low nominal interest rate in Hong Kong. In contrast, inflation in Hong Kong is often imported, such as the effect of the continuous appreciation of the renminbi, as many goods sold in Hong Kong are imported from China. This leads to a very low, even negative, real interest rate environment that encourages home purchasing. In addition, more funds from China are speculating in the Hong Kong real estate markets.⁶ As a whole, these factors create an expectation that house prices will go up [Clayton (1996)]. We will return to this point in a later section.

Overall, the new housing supply is jointly determined by the government and developers. Government plays a key role in redevelopment projects, scheduling land sales, and the conversion of land usage. Developers can determine the date of completion and primary selling prices. In the following section, we discuss each party in turn, and address the following questions.⁷

- (1) Housing availability: Are housing units now under-supplied? Can and will the government increase the housing supply?

⁶ See Leung and Tang (forthcoming) and Dieci and Westerhoff (2012) for details.

⁷ Notice that our sequence is to discuss availability issue first, followed by affordability and volatility. The idea is that housing units must be somehow “insufficiently” supplied (availability issue) first. Then the market price can become “too high” (affordability issue) when economic agents try to purchase units from the constrained market. Volatility, the third issue, is also related to price, and hence placed naturally after the discussion on affordability. This sequence is also consistent with the tradition in microeconomics that the allocation goods is first considered, and then the market price is interpreted as a “mechanism” to “implement” that (constrained) optimal allocation. Among others, see Mas-Colell et al (1995), McKenzie (2002), for more discussion.

- (2) Housing affordability: Can and will the government and developers make private housing “more affordable” by lowering the house price-to-wage ratio?
- (3) Housing volatility: Can and will the government reduce the volatility of the housing market?

Among others, Malpezzi (2012) highlights several common issues in the housing market policy considerations. We hope that some lessons drawn from this paper, which focuses on Hong Kong, will be applied to other Asian cities, especially fast-growing cities in China.

2. Housing Availability

Following the tradition of Economics to discuss the quantity allocation before the price determination, this section discusses the availability of housing in Hong Kong. The availability and volatility issues are related to house price and hence will be discussed in later sections. As shown in Figure 2, on average, each household has more than one housing unit (public or private). Thus, if housing units were evenly distributed, many issues would be resolved. Unfortunately, housing units are not evenly distributed. Some households have multiple units for investment or other purposes.⁸ Hence, the demand for both public and private housing is still un-fulfilled. The following paragraphs briefly describe the institutions and the current situation of public rental housing, subsidized housing, and private housing in Hong Kong.

First, we focus on the public rental market. In 2012, there were 727,800 households, 30.7% of the total households in Hong Kong, living in public rental housing [Figure 3]. To be eligible for public rental housing, a household’s income and assets cannot exceed a certain limit.⁹ A 1999/2000 survey by the Hong Kong Housing Authority collected information on 108,300 applicants in that period. If the Authority commits to keep the average waiting time for general applicants at around three years, it has to build at least 36,100 units a year.¹⁰ For various reasons, the Hong Kong government is unable to meet this target, and hence there is a prolonged average waiting time for applicants [Table 1].¹¹ More importantly, this figure does

⁸ Clearly, this points to the distribution of home ownership, or more generally, the income or wealth distribution issue. This is further discussed in later sections.

⁹ The income and asset limits are subject to renewal regularly. For the latest information, please visit <http://www.housingauthority.gov.hk/en/flat-application/income-and-asset-limits/index.html>

¹⁰ Mr. C. W. Tung, the first Chief Executive after Hong Kong was handed over to China, made such a promise. Among others, see Lau (2002) for more details.

¹¹ According to Goodstadt (2013), such delays are interpreted as beneficial by some government officials because a shortened waiting time could encourage even more people to join the queue, making the “excess demand” of public housing units even more unmanageable. Among others, see Wong (1998) for a related discussion.

not take into account people who are rehoused because of redevelopment.¹² It may be fair to say that there is strong evidence that the Hong Kong government has not fully accommodated the public's need of housing.

[Figures 2 and 3 and Table 1 about here]

One might argue that very few governments can meet the housing needs of their citizens in any case. Although this statement may be true, it is still important to note the magnitude of the “supply shortage” in Hong Kong. For example, in the year 2012/2013, the Housing Authority received 40,000 new applications, and the accumulated applications reached 229,000. However, the annual new supply of public rental housing was only 13,114 units. It has been estimated that an applicant has to wait 17 years for a public housing unit. This is consistent with the conventional wisdom in economics that when a private good is provided at a subsidized rate, it will be over-subscribed and will result in rationing.¹³ Even though the government's policy address in 2013/14 stated that the new public housing supply will further increase to about 20,000 units a year, the annual number of new applications is twice that of the new supply, and hence the average waiting time may not be shortened for at least the next few years.

In addition to public rental housing, the Hong Kong government has tried to promote home-ownership. For instance, the Home Ownership Scheme (HOS) attempts to provide subsidized home ownership to families that cannot afford a private unit. Usually, the subsidized units are sold at about 70% of market value. If the homeowner sells the subsidized unit in the secondary market, they have to pay the “premium”¹⁴ back to the government. The availability of subsidized housing is controlled by the government. In November 2002, the government attempted to stabilize the housing market by ending the HOS. In 2011, it launched an enhanced program to subsidize home ownership called the “My Home Purchase Plan”.¹⁵ Under the current housing target, the government plans to build 8,000 HOS units per year.

In an economy based on an *laissez faire* philosophy, the private housing market plays an important role in the whole sector. As Figure 3 shows, the proportion of households living in private housing has remained steady at around 50% since 1993. Since 2005, the number of new private housing unit has been below 20,000 units a year [Figure 4]. The government believes

¹² In 1999/2000 there were 14,601 houses allocated to this category.

¹³ Among others, see Banerjee (1997), Friedman (2002), and Wong (1998) for more discussion on this point. See also Leung, Sarpca, and Yilmaz (2012) for a discussion of how the introduction of public housing could affect the rent gradient, the population composition across communities, labor supply, and social welfare.

¹⁴ The calculation of premium is as follows:

$$\text{Premium} = (\text{market value at selling time}) * \frac{(\text{market value at purchasing time} - \text{actual purchase price})}{(\text{market value at purchasing time})}$$

¹⁵ In the 2012/2013 policy address, the government did not pledge to undertake any projects for the My Home Purchase Scheme. The land originally earmarked for the scheme was set aside for new HOS development instead.

the “housing shortage” is mainly due to wrangles over land use, and it plans to increase the supply of land, in both the short and long term, to satisfy housing and other needs.

For the government policy to be effective, an increase in the land supply must lead to an increase in the new housing supply. Statistically, this statement can be tested by running a Granger causality test for the effects of an increase in the area of land sold on the new supply of private housing units. Clearly, the causality could run the other way: because the government and the market anticipate a high demand for housing, the amount of land area sold by the government to the private developers would increase. In that case, the causality would be from the new supply of housing to the area of land sold. Again, this is a statement that we can test statistically. The results reported in Table 2a¹⁶ show that the total area of land sales, which is designated for residential purposes only, *does not Granger-cause* the number of new completions of private housing units, and the new completions of private housing *does not Granger-cause* the land sale area.¹⁷ In other words, simply increasing the land supply, either through auctions or tender [Figure 5], does not guarantee that there will be more private housing available in the market. This observation is further confirmed by the results reported in Table 2b that no strong lead-lag relationship exists between the two variables over ± 20 quarters.¹⁸ The main “missing piece” is the profit-maximization strategies of real estate developers¹⁹ [Lai and Wang (1999)]. In Hong Kong, the new supply of housing is dominated by a few developers. They are large corporations listed on the Hong Kong Stock Exchange. As their policies are to maximize shareholders’ wealth,²⁰ their strategies may not maximize the supply of private housing. Although in the 2010/11 budget speech, the Financial Secretary announced that the government was prepared to specify conditions for land sales, including the minimum number of flats to be constructed and their size restrictions, the developers’ still choose the time in which to complete and sell the units.

[Figures 4 and 5 and Tables 2a and 2b about here]

The agricultural land policy in Hong Kong illustrates how developers may influence the new housing supply. To fully understand the agricultural land policy in Hong Kong, some discussion of the Hong Kong land ownership system may be very helpful. We present a few key points below, and interested readers can refer to the Appendix for further details.

¹⁶ In fact, Lai and Wang (1999) have done some related analysis. The results presented here can be interpreted as an update and extension of their research.

¹⁷ Among others, see the Local Research Community (2013) for a related analysis.

¹⁸ The authors are grateful for an anonymous referee’s suggestion to use Johansen’s cointegration test to study the long-term relationship between LSA and CNPH. However, LSA is a I(0) series and CNPH is a I(1) series. Therefore, this test may not be applicable in this case.

¹⁹ For the list of developers in Hong Kong, please refer to Appendix 2.

²⁰ For the behavior and price strategy of developers, refer to Henderson and Thisse (1999), Gillen and Fisher (2002) and Ching and Fu (2003).

- After a battle in 1898, the British government, which had already occupied and developed Hong Kong Island for decades, took a 99-year lease on the New Territories. At that time, the New Territories area in sharp contrast with Hong Kong Island.
- When the British took over the New Territories, they attempted to understand the land ownership structure and raise taxes. They found a land-ownership system significantly different from their expectations. For instance, as Hase (2006, p. 31) observes, *“Besides the fact that there were no accurate survey records and that the district land registers were out of date, it was of even greater concern that much of the tax revenue was in the hands of intermediaries, who collected their rents from those farming the land and forwarded what was due to the authorities.”*
- Before the British takeover, the New Territories unfortunately experienced hardship due to population growth and “inter-village wars” that led to many casualties, which might have made the native residents more distrustful.
- The British takeover was not warmly welcomed, and misunderstandings and fears abounded. Taxes and the Sanitary Board were two important concerns. Some local landlords who had clear vested interests might have encouraged the spread of misunderstandings.
- This situation eventually led to the disastrous Six-Day War. Several thousand poorly equipped Chinese villagers surrounded and attacked the well-equipped British Army. Apparently, several hundred Chinese villagers were killed in that war.
- To maintain the security of Hong Kong with limited forces, Sir Henry Blake, the British Governor of Hong Kong at that time, adopted a “Forgive and Forget” policy. Blake even established district councils and invited the leaders of the villages to join the councils. Blake’s policy had a long-term effect on Hong Kong.

As a result, although land ownership is technically public in Hong Kong, the government faces several constraints when developing “agricultural land,” which is “effectively owned” by the native people. To develop those lands, the government can directly trade with the locals, obtain the agricultural land, and then ask the Town Planning Board, whose members are appointed by the Hong Kong government, to “convert” agricultural land to commercial and residential land. Alternatively, developers who purchase agricultural land from locals could submit a similar land-use conversion request. Usually, to obtain permission to convert land use, developers need to pay a “land premium” (LP). The exact amount of the LP is decided on a case-by-case basis, and is typically determined in confidential negotiations between the government and the involved developers.

In light of this process, it is relatively easy to understand why although the contribution of agricultural activities to Hong Kong's GDP has been less than 0.1% since 2000, the share of agricultural land stays above 6% [Figure 6a], with most of the land abandoned [Figure 6b]. The conversion of agricultural land to residential land could potentially increase the housing supply, but a substantial amount of the agricultural land is held by developers. From 2002 to 2011, the agricultural land bank of the four major developers increased from 79.6 million square feet to 101.2 million square feet [Figure 6c]. In this period, about 25% of the abandoned agricultural land was in the hands of developers. Clearly, developers are not interested in agricultural production. They simply wait for the "right market" and then apply for government permission to convert their agricultural land to residential or commercial land. Thus, although the government needs the developers to purchase land and develop new commercial and residential areas, the developers need the government to approve their land use conversion requests, at a "reasonable" LP so that the whole development project remains profitable. The relationship between the government and the major developers may thus be similar to a "bilateral monopoly" economic model.²¹ Some time-consuming bargaining is inevitable. Unfortunately, economic science may not be able to provide much useful guidance for that.

[Figure 6 about here]

Even if both the government and developers agree to increase the new housing supply, there may be additional constraints. As Hong Kong is open to international trade, those constraints come from "non-tradable sectors" of the economy.²² The first constraint is the supply of land. Severe land use regulations imposed in Hong Kong.²³ In particular, as we have discussed, a substantial amount of land in Hong Kong is classified as "agricultural land" and most of it is held by "native people," who are given special privileges, including the "New Territories Small House Policy" (SHP). The original idea was to ensure that the descendants of the native people would be given land and the right to build small houses for themselves if the Hong Kong government takes the land for development. However, it has been repeatedly reported that these rights have been abused in different ways, leading to many controversies.²⁴ According to the results of a survey conducted by Lao (2013), issues surrounding the SHP are still un-resolved. At the same time, both the Hong Kong government and developers need to have a certain level of

²¹ The study of bilateral monopolies has a long history in the economics literature. Among others, see Morgan (1949).

²² Clearly, this is an application of the Balassa-Samuelson effect. Among others, see Bardhan et al. (2004) and the reference therein for a discussion.

²³ It is well known that land use regulations can lead to severe distortions in the housing market. Among others, Bertaud and Malpezzi (2001) study the case of Malaysia. Leung and Teo (2011) present a multi-region, dynamic, stochastic general equilibrium (DSGE) model to study the general equilibrium impacts of related distortions.

²⁴ For the official statement of the Small House Policy (SHP), see the website provided by the Hong Kong government, <http://www.landsd.gov.hk/en/legco/house.htm>. Among others, Hopkinson and Lao (2003) provide a comprehensive review of the issues relating to the SHP.

agreement with the native people if they intend to develop more “agricultural land” for residential and commercial purposes. Thus, reaching an agreement with the native people may be an additional issue in the further development of Hong Kong.

The second constraint comes from the labor supply. Clearly, an increase in the housing supply implies an increase in the demand for trained and licensed construction workers. According to the latest consultation document of the Public Engagement Exercise on Population Policy,²⁵ the number of job vacancies in construction sites rose by 74.3% in June 2013. The document recommends importing workers to complement the existing workforce, but it has received a range of feedback. Although the Labor Advisory Board took action in April 2014 to speed up the importation of workers through the Supplementary Labor Scheme that covers 26 categories of jobs in the construction sector, this may not significantly increase the new housing supply within the next several years. Hence, the increase in new housing supply may be moderate.

3. Housing Affordability

It is not surprising that when the public housing supply cannot meet the demand, the demand will be channeled to the private market. Hence, the “affordability” of private housing becomes a crucial issue [Mukhija (2004); Tiley and Hil (2010); Wang and Murie (2011); Gurrán and Whitehead (2011)]. We follow Malpezzi (1999)²⁶ to provide a benchmark for house prices. Malpezzi’s model relates the changes in house price-to-income ratio to the house price dynamics with several merits. It is simple and easy to implement as it requires only income and house price data. It recognizes that as the house price-to-income ratio deviates from the long-term value, house prices will adjust and the system will eventually return to the long-term value. More specifically, we use the Hong Kong data for the 1980Q2-2009Q1 period as our starting sample. Moving the terminal date one quarter at a time, we then repeatedly re-estimate both the recursive regression model and the rolling regression model,²⁷ so that the parameters and model-implied real housing prices are estimated.²⁸ Then, by comparing the actual value with

²⁵ For details, please refer to http://www.hkpopulation.gov.hk/public_engagement/en/doc.html

²⁶ Leung (2014) shows that Malpezzi’s model can be approximated as the reduced form dynamics derived from a dynamic stochastic general equilibrium model. For the details of the formula, see Appendix 3.

²⁷ According to Clark and McCracken (2009), combining recursive regression (with a sampling period that increases over time) with a rolling regression (with a constant sampling period), can significantly improve forecasting accuracy when the data generation process is (potentially) subject to a structural break. As the Hong Kong housing market may be subject to a “structural break” during the sampling period, we consider it appropriate to use both a recursive and rolling regression.

²⁸ Notice that since model parameters are being updated in each quarter. Thus, relative to the original model of Malpezzi (1999), our econometric model is more “flexible” in at least two dimensions. First, our model allows the house price-to-income ratio to be time-varying. Second, it allows the house price change to be increasingly (or decreasingly) sensitive to the change of house price-to-income ratio. Yet, in spite of these relaxations, our model’s

the implied value in each quarter, we can produce the time plot of the following quantity (in percentage terms):

$$\frac{\text{Actual real housing price}}{\text{Malpezzi's implied real housing price}} - 1$$

Clearly, a negative (positive) value of this quantity means that the actual house price is smaller (higher) than its model-implied counterpart. Figure 7 illustrates several points clearly. First, our result is robust in the sense that the recursive and rolling regressions achieve the same patterns in the implied quantities. Second, since March 2009, there have been many more quarters with positive values than quarters with negative values, meaning that house prices tend to be higher than those implied by the market fundamentals, even when we allow the coefficients to be time-varying. In fact, the deviations seem to be significant. There are several quarters in which the percentage deviations are more than 6%: 2009Q3, 2010Q3, and 2012Q3. This is consistent with the results of Shiller (2007) that the market fundamentals may not fully explain the movements in housing prices. In fact, Leung and Tang (forthcoming) provide evidence that market sentiment or “animal spirit” is a driving force in the Hong Kong housing market. Again, we are not trying to provide an explanation for this phenomenon. We only intend to establish the “over-pricing of Hong Kong housing” as a stylized fact.

[Figure 7 about here]

When we perform the Johansen cointegration test for the U.S. real housing price index and real weekly earnings (both are I(1) variables, from Table 3a), the results show a cointegrating relationship (Table 3b). This means that the long-term ratio between the U.S. housing prices and weekly earnings is constant. In the case of Hong Kong, although the variables are also I(1) (Table 3c), the Johansen cointegration test reports that both the Trace statistic and Max-eigen statistic do not exceed the 5% critical values (Table 3d). In other words, the test statistics suggest that there is no constant long-term ratio between the real housing price and real earnings in Hong Kong. This is somewhat at odds with existing economic models, which typically predict the existence of a steady state or some constant long-term value. Thus, there may be significant mispricing in the Hong Kong housing market. To further investigate this mispricing issue, we adopt a few measures to examine whether “housing affordability” in Hong Kong has deteriorated or improved.²⁹

prediction of house price is still persistently above the actual house price. The only conclusion one can draw is that the house price itself persistently grows faster than the house price-to-income ratio.

²⁹ Clearly, there are other measures of affordability, for example purchase affordability and repayment affordability, such as Gan and Hill (2009). Unfortunately, to repeat the analysis of Gan and Hill (2009) in the context of Hong Kong would demand detailed information of the income distribution of Hong Kong, which is not accessible to the

[Tables 3a, 3b, 3c, 3d about here]

According to the cross-country data provided by the CIA, Hong Kong has the second highest population density in the world [Figure 8], and the related problem of the low affordability of housing has been highlighted recently.³⁰ As Figure 9a shows, in 2012, an average person in Hong Kong could only purchase 22 square feet of housing with his or her annual income, which is in sharp contrast with the situation in Japan (103 square feet). If we further classify workers according to the nature of their job, it is clear that the problem of unaffordable housing is not restricted to people with low incomes. Figure 9b demonstrates that the annual income of people working at the supervisory level is worth at most 30 square feet of a typical-sized (Classes A, B, and C) flat, or less than 20 square feet of a luxurious (Classes D and E) flat. Not surprisingly, housing affordability is even lower for employees with lower income levels [Figure 9c].

[Figures 8, 9a, 9b, 9c about here]

Some commentators have attributed the “unaffordability” of housing to the so-called “high land price policy” (HLPP).³¹ According to this explanation, the government deliberately sells land at a high price. In fact, the proceeds from land sales³² are one of the major sources of government revenue. In the fiscal year 2012/2013, the LP³³ shares were 15.7% of the total government revenue, followed by profits taxes [Figure 10a]. As a result, high land prices could be translated into the high selling price of private units.

Although this explanation may sound intuitive, and it is popular among certain groups, it may not be the complete economic explanation. There are several issues to be addressed. First, as shown in Table 4, land sales do *not* Granger-cause real housing prices.³⁴ Thus, even if the Hong Kong government does practice a HLPP, it is not clear whether high land prices are translated into high house prices. Second, as the Hong Kong government has limited land reserves, selling the land at a slow rate (and hence a high price) may not be a bad policy. The situation is

authors at the moment. In addition, this paper focuses on the dynamic issue and mainly replies on time series techniques, which may have a very different focus than Gan and Hill (2009), which is a cross-sectional analysis by nature. Clearly, there are alternative notions of “equilibrium affordability” (or the lack of it). Among others, see Green and Malpezzi (2003), Malpezzi (2012), Ortalo-Magné and Rady (2008), Ortalo-Magné and Prat (2014).

³⁰ According to Bertaud (2014), comparing with cities in Australia, Canada, Ireland, Japan, New Zealand, the United Kingdom, U.S.A., Hong Kong housing was the least affordable in the year 2013.

³¹ Although the Hong Kong government has never admitted the existence of such a policy, there are clues that it has at least attempted to maintain land prices above a certain level. For instance, the Policy Address 2008/2009 (Paragraph 34) explicitly states that land will never be sold below market value.

³² For the share of land revenue under different disposal types, please refer to Appendix 4.

³³ The premiums from land transactions are credited to the Capital Works Reserve Fund. The Fund can only be used in land acquisition, public works programs, capital subventions, and major systems, equipment, and computerization. For details, please refer to the link: www.budget.gov.hk/2012/eng/pdf/cwrf-mem.pdf

³⁴ See Tse (1988) for a similar finding.

analogous to an oil oligopoly that has limited oil reserves and thus attempts to maximize the present value of the profit. The optimal strategy could indeed be selling a small amount of oil in each period of time, letting the demand drive up the price, and thus maximizing profit (Loury, 1986).³⁵ Moreover, Figure 10b shows that one of the major public expenditures is housing, in the form of below-market-rate public rental housing and subsidized ownership. If real estate constitutes a large fraction of most people's life-time wealth, then more people will demand public housing and subsidized ownership, which in turn increases the government's burden. As the Hong Kong government is constrained by the Basic Law to maintain a balanced budget, the incentive for a rational government to maintain an "excessively high land price" could be over-estimated.³⁶

[Figures 10a and 10b about here]

We consider two alternative explanations for the "unaffordability" of housing in Hong Kong. First, we conjecture that the developers may be responsible for the high house price in Hong Kong. We follow Glaeser and Gyourko (2008) in using the price-to-cost ratio as a measure of the profit margin of developers. We find that the annual growth rate of price-to-cost ratio over time is always positive [Figure 11a], except for the periods after the Asian financial crisis and the global financial crisis (GFC)³⁷. This suggests that for every dollar of building cost, developers are charging increasing housing prices.

To shed further light on this issue, we attempt to study the relationship between developers' stock prices and housing prices. As the real stock prices of the four major developers are positively correlated [Table 5], we use principal component analysis to extract the "common factor" in the different developers' stock prices. Clearly, PC1 explains most of the variation [Table 6], and it is positively and significantly related to stock prices [Table 7]. The Granger causality results in Table 8 show that PC1 is Granger-caused by real housing prices. There is also a feedback effect such that PC1 Granger-causes real housing prices. As a robustness check, the analysis is repeated for the other six developers, and the same conclusion is reached. In summary, the stock performances of the major developers' stocks are tied closely to real housing prices. High house prices benefit the stock prices. In light of this, it is unlikely that the profit-maximizing developers would have much incentive to build affordable housing units.

³⁵ This is consistent with Shih's theory of Hong Kong's housing policy. According to Shih (2014), the British government did not devote many resources to the development of Hong Kong. It thus needed to establish the colony as a low income tax and virtually free-trade port. Hence, to finance any public expenditures, the government now needs to sell land at a high price.

³⁶ Clearly, whether the Hong Kong government is "rational" in the sense of economics is beyond the scope of this study. We thank some anonymous friends for this qualification.

³⁷ Following Leung and Tang (2012), we designate the periods for the Asian financial crisis and global financial crisis as December 1997 and September 2008, respectively.

[Figures 11a, Tables 4 to 8 about here]

Our second conjecture is related to income inequality. Glaeser and Gyourko (2008, p. 16) argue that “combining income and housing costs in a single affordability metric is a bad idea because it confuses issues of income inequality with problems in the housing market”. According to their calculations, people earning minimum wage would not have much after paying rent and basic consumption. Thus, part of the “observed housing unaffordability” problem may be due to the fact that the income of certain groups in the society cannot keep pace with the aggregate output trend. This conjecture is consistent with the recent literature in macroeconomics. Among others, Krusell et al. (2000) argue that capital goods are complementary to skilled labor and as the relative price of capital goods (including computers) continues to drop, the “college premium” increases and the income gap between those who are college educated and those who are not widens. Duffy et al. (2004) confirm this hypothesis with panel data from more than 70 countries.³⁸

Unfortunately, the official data for the study of income inequality is limited in Hong Kong.³⁹ Here we adopt the ratio between the official wage index and the per capita GDP. The idea is that if wages can somehow keep pace with the aggregate GDP trend, that ratio would remain more or less constant. Formally, we can in fact prove the following proposition. (The proof can be found in Appendix 5.)

Proposition 1:⁴⁰

If the aggregate production of an economy is characterized by an aggregate Cobb-Douglas function as in much of the macroeconomics literature, $Y = A(K)^\alpha (N)^{1-\alpha}$, where Y is the aggregate output, A is the productivity, K is the aggregate capital, N is the aggregate labor inputs, and the factor markets are perfectly competitive, then the ratio of the wage rate to per capita real GDP, $w / (Y / N)$, is a constant.

Notice that this result holds whether the productivity is a constant or a random variable. With this theoretical benchmark, we plot the empirical counterpart of this ratio in Figure 11b.

[Figures 11b about here]

According to the graph, the ratio drops from unity (baseline value at 1982) to less than half. It seems reasonable to conclude that income inequality in Hong Kong is indeed widening.⁴¹ Some

³⁸ Among others, see also Acemoglu (2002) and Hornstein et al. (2007) for related analyses.

³⁹ Among others, see Lui (2011) for a related analysis.

⁴⁰ Since the Nobel-winning work of Kydland and Prescott (1982), the aggregate production function is typically assumed to be Cobb-Douglas for a variety of reasons. Among others, see Cooley (1995), Davis (2009), King and Rebelo (1999), and Ljungqvist and Sargent (2000, 2007) for more discussion.

research questions remain open: (1) how does this affect the housing market? and (2) what should the corresponding optimal policy be? We are unable to address these questions here, and can only suggest they be examined in future research.

4. Housing Price Volatility

The third issue we consider is housing market volatility, which has received much attention recently.⁴² For example, Leung and Teo (2011) note that differences in supply elasticities⁴³ can be used to explain the differences in house price volatility. In particular, they find that supply elasticity is negatively and significantly related to housing volatility in major U.S. cities. The idea is very simple. If housing supply elasticity is low when prices are low, then most of the adjustments in housing markets would occur when the market are affected by shocks. Therefore, when we compare the volatility of housing prices across cities, we should consider the potential differences in supply elasticities.

Unfortunately, for most Asian economies, comparable time series of house prices are not publicly available. Perhaps more importantly, we need to *a statistical relationship* between supply elasticity and the volatility of the housing price among cities comparable to Hong Kong, so that we can determine whether the housing price volatility in Hong Kong is “too high” given her supply elasticity. Hence, comparing Hong Kong with another Asian city would not be suitable for our purposes. We thus use the relationship that has been identified in major U.S. cities.⁴⁴ Although Hong Kong is clearly not an American city, there are some similarities. For example, like many American cities, Hong Kong has high levels of maturity and transparency, and a large listed real estate market.⁴⁵ Interestingly, Hong Kong fits reasonably well in the statistical relationship identified by Leung and Teo (2011). We thus use the monthly real estate data from 1993 to 2011 and calculate the supply elasticity of the Hong Kong housing market as 0.76 and its house price volatility as 8.37%. Based on Leung and Teo’s (2011) estimation, an American city with a supply elasticity of 0.76 would be associated with a volatility is 7.90%, which is close to the actual house price volatility of Hong Kong.⁴⁶ Figure 12 shows that if Hong

⁴¹ Thus, our result is also consistent with the findings of Karabarbounis and Neiman (2013) regarding major economies.

⁴² For instance, see Leung, Cheung, and Tang (2013) for the decomposition of volatility in the Hong Kong housing market and the references therein.

⁴³ See Glaeser et al. (2005), Green et al. (2005), Saiz (2010), and Davidoff (2013) for discussions of supply elasticities and housing price movements.

⁴⁴ Clearly, there are other studies that compare Hong Kong with U.S. cities. See, for instance, Chang et al. (2013) for an analysis on how shocks in the U.S. affect the GDP and asset markets in Hong Kong.

⁴⁵ Among others, see Newell et al. (2004) for details.

⁴⁶ Please refer to Appendix 6 for computations.

Kong were an American city, it would fit well in the regression line given in Leung and Teo. The result is even better if we remove Atlanta from the regression.⁴⁷ Thus, the housing market of Hong Kong is not suffering from excessive volatility, despite the comments in the media.⁴⁸

[Figure 12 about here]

However, when housing prices increase and there is the possibility of a speculative bubble, the Hong Kong government does attempt to take some precautionary measures to cool down the market.⁴⁹ Due to the pegged exchange rate system, the recent nominal interest rate in Hong Kong has been low. At the same time, the Hong Kong economy has been stimulated by the appreciation of the renminbi, which has resulted in a high inflation rate. Overall, such a low real interest environment encourages home purchases, by locals and residents of foreign countries. The government has responded by imposing different versions of transaction tax, including the Buyer Stamp Duty (15%), Special Stamp Duty,⁵⁰ and Double Stamp Duty, enforcing a “Hong Kong land for Hong Kong people” policy and restricting the mortgage ratio to 60% or below. Banks are not allowed to approve a mortgage contract if the monthly payment to income ratio exceeds 50%. With these measures, the Secretary for Development, Mr. Paul Chan Mo-po, said that the housing market has stabilized and only 2% of home purchases are by non-locals (The Standard, 2014a).

5. Conclusions

This paper has examined three aspects of the Hong Kong housing market: availability, affordability, and volatility. Examining availability is relatively straightforward. Section 2 presents evidence suggesting that there is a “housing shortage” in both the public and private housing markets. The number of outstanding applications for public rental houses has reached 229,000 cases, whereas the expected number of new completed units remains 20,000 a year. The waiting time is clearly much longer than the official target. The number of new private units

⁴⁷ Details will be provided upon request.

⁴⁸ Historically, the Hong Kong government has attempted to stabilize housing prices. In 2002, housing was in a trough. The government launched nine measures aimed at providing public rental houses to those in need, reducing direct participation in the private housing market, and improving transparency in the market. Together with the Individual Travel Scheme in 2003, the housing market started to recover. In fact, similar stabilizing measures have also been implemented in Hong Kong. For details, please refer to the document (Chinese only): www.legco.gov.hk/yr03-04/chinese/sec/library/0304fs01c.pdf. According to Stephens (2012a and 2012b), the U.K. government has also attempted to identify the root causes of volatility, create a sustainable housing market, and protect homeowners from high volatility.

⁴⁹ See Yiu, Yu, and Jin (2013) for the identification of bubbles in the Hong Kong property market.

⁵⁰ The rates of the Special Stamp Duty are available at: <http://www.ird.gov.hk/eng/faq/ssd.htm>. For a formal analysis of how the Stamp Duty affects the housing market, see Leung, Leung, and Tsang (forthcoming), among others.

has recently been below 20,000 units annually, suggesting that there may be an “excess demand.”

As the land ownership in Hong Kong is public, it is tempting to conclude that if the government increases the land supply, the housing supply issue (i.e., availability) will be solved. Unfortunately, our econometric findings suggest that even if the government increases land sales, the new housing supply may not be increased, because building more housing units and making them more affordable may not be consistent with the profit-maximizing objective of the real estate developers.

How then can the Hong Kong government increase the availability of housing units? Several strategies have been proposed. Wong (1998, 2013) suggests that current practices, such as the lack of means testing, could create a mismatch between public housing units and tenants. Therefore, Wong suggests privatizing the public housing units to improve their market efficiency and even the wealth of the residents.⁵¹ Alternatively, to modify the “hold and wait” behavior of developers, some commentators suggest specifying in the land sale documents a maximum period of time during which private developers must build a specific number of units.⁵² The government may also need to provide incentives for more labor in the construction sector, so that the official target of completing 470,000 housing units in ten years can be met.

Clearly, the lack of housing tends to drive up house prices, and if income distribution is uneven, unaffordability can become an issue. We argue that a high land price policy is not the crucial factor that makes private housing unaffordable. There are other agents in the housing market. For instance, as suggested by Ortalo-Magné and Prat (2014), among others, homeowners may have incentives to keep housing units unaffordable to outsiders. Our study provides evidence that the unaffordability of housing units may come from developers’ strategies. The objective of developers is to maximize shareholders’ profit, and hence the developers may lack incentives to sell housing units at “affordable prices.” The fact that the average wage does not keep pace with the aggregate GDP may also suggest a widening of income inequality, which causes housing units to be unaffordable to a growing proportion of the population. Although the government might develop policies that encourage developers to provide private units at affordable prices, it is much harder for the government of a small open economy to resist the global trend of increasing income inequality.

Finally, if the limited housing supply is persistent, it can magnify the volatility issue. Hong Kong has a small open economy and hence is subject to different kinds of international shocks. For

⁵¹ Based on Ortalo-Magne and Rady (2006), Ho and Wong (2006) discuss the potentially negative side of the privatization of public housing in Hong Kong.

⁵² It is well known that developers may wait to develop when facing stochastic prices. Among others, see Wang and Zhou (2006) for a formal analysis.

instance, a sudden and significant inflow of capital can drive up the housing demand and as housing is non-tradable, house prices can only increase to clear the market. If the housing supply elasticity is low, the extent to which house prices need to increase is even higher. In fact, the Hong Kong housing market has experienced peaks and troughs in the past two decades. To minimize the swings in the housing market, the government has implemented countercyclical measures to stabilize the market. Given the supply elasticity of the Hong Kong housing market, we find that the actual housing price volatility in Hong Kong is comparable to that in American cities. In that sense, the Hong Kong housing market is functioning well. Thus, if the Hong Kong government intends to lower housing price volatility, attention should be shifted to policy measures that can increase the elasticity of the supply of housing. Whether this is worth pursuing, and if so, how it can be achieved, is a question for future research.

Obviously, several issues are left unexplored in this study. For instance, given that small and medium size enterprises constitute a large number of firms in Hong Kong, and many of these entrepreneurs use their personal homes as collateral,⁵³ how the macroeconomy might be distorted? what is the optimal housing and land use policy? Furthermore, will the housing policy need to be adjusted if the global trend of increasing income inequality persists? We believe that future research would provide more guidance to these issues.⁵⁴

Acknowledgement:

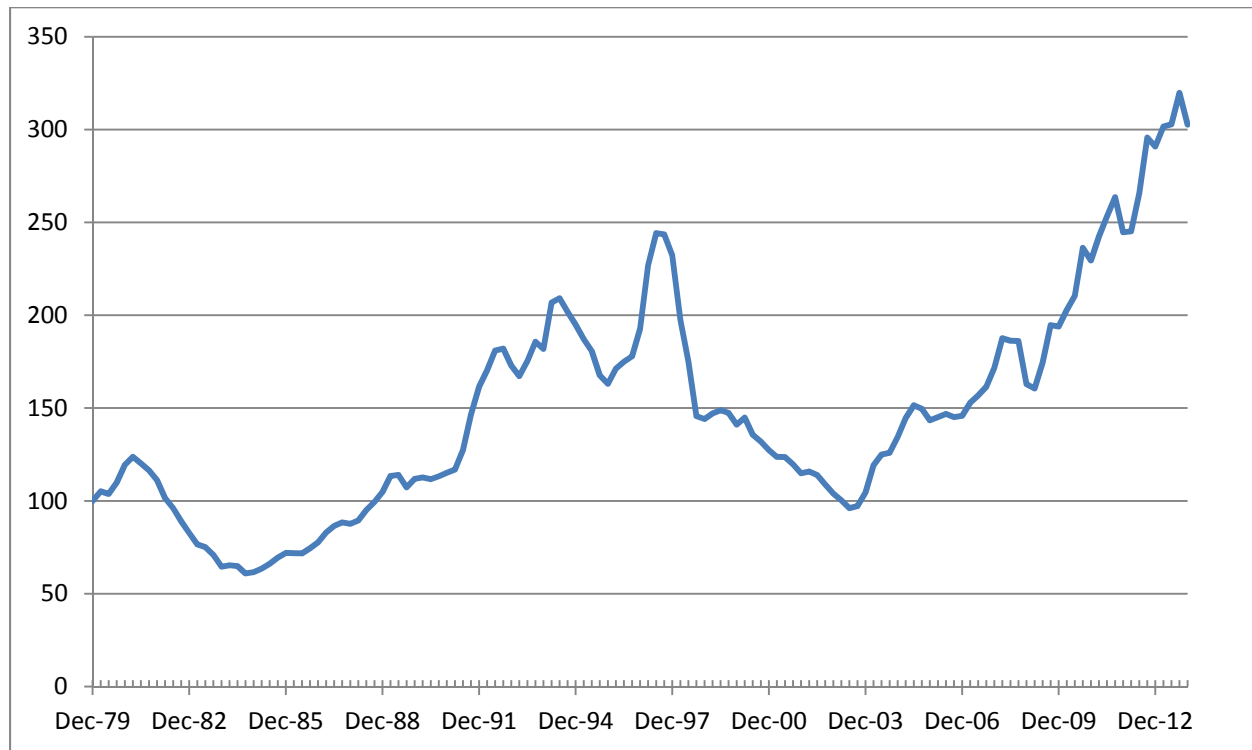
We are grateful to the comments and suggestions from an anonymous referee, Paul Anglin, Shaum Bond, Wing Hong Chan, Nan-Kuang Chen, Yan Dong, John Glascock, Yifan Gong, Richard Green, Daisy Huang, Rose Lai, Hongyu Liu, Lok Sang Ho, Vikas Kakkar, Steve Malpezzi, Tim Riddiough, Isabel Yan, Zan Yang, Abdullah Yavas, Matthew Yiu, seminar participants of HKSAR Government Bureau of Education Seminar on Housing Market (2012), Hong Kong Economic Association Forum 2012, Christian Economists Roundtable 2013, Southwest University of Finance and Economics (Cheng Du, China), 2013 Tsinghua workshop on Real Estate and Consumption, City University students in the EF4490, EF4491 class, and the financial support of City University of Hong Kong. The usual disclaimer applies.

⁵³ Among others, see Jin and Zeng (2007) and Chen and Leung (2008) for more analysis.

⁵⁴ Among others, see Leung (2204) for a non-technical discussion of the early macro-housing literature.

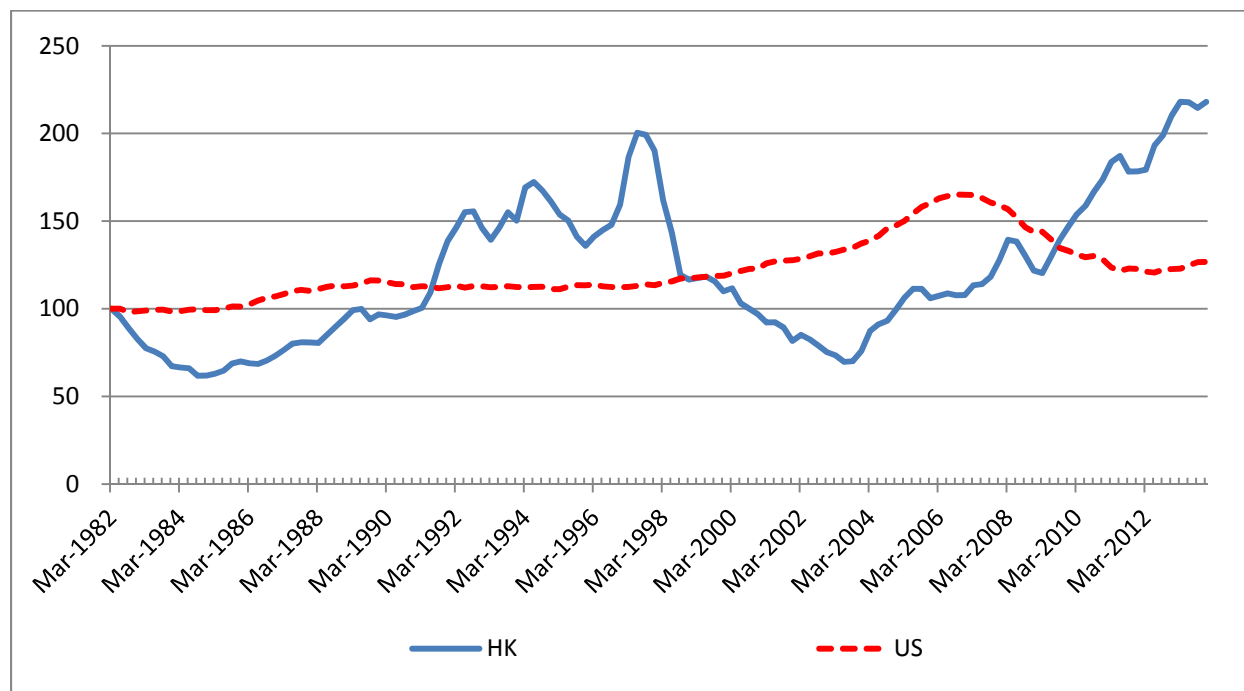
Figures and Tables

Figure 1a Real Housing Price Index (Dec 1979 = 100)



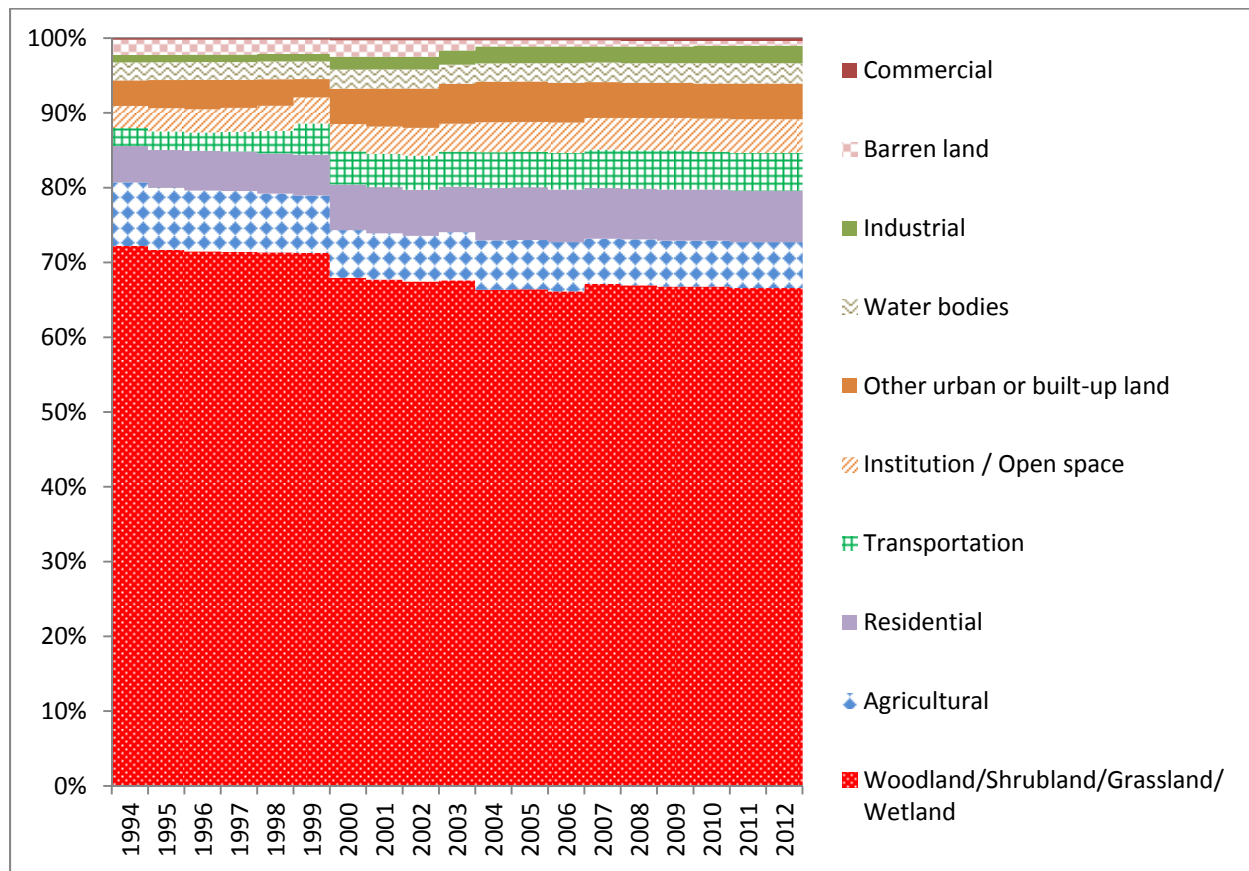
Sources: Rating and Valuation Department and Census and Statistics Department, Hong Kong SAR government.

Figure 1b Time plot of housing price index relative to wage index



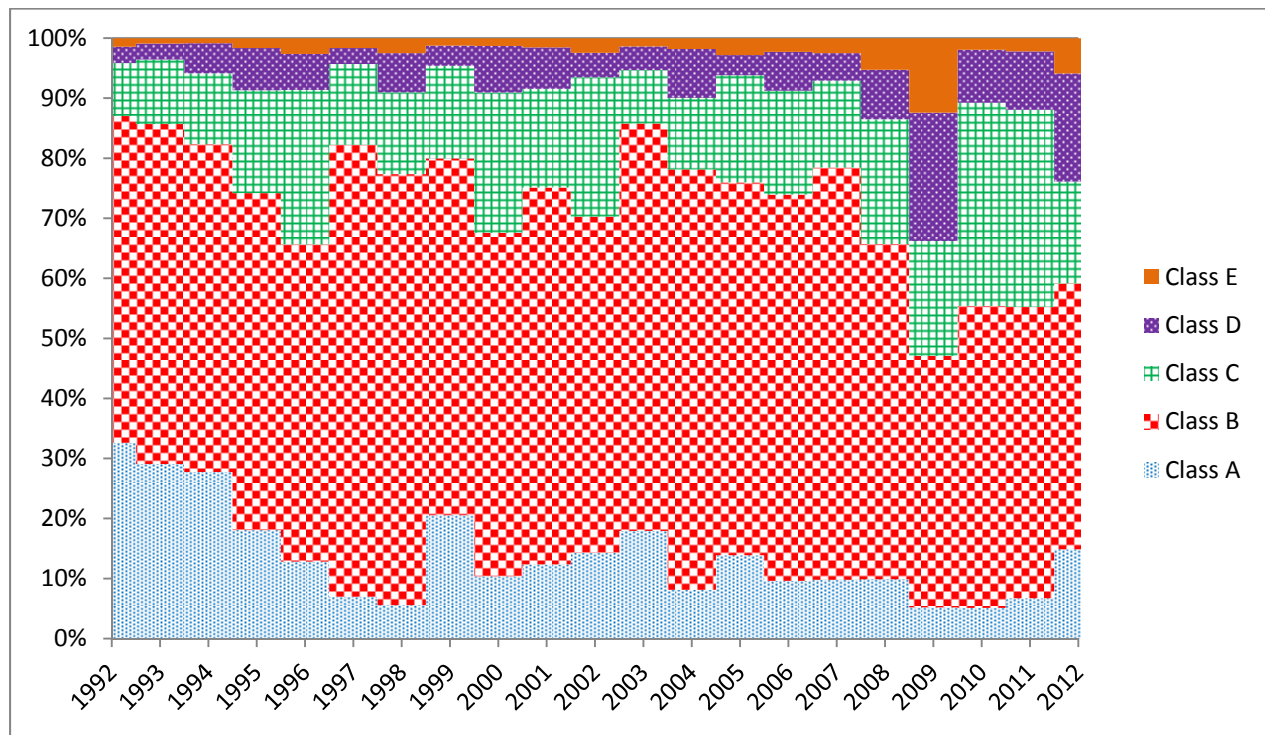
Sources: Rating and Valuation Department and Census and Statistics Department, Hong Kong SAR government; International Monetary Fund; Federal Housing Finance Agency.

Figure 1c Land Utilization in Hong Kong



Source: Planning Department, Hong Kong SAR government.

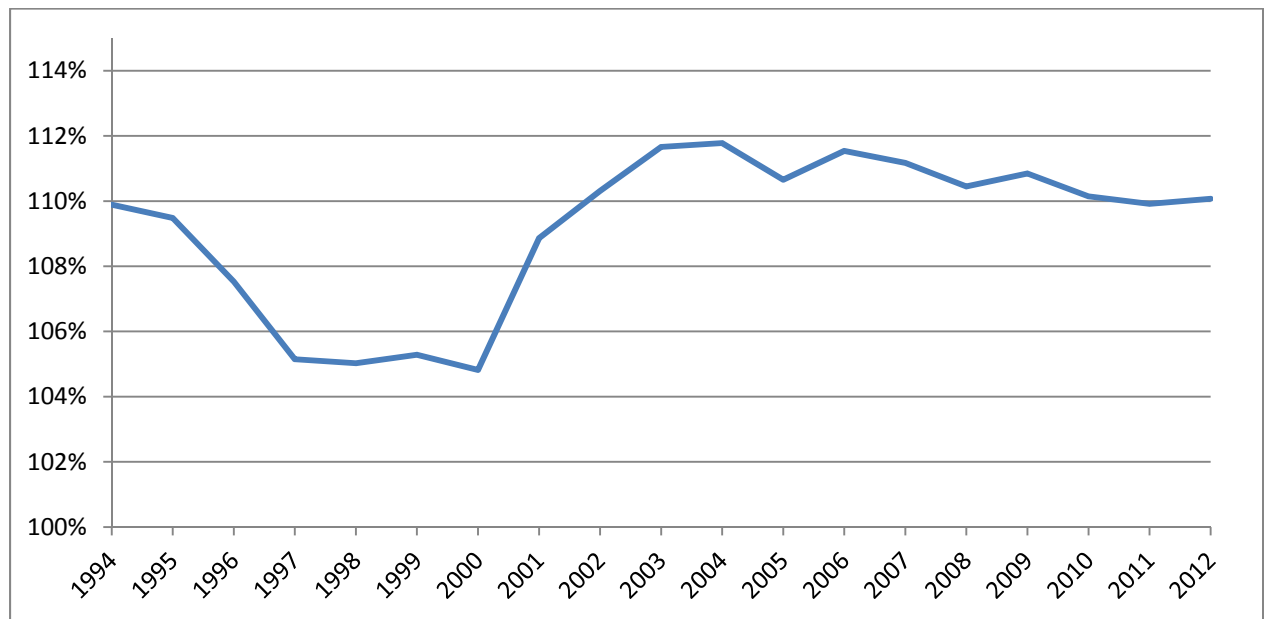
Figure 1d Composition of New Housing Units



Key: Class A – Flats with a saleable area smaller than 400 square feet; Class B – Flats with a saleable area from 400 to 699 square feet; Class C – Flats with a saleable area from 700 to 999 square feet; Class D – Flats with a saleable area from 1000 to 1599 square feet; Class E – Flats with a saleable area larger than 1600 square feet.

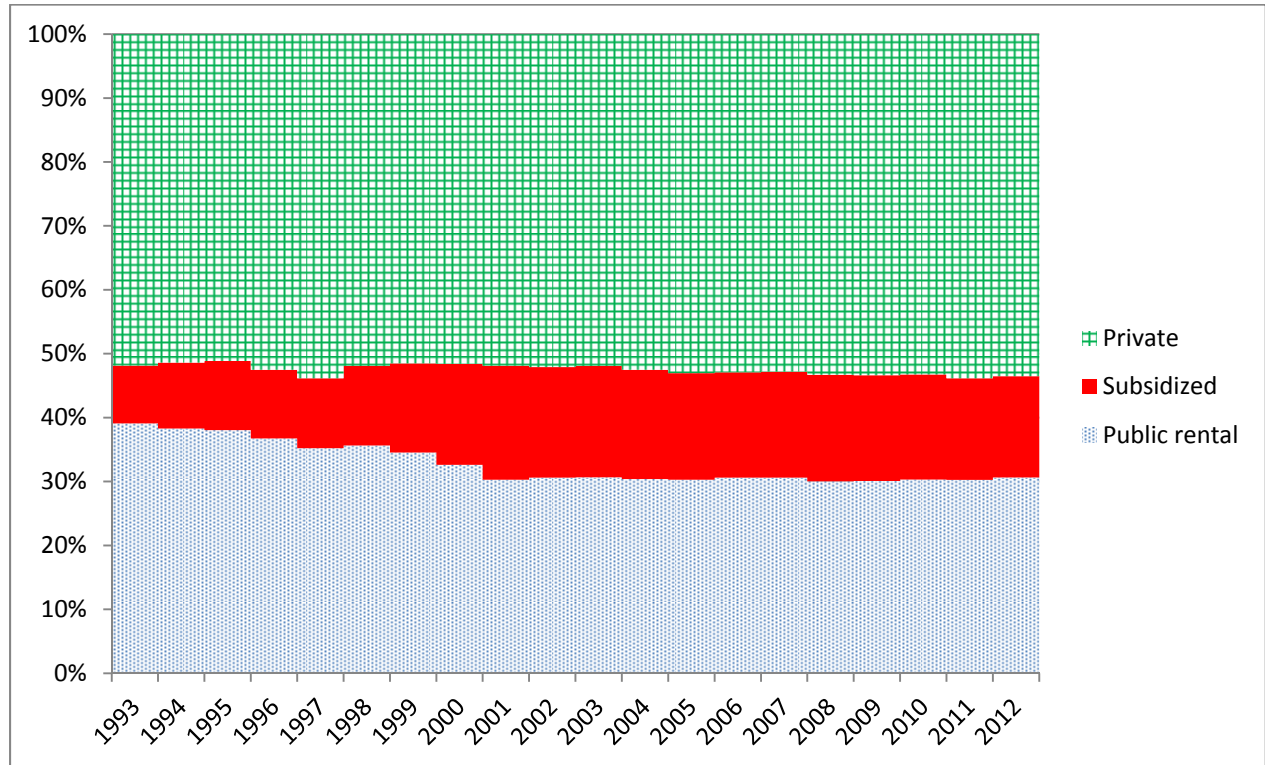
Source: Rating and Valuation Department, Hong Kong SAR government.

Figure 2 Housing Units Relative to Number of Households



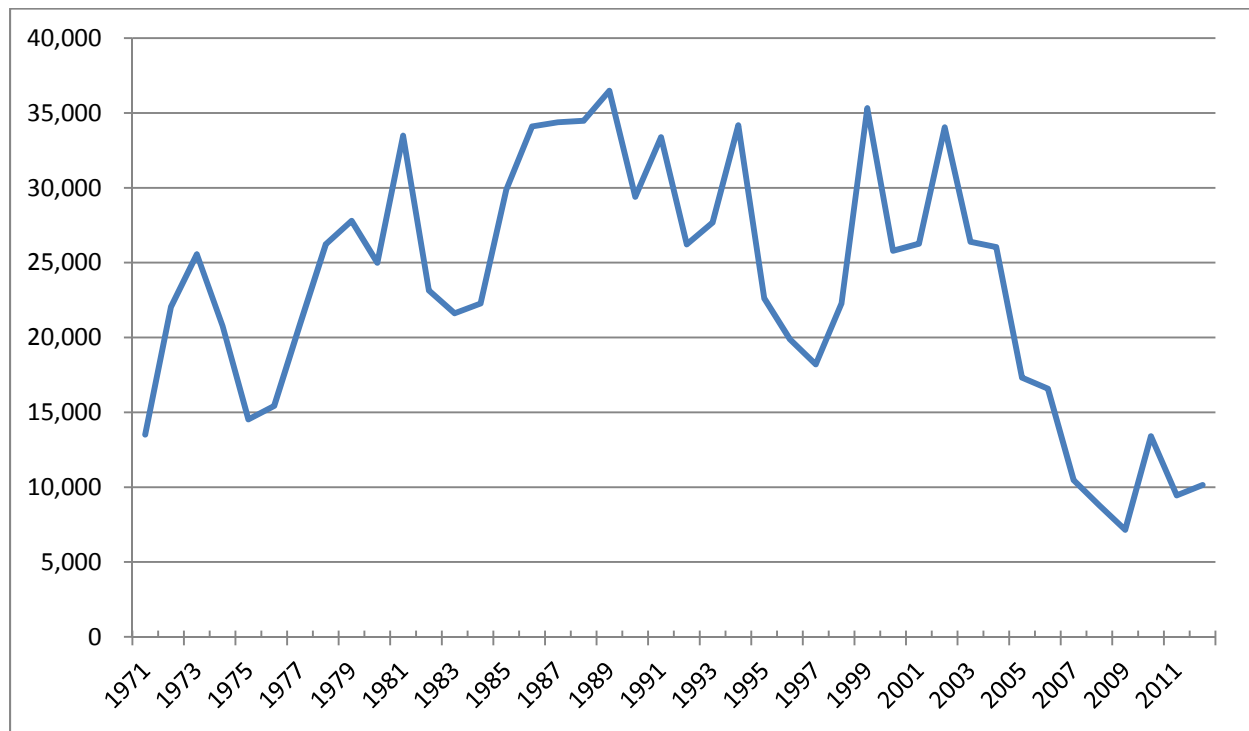
Source: Census and Statistics Department, Hong Kong SAR government.

Figure 3 Domestic Households by Type of Housing



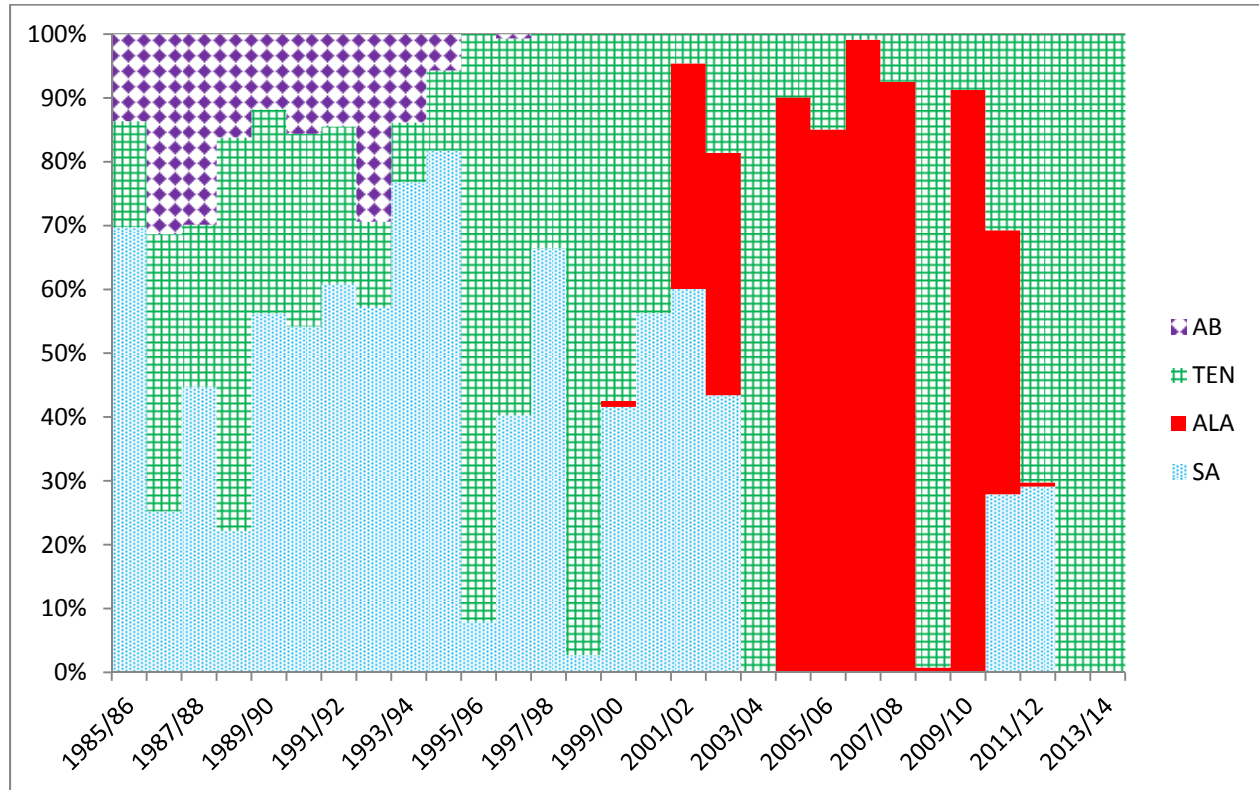
Source: Census and Statistics Department, Hong Kong SAR government.

Figure 4 Completions of Private Housing Units



Source: Rating and Valuation Department, Hong Kong SAR government.

Figure 5 Land Sale by Area

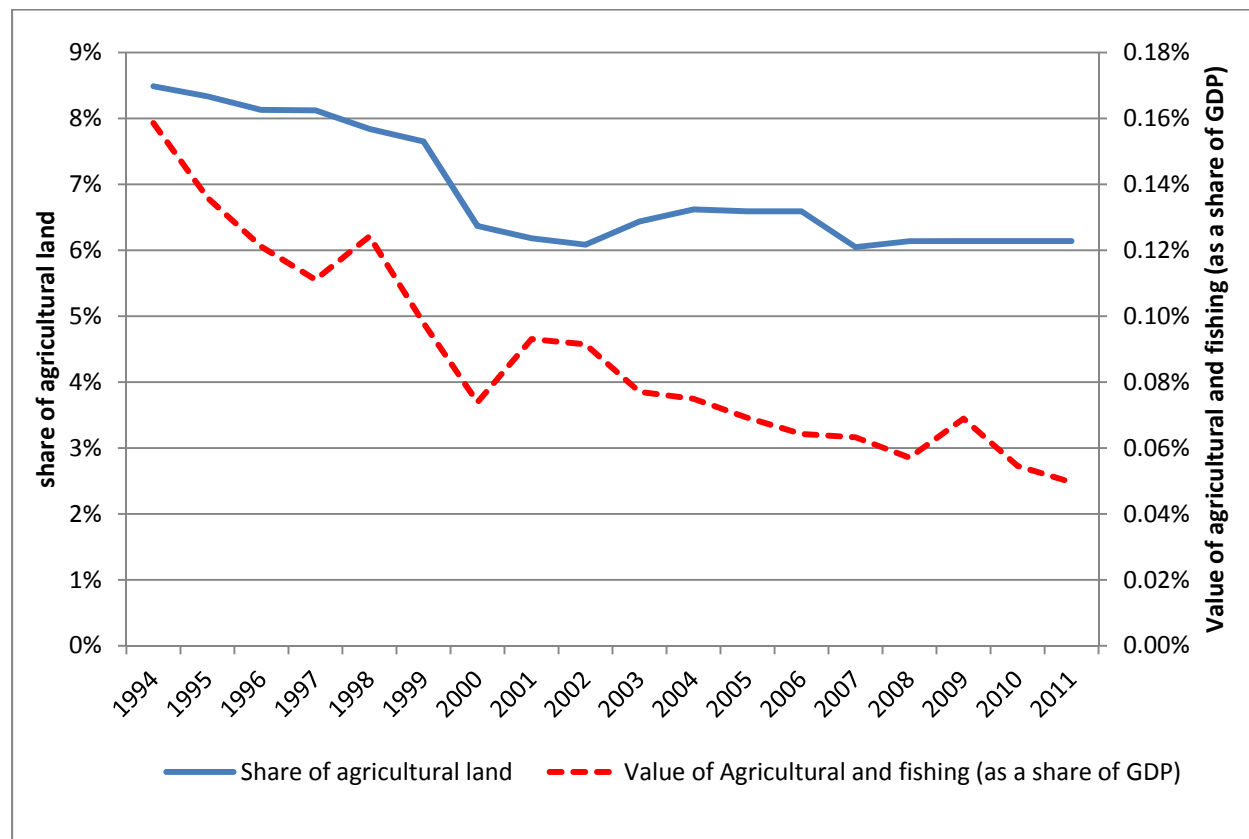


Key: SA – Scheduled Auction; ALA – Application List Auction; TEN – Tender; AB – Letter A/B⁵⁵

Source: Lands Department, Hong Kong SAR government.

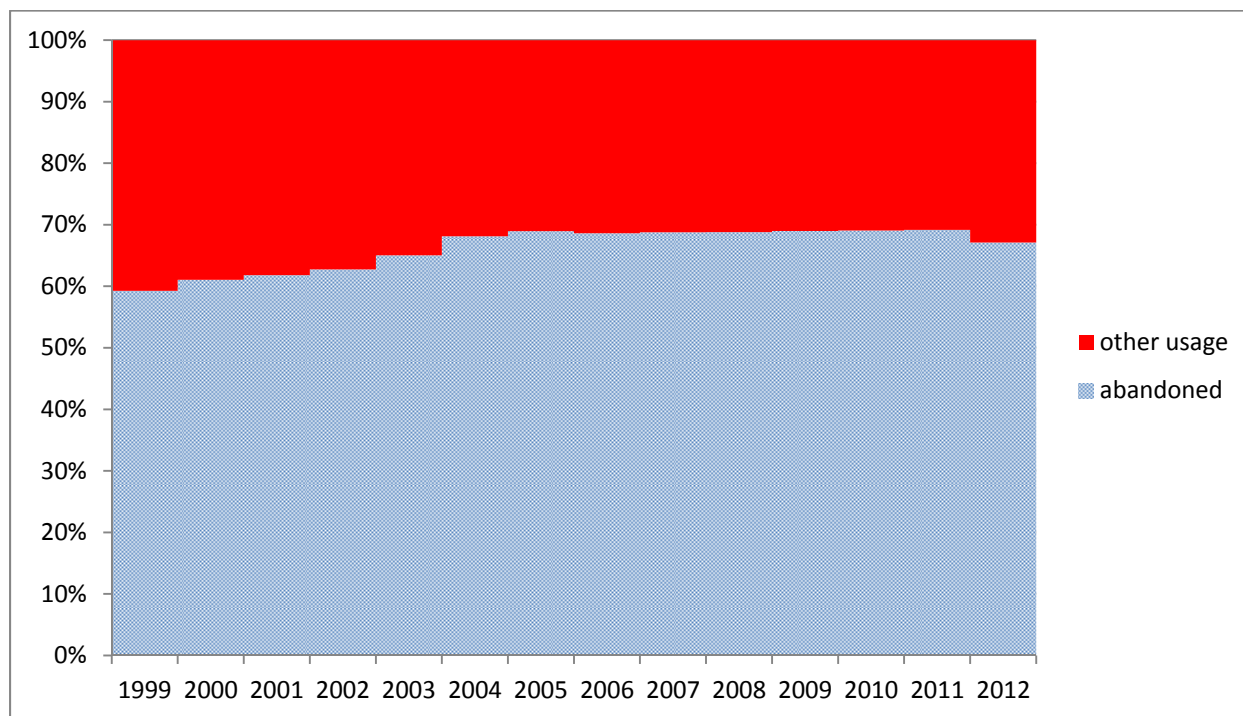
⁵⁵ See Appendix 1 for details.

Figure 6a Share of Agricultural Land and Value of Agricultural and Fishing Industry (As a Share of GDP)



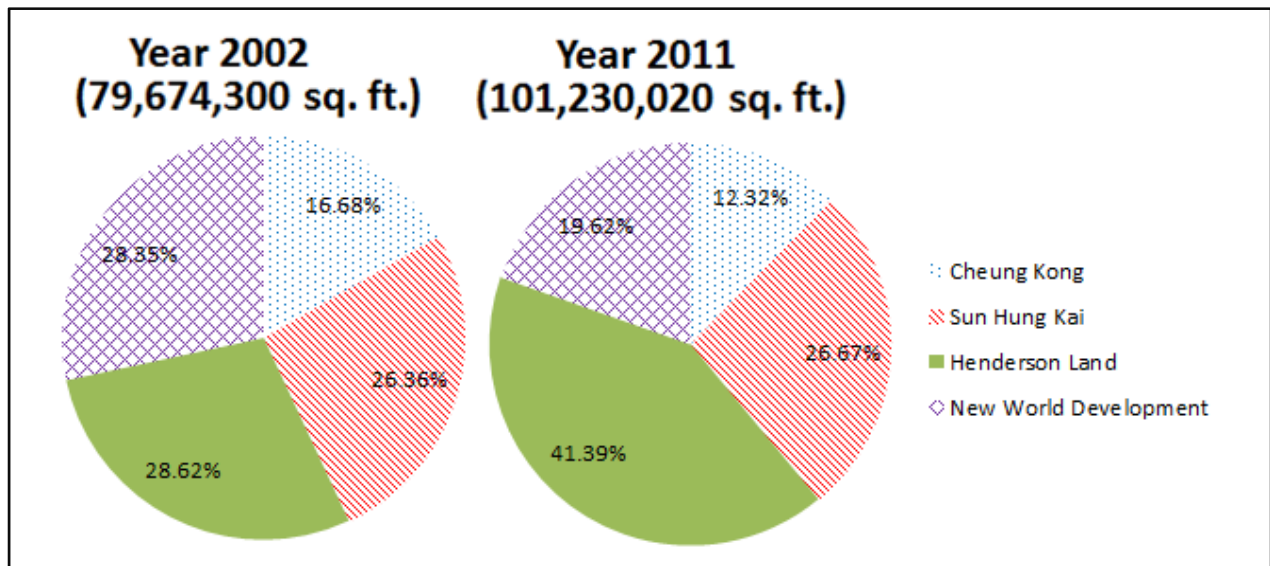
Sources: Census and Statistics Department and Planning Department, Hong Kong SAR government.

Figure 6b Agricultural land Utilization



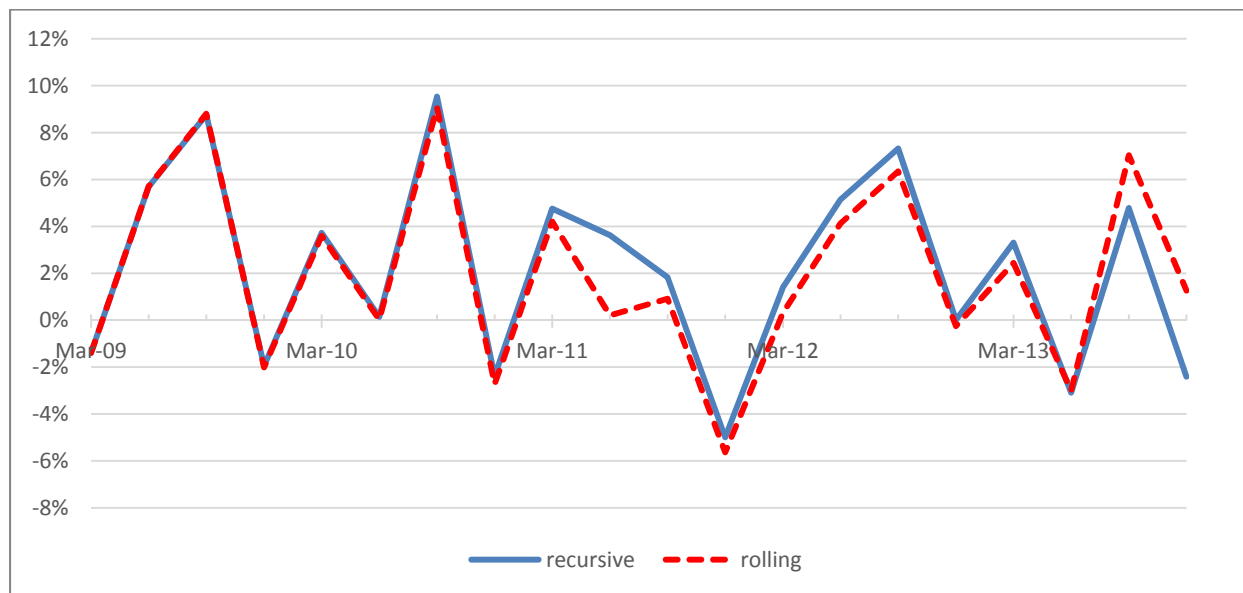
Source: Agriculture, Fisheries and Conservation Department, Hong Kong SAR government.

Figure 6c Agricultural Land Holding



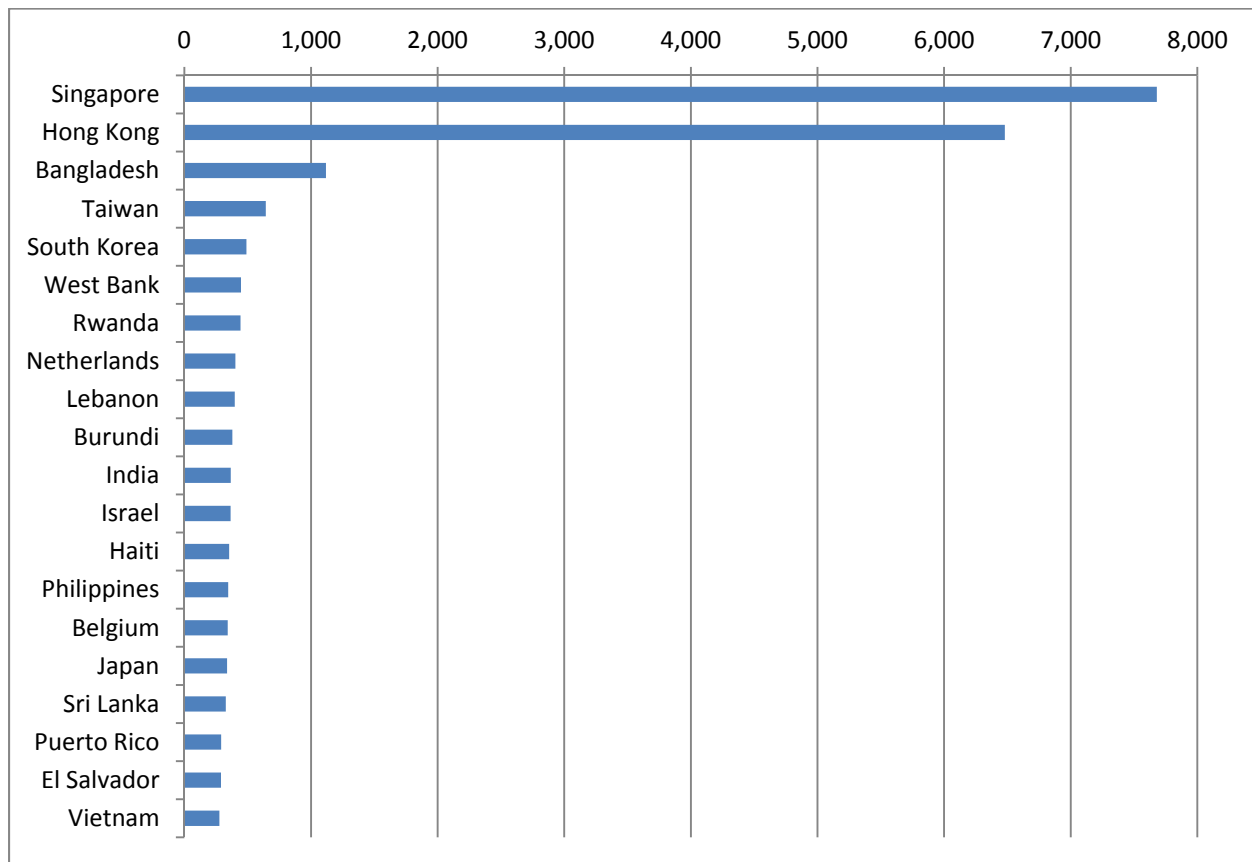
Source: Hong Kong Exchanges and Clearing Limited

Figure 7 Percentage deviation of the actual real house price relative to the model-implied real house price



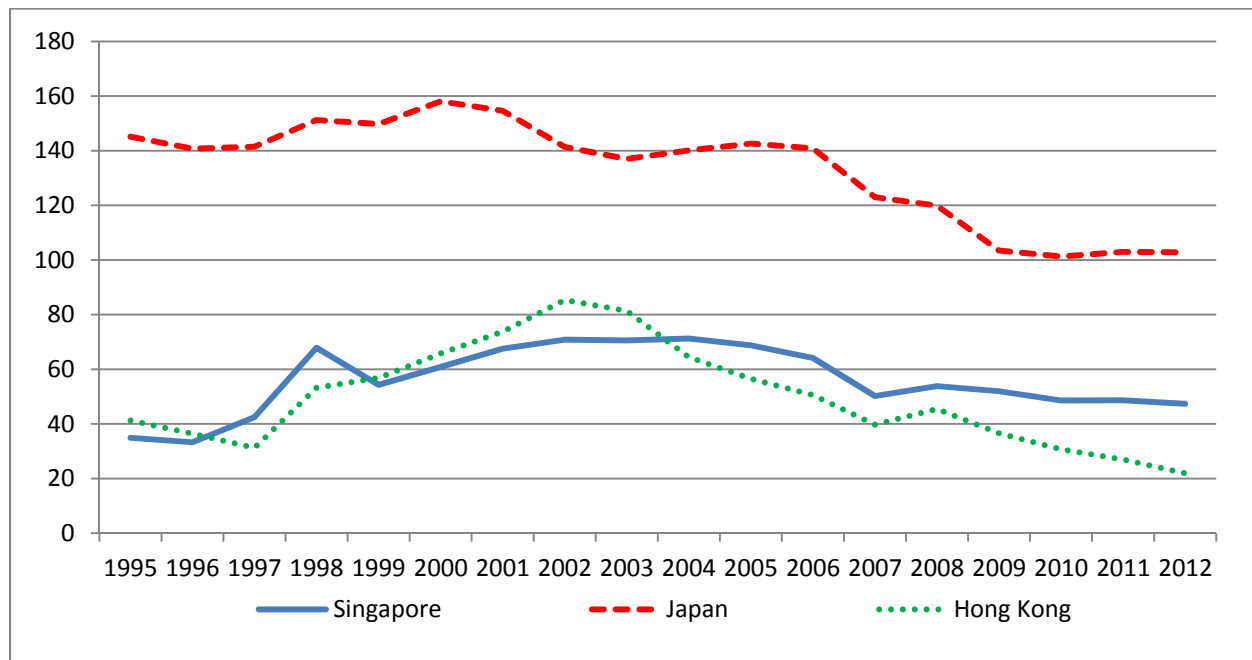
Source: Authors' calculations

Figure 8 Population Densities across Countries (People per Square Kilometers of Land)



Source: CIA World Factbook (2012)

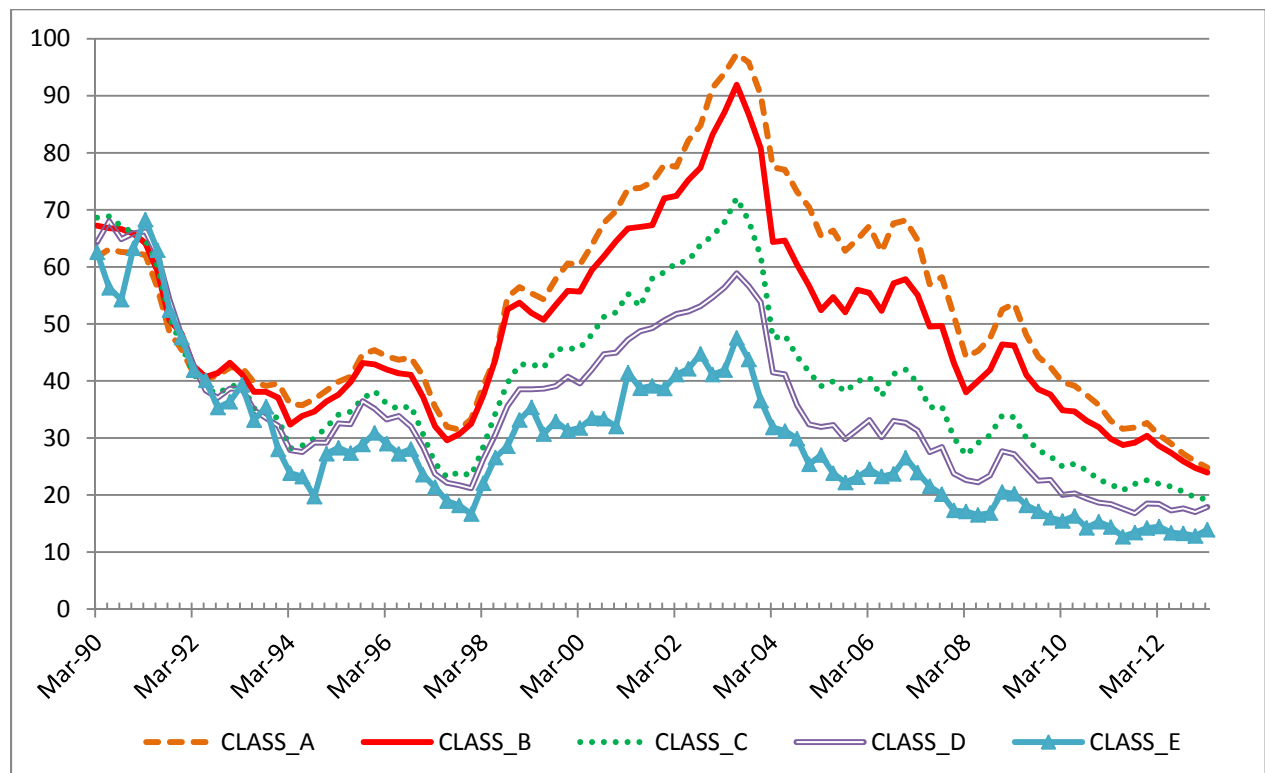
Figure 9a The Purchasing Power of Annual Income (in terms of square feet of flat)



Sources: CEIC

Figure 9b The Purchasing Power of Annual Income (for workers in supervisory level)

(in terms of square feet of flat)

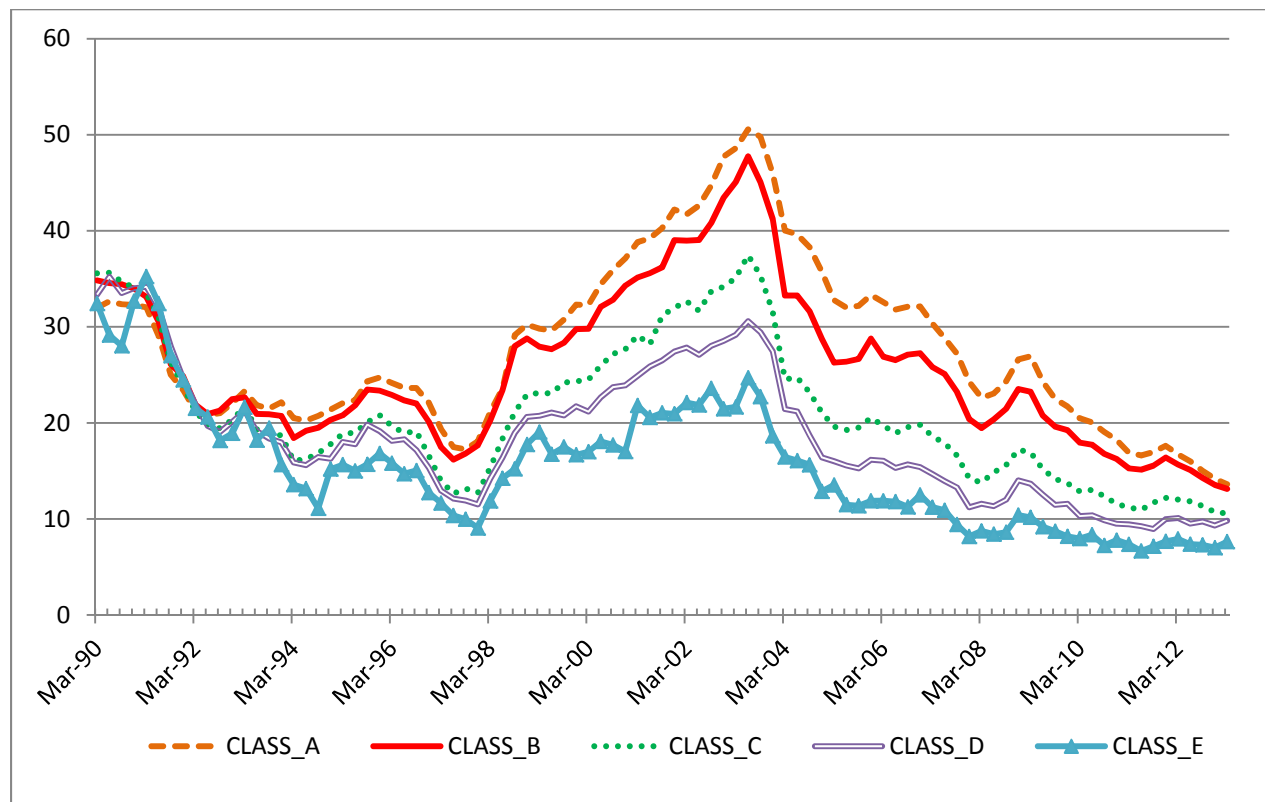


Key: Class A – Flats with a saleable area smaller than 400 square feet; Class B – Flats with a saleable area from 400 to 699 square feet; Class C – Flats with a saleable area from 700 to 999 square feet; Class D – Flats with a saleable area from 1000 to 1599 square feet; Class E – Flats with a saleable area larger than 1600 square feet

Sources: Census and Statistics Department; Rating and Valuation Department, Hong Kong SAR government.

Figure 9c The Purchasing Power of Annual Income (for low level of workers)

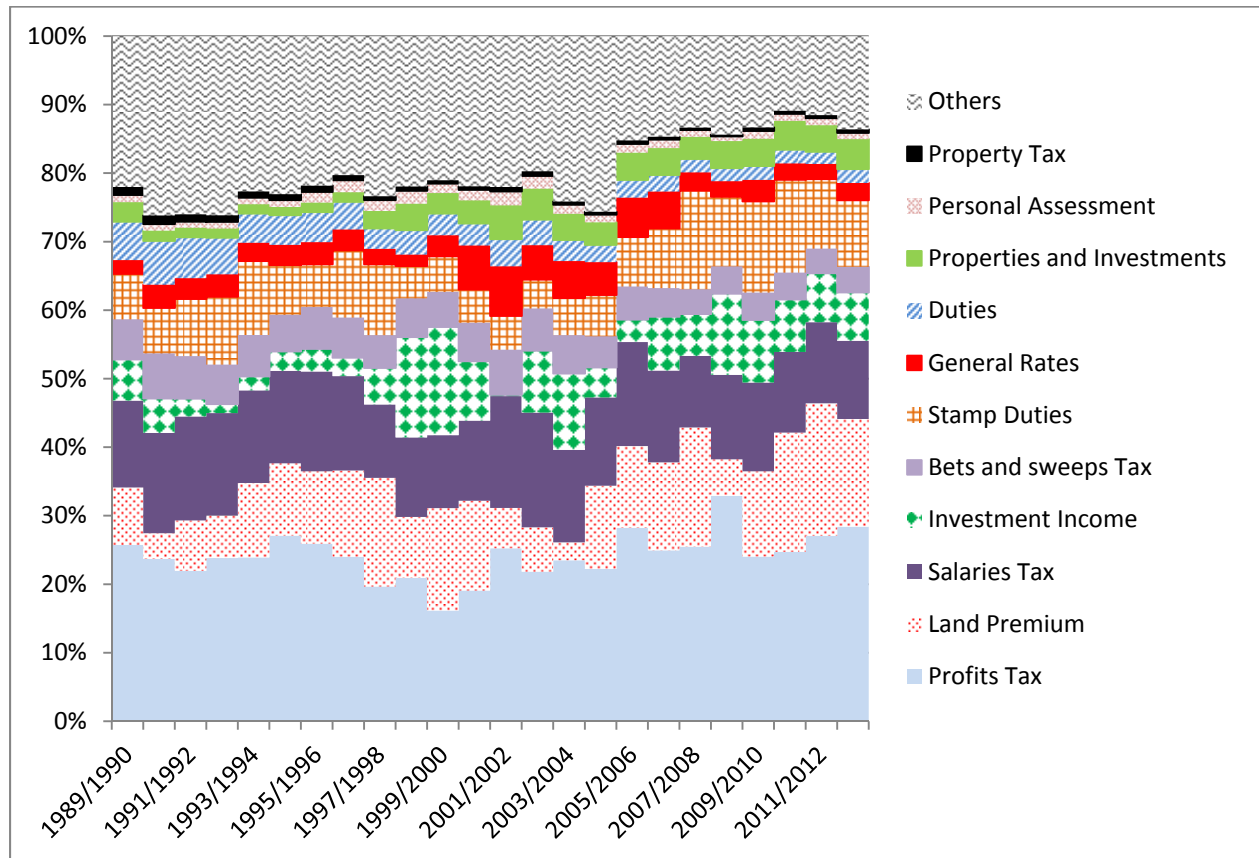
(in terms of square feet of flat)



Key: Class A – Flats with a saleable area smaller than 400 square feet; Class B – Flats with a saleable area from 400 to 699 square feet; Class C – Flats with a saleable area from 700 to 999 square feet; Class D – Flats with a saleable area from 1000 to 1599 square feet; Class E – Flats with a saleable area larger than 1600 square feet

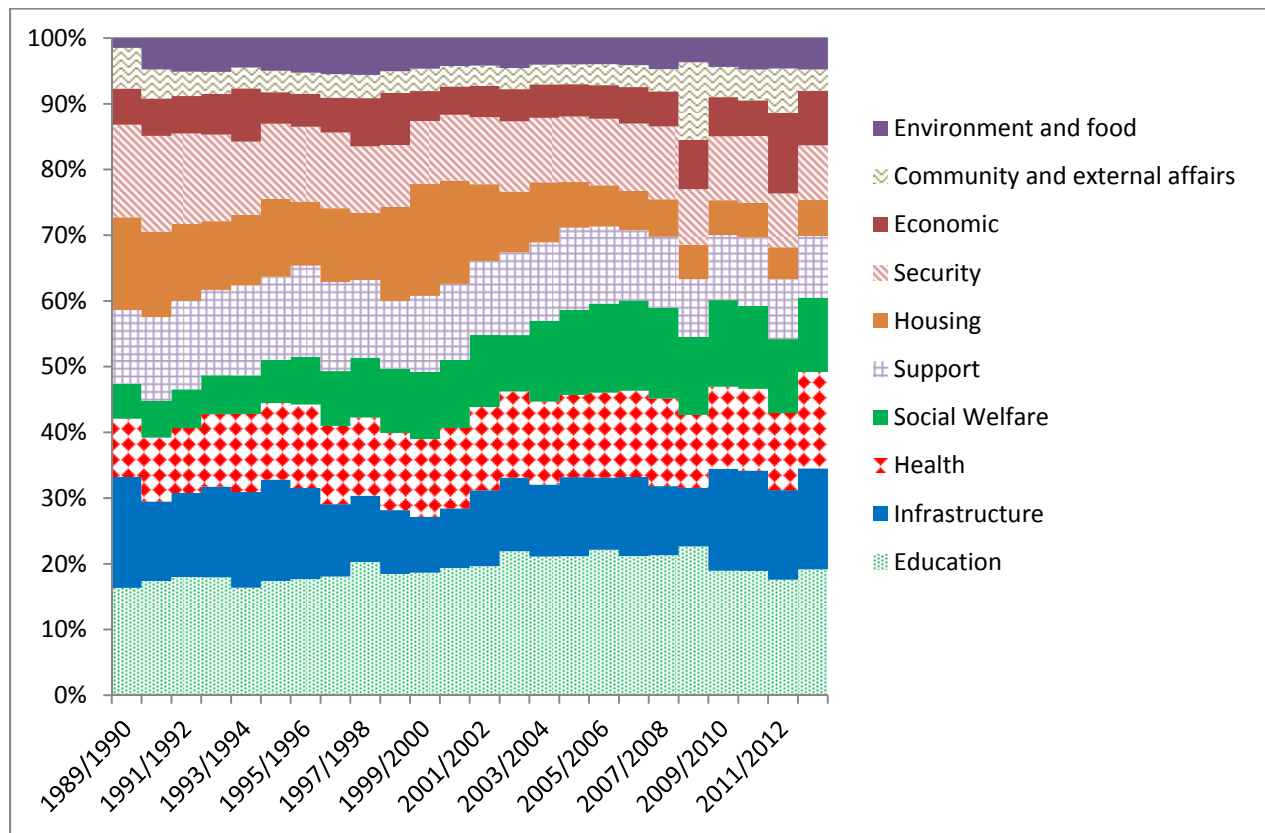
Sources: *Census and Statistics Department; Rating and Valuation Department, Hong Kong SAR government.*

Figure 10a Components of Government Revenue



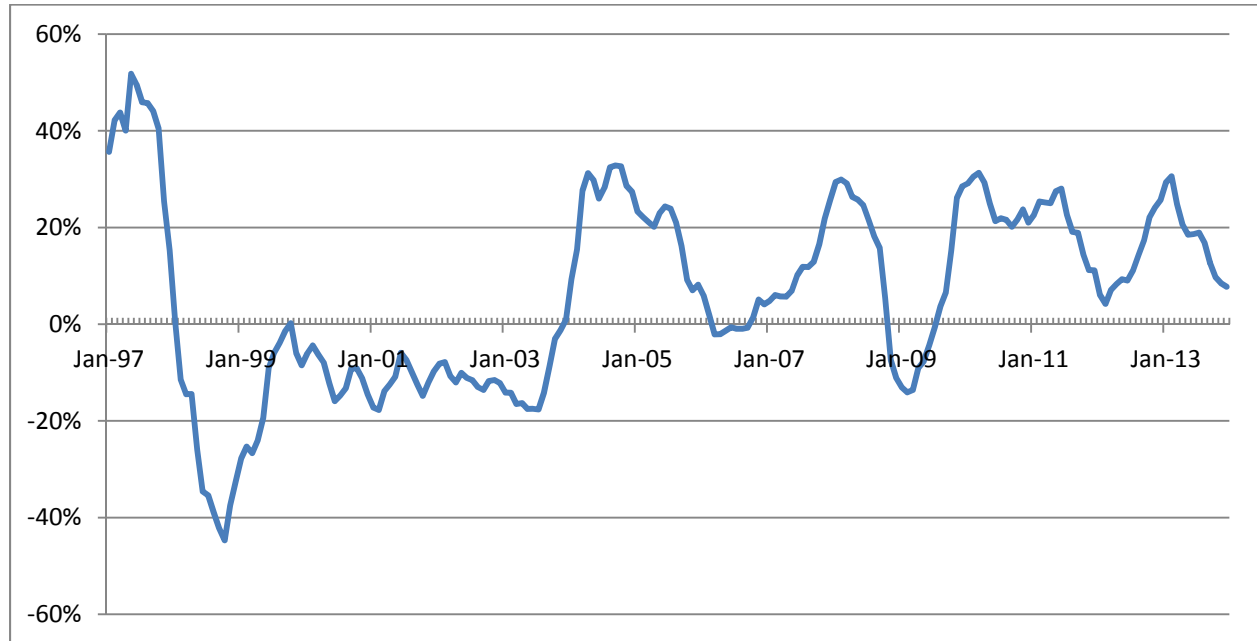
Source: Census and Statistics Department, Hong Kong SAR government.

Figure 10b Public Expenditure by Policy Area Group



Source: Census and Statistics Department, Hong Kong SAR government.

Figure 11a Annual Growth Rate of Price-to-Cost Ratio



Sources: Civil Engineering and Development Department; Census and Statistics Department, Hong Kong SAR government.

Figure 11b Ratio of the official wage index relative to the per capita GDP (Rebased as unity at the year 1982)



Sources: Census and Statistics Department, Rating and Valuation Department, Hong Kong SAR government.

Figure 12 Scatter Plot of Housing Volatility and Supply Elasticity

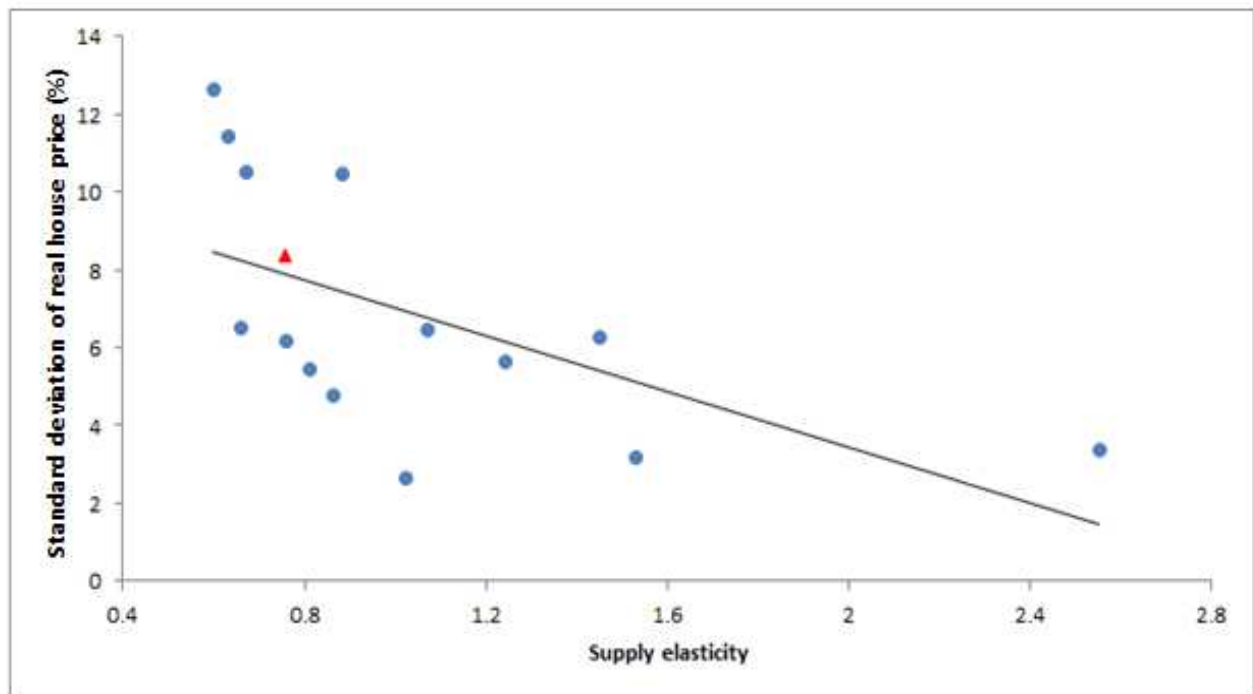


Table 1 Number of Applications for Public Rental Housing

	Total Public Rental Housing Applications	New Public Rental Housing Supply
1999/2000	108,300	27,665
2000/2001	108,400	46,756
2001/2002	86,400	29,817
2002/2003	91,900	20,390
2003/2004	91,000	15,148
2004/2005	91,400	24,682
2005/2006	97,400	17,153
2006/2007	107,300	7,192
2007/2008	111,600	13,726
2008/2009	114,400	19,050
2009/2010	129,100	15,389
2010/2011	152,400	13,672
2011/2012	189,000	11,186
2012/2013	229,000	13,114

Source: Hong Kong Housing Authority, Hong Kong SAR government.

Table 2a Granger Causality between Land Sale Area (LSA) and Completions of New Private Housing (CNPH) (F-statistics)

(Sampling period: 1980Q4 – 2013Q1)

	LSA does not granger cause CNPH	CNPH does not granger cause LSA
Lag = 1	0.016	1.773
Lag = 2	0.843	1.949
Lag = 3	0.796	1.434
Lag = 4	0.975	0.939
Lag = 8	0.877	0.962
Lag = 12	0.809	0.964

Note: The cyclical components are used. ***, ** and * denote 1%, 5% and 10% significance respectively.

Table 2b Lead lag-table between Land Sale Area (LSA) and Completions of New Private Housing (CNPH)

(Sampling period: 1980Q4 – 2013Q1)

	CNPH(-20)	CNPH(-16)	CNPH(-12)	CNPH(-8)	CNPH(-4)	CNPH(-3)
LSA	-0.130	-0.055	-0.025	0.145	0.101	-0.097

	CNPH(-2)	CNPH(-1)	CNPH	CNPH(+1)	CNPH(+2)	CNPH(+3)
LSA	0.059	0.102	0.168	-0.026	-0.109	0.027

	CNPH(+4)	CNPH(+8)	CNPH(+12)	CNPH(+16)	CNPH(+20)
LSA	-0.007	0.131	0.202	0.160	0.140

Note: The cyclical components are used.

Table 3a Unit root test of real housing price index and real weekly earnings for the United States

(Sampling period: 1979Q1 – 2013Q4)

	Level (trend and intercept)	1 st difference (trend)
Real housing price index (seasonally adjusted)	-3.344	-2.892 **
Real weekly earnings (seasonally adjusted)	-3.314	-13.56 ***

The optimum lag is determined by AIC criteria at a maximum lag of 4 quarters.

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

Table 3b Johansen cointegration test between real housing price index and real weekly earnings for the United States

(Sampling period: 1970Q1 – 2013Q4)

(i) Unrestricted cointegration rank test (Trace)

Hypothesized number of cointegrating equation	Trace statistic	5% critical value
None	20.85	15.49
At most 1	1.72	3.84

(ii) Unrestricted cointegration rank test (Maximum Eigenvalue)

Hypothesized number of cointegrating equation	Max-eigen statistic	5% critical value
None	19.13	14.26
At most 1	1.72	3.84

Table 3c Unit root test of real housing price index and real wage index for Hong Kong

(Sampling period: 1982Q1 – 2013Q4)

	Level (trend and intercept)	1 st difference (trend)
Real housing price index (not seasonally adjusted)	-1.884	-5.941***
Real wage index (not seasonally adjusted)	-1.764	-3.658***

The optimum lag is determined by AIC criteria at a maximum lag of 4 quarters.

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

Table 3d Johansen cointegration test between real housing price index and real wage index for Hong Kong

(Sampling period: 1979Q4 – 2013Q4)

(i) Unrestricted cointegration rank test (Trace)

Hypothesized number of cointegrating equation	Trace statistic	5% critical value
None	3.403	15.49

(ii) Unrestricted cointegration rank test (Maximum Eigenvalue)

Hypothesized number of cointegrating equation	Max-eigen statistic	5% critical value
None	3.347	14.26

Table 4 Granger Causality between Land Sale Area (LSA) and Real Housing Price (RHP) (F-statistics)

(Sampling period: 1980Q4 – 2013Q1)

	LSA does not granger cause RHP	RHP does not granger cause LSA
Lag = 1	0.319	3.079 *
Lag = 2	0.299	2.355 *
Lag = 3	0.290	1.686
Lag = 4	0.521	1.565
Lag = 8	0.463	1.180
Lag = 12	0.360	1.239

Note: The cyclical components are used. ***, ** and * denote 1%, 5% and 10% significance respectively.

Table 5 Correlations among developers' stock

(1983Q1 – 2013Q1)

Panel A: 4 main developers

	CH	HEN	NWD	SHK
CH	1			
HEN	0.761***	1		
NWD	0.622***	0.841***	1	
SHK	0.870***	0.916***	0.768***	1

Key: CKH = Cheung Kong (Holdings) Limited; HEN = Henderson Land Development Company Limited; SHK = Sun Hung Kai Properties Limited; NWD = New World Development

Panel B: Other 6 developers

	HL	HOPE	HUT	HYS	SINO	WH
HL	1					
HOPE	0.533***	1				
HUT	0.434***	0.387***	1			
HYS	0.542***	0.624***	0.584***	1		
SINO	0.782***	0.632***	0.557***	0.625***	1	
WH	0.707***	0.629***	0.563***	0.845***	0.670***	1

Key: HL = Hang Lung Properties Limited; HOPE = Hopewell Holdings Limited; HUT = Hutchison Whampoa Property; HYS = Hysan Development Company Limited; SINO = Sino Land; WH = Wharf Holdings Limited

Note: The cyclical components are used. ***, ** and * denote 1%, 5% and 10% significance respectively.

Table 6 Explanatory Power of Principal Components

Panel A: 4 main developers

	Proportion explained
PC1-A	84.90%
PC2-A	10.09%
PC3-A	3.63%
PC4-A	1.39%

Panel B: Other 6 developers

	Proportion explained
PC1-B	67.71%
PC2-B	10.90%
PC3-B	9.25%
PC4-B	6.90%
PC5-B	3.43%
PC6-B	1.81%

Table 7 Principal Components

Panel A: 4 main developers

	PC 1-A	PC 2-A	PC 3-A	PC 4-A
CH	0.479	-0.672	0.491	0.280
HEN	0.519	0.188	-0.587	0.592
NWD	0.475	0.689	0.538	-0.102
SHK	0.525	-0.197	-0.354	-0.749

Panel B: Other 6 developers

	PC1-B	PC2-B	PC3-B	PC4-B	PC5-B	PC6-B
HL	0.405	-0.415	0.510	-0.236	0.415	0.420
HOPE	0.382	-0.336	-0.533	0.622	0.262	0.037
HUT	0.348	0.775	0.301	0.361	0.238	0.032
HYS	0.427	0.243	-0.427	-0.362	-0.398	0.536
SINO	0.431	-0.231	0.380	0.244	-0.691	-0.285
WH	0.448	0.050	-0.197	-0.487	0.260	-0.673

Table 8 Granger Causality between PC1 and Real Housing Price (F-statistics)

Panel A: 4 main developers

	PC1-A does not granger cause Real Housing Price	Real Housing Price does not granger cause PC1-A
Lag = 1	25.96 ***	9.287 ***
Lag = 2	5.972 ***	5.864 ***
Lag = 3	3.639 **	5.527 ***
Lag = 4	2.718 **	4.174 ***
Lag = 8	4.748 ***	3.033 ***
Lag = 12	3.859 ***	1.782 *

Panel B: Other 6 developers

	PC1-B does not granger cause Real Housing Price	Real Housing Price does not granger cause PC1-B
Lag = 1	14.61 ***	5.172 **
Lag = 2	5.568 ***	3.416 **
Lag = 3	3.698 **	3.559 **
Lag = 4	2.667 **	2.851 **
Lag = 8	3.318 ***	2.392 **
Lag = 12	2.730 ***	1.534

Note: ***, ** and * denote 1%, 5% and 10% significance respectively.

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Appendix

The appendix consists of several parts.

- Appendix 1 provides a detailed description about the letter A/B in land exchange.
- Appendix 2 provides the major listed developers in Hong Kong. Their stock codes and market capitalization (as at 6 June 2013) are also shown.
- Appendix 3 expands the formula of Malpezzi (1999) model.
- Appendix 4 shows the time plot of revenues from different land disposal types.
- Appendix 5 provides the proof of Proposition 1.
- Appendix 6 shows the calculation method of supply elasticity.

Appendix 1 Description of Letter A/B

Letter A/B actually is a kind of land exchange. These Letters A/B were first issued by the government as an alternative to cash compensation when private land was to be resumed in the New Town Development Areas of the New Territories. It aimed at speeding up acquisition of private land for public purposes by avoiding lengthy arguments over the level of compensation and cash payments and large outflow of cash. However, the system has not solved the ultimate problem because of shortage of land in Hong Kong. Therefore, this system was stopped (no letter A/B was offered any longer) on 8 March 1983. This system was first used to form part of the Tsuen Wan New Town.

In the old days, with the increase in population and expansion of urban area, much of the land is urgently required for public purpose such as for road widening, community buildings or public housing schemes. However, a considerable amount of land being selected for the new town development was in private ownership. A novel system of land exchange was evolved which enabled the local inhabitants and landowners to retain an interest in the development of new town.

'Letter A' was issued by the government when private land was urgently required needed for public purposes and the land owners voluntarily surrender the land with vacant possession without going through the statutory resumption.

'Letter B' was offered to the land owners already affected by a Gazette Notice of resumption under Cap. 124 a choice of either cash payment or an entitlement to future grant of land.

Both 'Letter A' and 'Letter B' can be exchanged for building land, residential or industrial, at any time when suitable land becomes available by payment of a premium based upon the difference in value of the agricultural land surrendered and the building land selected. 2 sq. feet of building land can be exchanged for every 5 sq. feet of agricultural land that is surrendered. For building land, the ratio is one to one.

The bidder that submitted, in aggregate terms, the oldest Letter A/B calculated backwards from the date of closing the tender to the operative date of the Letter A/B surrendered would be awarded with the tender site.

In mid 1947 there was an outstanding land entitlement of between 420000 and 470000 sq. metres of building land in the form of 'letter B'. Because of the huge amount of land area accumulated from 'Letter A/B', the government should take some actions to speed up the clearance of the commitments for 'Letter A/B'. In 1984, it was announced that a number of New Territories related land transactions e.g. the payment of modification premia, building covenants extensions, and short-term-tenancy rent can be paid for by the surrender of 'Letter A/B' in lieu of cash.

Later in June 1997, the government enacted the New Territories Land Exchange Entitlements (Resumption) Ordinance to provide for the payment of redemption money in respect of land exchange entitlements to the Letter A/B owners, and for the extinguishment of their rights against the government under such documents to a future land exchange. Nowadays, there is no more Letter A/B.

Source: Department of Real Estate and Construction, University of Hong Kong (<http://rec.hku.hk/hkbuilt/1-3-1-4.htm>)

Appendix 2 Listed Property Developers

Property Developers	Stock Code	Market Capitalization ⁵⁶ (HKD)
Sun Hung Kai Properties Limited *	0016	367,629,050,221
Hutchison Whampoa Property ^	0013	347,251,550,031
Cheung Kong (Holdings) Limited *	0001	245,050,186,960
Wharf Holdings Limited ^	0004	212,686,858,355
China Overseas Land and Investment Ltd.	0688	186,744,279,530
Henderson Land Development Company Limited *	0012	127,503,688,224
Hang Lung Properties Limited ^	0101	122,925,410,885
Swire Pacific A	0019	84,988,542,225
New World Development *	0017	75,612,975,128
Sino Land ^	0083	68,518,936,800
China Resources	0291	61,265,206,560
Kerry Properties Limited	0683	44,348,403,422
Hysan Development Company Limited ^	0014	35,790,915,397
Chinese Estates Holdings Limited	0127	25,562,095,659
New World China Land Limited	0917	24,950,598,742
Hopewell Holdings Limited ^	0054	23,366,038,311
Shun Tak Holdings Limited	0242	12,407,086,177
K. Wah International	0173	10,344,401,121
Emperor International	0163	8,690,256,575
Lai Sun Development	0488	4,694,717,029
Tai Cheung Holdings Limited	0088	3,865,745,721
SEA Holdings	0251	3,171,706,547
Y. T. Realty	0075	1,958,915,667
Chuang's Consortium International Ltd.	0367	1,781,383,563
Asia Standard International	0129	1,781,068,108
Tai Sang Land Development	0089	1,035,610,834

Note: The developers marked with * and ^ are referred as “Top 4 developers” and “Other 6 developers” respectively.

⁵⁶ The values are obtained from Hong Kong Exchanges and Clearing Limited, as at 6 June 2013.

Appendix 3 Malpezzi (1999) model

The model asserts that

$$dP_t = \beta_0 + \beta_1 \left(\frac{P_{t-1}}{Y_{t-1}} - k \right) + \dots + \beta_n \left(\frac{P_{t-n}}{Y_{t-n}} - k \right) + \gamma_1 \left(\frac{P_{t-1}}{Y_{t-1}} - k \right)^3 + \dots + \gamma_n \left(\frac{P_{t-n}}{Y_{t-n}} - k \right)^3 + X\alpha + \varepsilon_t$$

where P_t = Real housing price at time t , Y_t is the real income at time t , k is the long-run house price-to-income ratio, X is a vector of control variables, and ε_t is the error term.

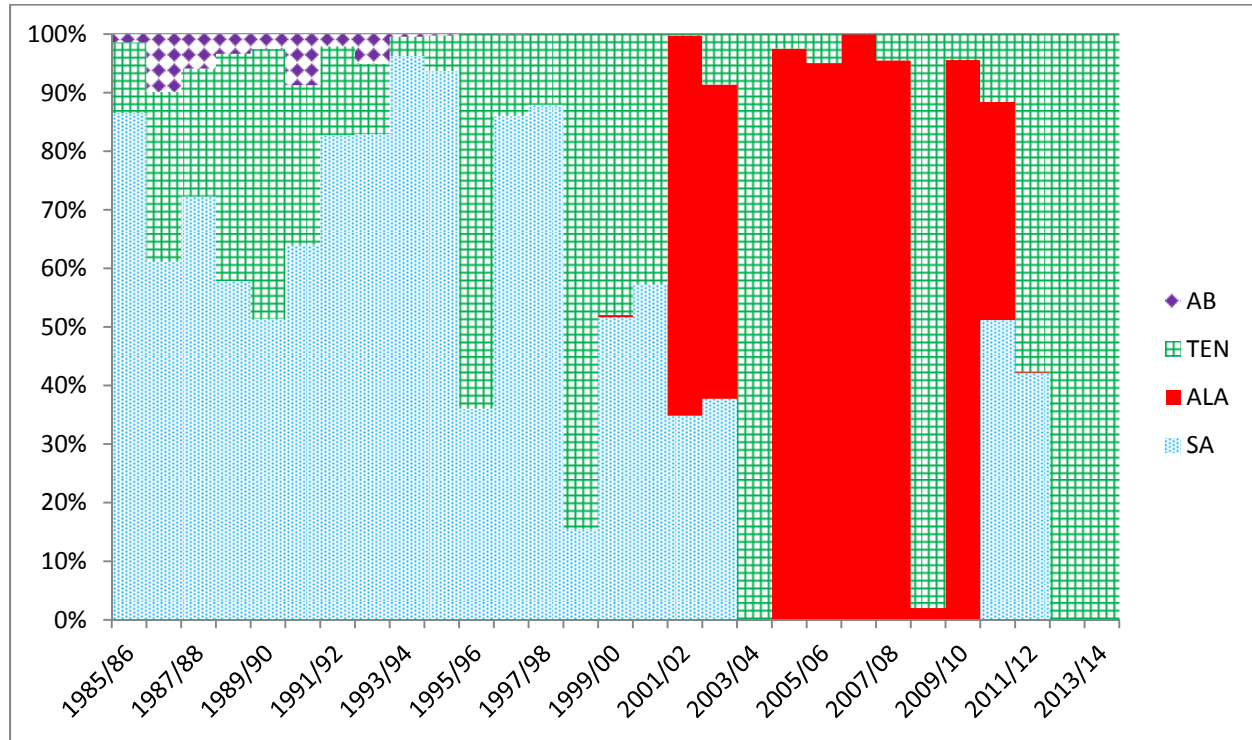
In our paper, it considers $n = 2$ and the model can be simplified as:

$$\begin{aligned} dP_t &= \beta_0 + \beta_1 \left(\frac{P_{t-1}}{Y_{t-1}} - k \right) + \beta_2 \left(\frac{P_{t-2}}{Y_{t-2}} - k \right) + \gamma_1 \left(\frac{P_{t-1}}{Y_{t-1}} - k \right)^3 + \gamma_2 \left(\frac{P_{t-2}}{Y_{t-2}} - k \right)^3 + \varepsilon_t \\ P_t - P_{t-1} &= \beta_0 + \beta_1 \frac{P_{t-1}}{Y_{t-1}} - \beta_1 k + \beta_2 \frac{P_{t-2}}{Y_{t-2}} - \beta_2 k + \gamma_1 \left[\left(\frac{P_{t-1}}{Y_{t-1}} \right)^3 - 3k \left(\frac{P_{t-1}}{Y_{t-1}} \right)^2 + 3k^2 \left(\frac{P_{t-1}}{Y_{t-1}} \right) - k^3 \right] \\ &\quad + \gamma_2 \left[\left(\frac{P_{t-2}}{Y_{t-2}} \right)^3 - 3k \left(\frac{P_{t-2}}{Y_{t-2}} \right)^2 + 3k^2 \left(\frac{P_{t-2}}{Y_{t-2}} \right) - k^3 \right] + \varepsilon_t \\ P_t - P_{t-1} &= [\beta_0 - k(\beta_1 + \beta_2) - k^3(\gamma_1 + \gamma_2)] + \left[(\beta_1 + 3k^2\gamma_1) \frac{P_{t-1}}{Y_{t-1}} + (\beta_2 + 3k^2\gamma_2) \frac{P_{t-2}}{Y_{t-2}} \right] \\ &\quad - 3k \left[\gamma_1 \left(\frac{P_{t-1}}{Y_{t-1}} \right)^2 + \gamma_2 \left(\frac{P_{t-2}}{Y_{t-2}} \right)^2 \right] + \left[\gamma_1 \left(\frac{P_{t-1}}{Y_{t-1}} \right)^3 + \gamma_2 \left(\frac{P_{t-2}}{Y_{t-2}} \right)^3 \right] + \varepsilon_t \end{aligned}$$

Hence, we have

$$\hat{P}_t = P_{t-1} + \hat{\alpha}_0 + \hat{\alpha}_{11} \frac{P_{t-1}}{Y_{t-1}} + \hat{\alpha}_{12} \frac{P_{t-2}}{Y_{t-2}} + \hat{\alpha}_{21} \left(\frac{P_{t-1}}{Y_{t-1}} \right)^2 + \hat{\alpha}_{22} \left(\frac{P_{t-2}}{Y_{t-2}} \right)^2 + \hat{\alpha}_{31} \left(\frac{P_{t-1}}{Y_{t-1}} \right)^3 + \hat{\alpha}_{32} \left(\frac{P_{t-2}}{Y_{t-2}} \right)^3$$

Appendix 4 Revenues from Land Disposal Types



Key: SA – Scheduled Auction; ALA – Application List Auction; TEN – Tender; AB – Letter A/B

Source: Lands Department

Appendix 5 Proof of Proposition 1

Proposition 1: *If the aggregate production of an economy is characterized by a Cobb-Douglas function, $Y = A(K)^\alpha (N)^{1-\alpha}$, where Y is the aggregate output, A is the productivity, K is the aggregate capital, N is the aggregate labor inputs, and the factor markets are perfectly competitive, then the ratio of the wage rate to per capita real GDP $w / (Y / N)$ is a constant.*

Proof:

$$\text{Wage (w) = Marginal Product of Labor} = \frac{\partial Y}{\partial L}$$

$$= (1-\alpha)AK^\alpha N^{-\alpha}$$

$$= (1-\alpha) \frac{Y}{N}$$

Rearranging gives $\frac{w}{\left(\frac{Y}{N}\right)} = 1 - \alpha = \text{constant}$

Remark:

In microeconomics, we assume that the economy always achieves full employment. And hence “GDP per worker” and “GDP per capita” are identical. In reality, the two are not. The labor market participation rate changes over time. To correct for that, we need to define N to be the aggregate labor force and N^p is the total population. And hence $w / (Y / N)$ is a constant, but $\frac{w}{\left(\frac{Y}{N^p}\right)} = \frac{w}{\left(\frac{Y}{N}\right)\left(\frac{N}{N^p}\right)}$

may not be a constant, since the labor market participation rate $\left(\frac{N}{N^p}\right)$ may change over time.

Empirically, the labor market participation rate does not change much and displays no clear trend. Thus, our result is essentially unchanged even after the correction.

Appendix 6 Calculation of Supply Elasticity

To calculate supply elasticity, we first obtain the housing data from CEIC, covering the period from January 1993 to December 2011. While the monthly series of housing price, consumer price index and materials cost index are available, the data of private housing stock is only updated once a year. Hence, we use interpolation to turn this yearly series into monthly series. Also, since the data for the relevant instruments proposed by Saiz (2010) is not available, we can only assume the error term is uncorrelated with housing price and housing stock in our analysis.⁵⁷ The estimation result is as follows (with the t-statistics inside the parentheses):

$$\begin{aligned} \text{Log(Housing Price)} = & -16.38 + 0.63 * \text{Log(materials cost)} + 1.32 * \text{Log(housing stock)} \\ & (-1.86) \quad (3.44) \qquad \qquad \qquad (2.25) \end{aligned}$$

The estimates suggest a relatively inelastic housing supply on average, with a value of 0.76 (=1/1.32). In the previous literature, it is shown that areas with lower supply elasticities tend to have high volatility of real house prices. To calculate the volatility of Hong Kong housing prices, the cyclical component of the log of real housing price is used. It is found that the standard deviation of real housing price is 8.37% over the sampling period.

In Leung and Teo (2011), they estimate the relationship between supply elasticity and house price volatility. They found that

$$\begin{aligned} \text{Standard deviation (in \%)} = & 10.63 - 3.60 * \text{Supply Elasticity} \\ & (6.34) \quad (-3.10) \end{aligned}$$

If we treat Hong Kong as one of the American cities, then using the above equation we could find that the standard deviation is about 7.90%.

⁵⁷ Same assumption has been made in Saks (2008).

Historical Appendix

In this appendix, we will provide more quotes from the history literature in order to sustain our claims in the text.

Some history of Hong Kong.

- In contrast to the conception of some people, the Hong Kong Island has been a developed area before 1900, rather than a fishing village.

According to Hayes (2006, p.17), *“for its 19th-century Western visitors, “Hong Kong” meant the Island, and more specifically, what they called the City of Victoria, though this name was more in official than everyday usage. In 1881, walking into the town after landing at the naval dockyard during their world voyage on board HMS Bacchante, two young British royal princes noted that the streets were “wide and clean, full of chairs with green canopies and wickerwork sides, on long bamboo carrying poles, and of jin-ricki-shas. On either side of the street is lofty white arcaded houses in the Italian style; or groves of trees, wooded drives, and walks lead away up the slopes of the hills”.* It is always this, the European section of the city, which so impressed visitors. In 1878, the celebrated Victorian lady traveler, Mrs. Bishop, had styled it, *“the most imposing city of the East”, going on to say that, “The magnificent city of Victoria extends for four miles along its southwen shore, with its six thousand houses of stone and brick and the princely mansions and roomy bungalows of its merchants and officials scrambling up the steep sides of the Peak.... A decade or so later, a visiting member of the British parliament, had written how “it would always remain a marvel how from a scorching rock had been evolved the Elysian graces of Hong Kong”.*”

- Yet in 1898, after a battle, the British government takes a 99-Year lease of the New Territories. During that time, the New Territories was in sharp contrast to the Hong Kong Island.

According to Hase (2008, p.15~16), *“Throughout the period from 1841 to 1899, Hong Kong was ruled by a Governor appointed from London (in 1899 Sir Henry Blake), and responsible to the Secretary of State for the Colonies. The bureaucracy, which was responsible for the day-to-day governance of the City, was small. It was headed by the Colonial Secretary (in 1899 James Stewart Lockhart)....*

By 1899, the City of Hong Kong (formally known as the City of Victoria), which had by then grown to 280,000 inhabitants, stretched along the north shore of Hong Kong Island from Kennedy Town to Shaukeiwan, a distance of some seven and a half miles.

By 1899, the great prosperity and commercial success of Hong Kong has led to the centre of the City being filled with fine, imposing modern buildings. Its harbor teemed with shipping: by 1899 Hong Kong was the second largest busiest port in the British Empire.... The City has had electricity since 1890. The streets had been lit by gas-lamps since 1864, but new electric street-lamps began to replace them as soon as electricity became available, in 1890. The Peak Tram had been opened in 1888. In 1899 discussions were nearing completion on the construction of an electric tramway to run the length of the City: work on this was to start in 1904. Similarly, in 1899 surveyors were identifying the best line for a railway to link Hong Kong with Canton: work on this was to begin in 1905. Communications were good: between 1873 and 1894 seven telegraph lines were laid down, linking Hong Kong with all its neighbors—six of these were undersea cables. Telephones had been installed in the City from 1881, and a cheap Penny Post inaugurated in 1898.... The Royal Observatory had been founded, and the first Typhoon Shelter constructed, both in 1883, in the hope that the dangers of typhoons to small craft might be alleviated....

According to Hase (2008, p.39), *“The New Territories were mostly mountainous, especially in the centre and east, with little flat land except in patches along the stream-courses or seashore. In place in the mountains were patches of dense forest, and much larger areas of scrub forest. In 1899 tigers were still common, as were deer and wild boars. Wild ducks were abundant in the marshes.”*

- The village lives in the New Territories is very different from the urban counterpart.

Watson and Watson (2004, p.153), *“... In one important sense the tenants were clearly in a servile position because they were subject to the authority of their corporate landlords. The Lam, for instance, had few effective political rights that extended beyond their own community. Not only were they treated by others as a low status appendage of the Man lineage, but they appear to have internalized this view themselves. This is still true in spite of the fact that the Lam have been legally independent of the Mans for over seventy years. In 1905, the colonial government granted full ownership rights to hereditary tenants in the San Tin area. The Man, along with the other elite lineage of the New Territories, were upset by this decision but there was nothing they could do to change government policy. However, the old landlord groups did not lose control over their satellite villages overnight. As late as the 1950s British authorities had difficulty convincing the Lam to elect their own Village Representative, a liaison post recognized by the colonial administration. In their own eyes, Lam Uk Tsuen was still a dependent community; they did not dare offend their powerful neighbors. Lam elders explained to a visiting official at the time that they had been represented by the Man lineage “for over ten generations” and they did not think it advisable to change too quickly. Even in the late 1960s there was a*

striking contrast between the subservient behavior of the former tenants and the haughty, self-confident bearing of the Man elders whenever the two groups interacted."

- When the British took over the New Territories, they attempted to understand the land ownership structure and raise tax. And they soon met a system different from their expectations.

According to Hayes (2006, p.30~31) *"...As Special Commissioner, Lockhart (as directed from London) had given his close attention to the land situation, especially in regard to registration of ownership, the tax revenue produced from landed properties, the parties from whom tax was collected, and how its collection was managed. It was soon evident to him that the Chinese system of land administration was subject to major objections, and could not be taken over as it was. One problem was stated in the following terms:*

All documents relating to land in the New Territory were registered in the San On District registry, but that registry is only a deed registry and not a registry of titles to land...

But the problems embraced more than a system of deed registration which could produce such confusion. Besides the fact that there were no accurate survey records and that the district land registers were out of date, it was of even greater concern that much of the tax revenue was in the hands of intermediaries, who collected their rents from those farming the land and forwarded what was due to the authorities.

These "rent charge owners" (also styled "taxlords" by the Hong Kong authorities) were the persons or families who had acquired rights over surface and sub-soil as a consequence of imperial grants or purchases of land from the authorities in times past. Their holdings were registered in the district land registry, but more often than not, were in the names of owners long since dead by hundreds of years. Their descendants were not themselves cultivating the land, but were collecting rents in silver or grain from persons holding surface right (in effect, the right to cultivate) on renewable perpetual leases. They also received payments from other persons, to whom the surface rights had been sold by the lessees in unregistered customary deeds... Such sales were permissible under local customary law, but under condition of paying the same amounts to sub-soil (i.e. registered) owners, as usually stipulated in the deeds of sale....

Despite many generations of occupancy, none of the persons holding surface rights under customary law had registered titles to the land they occupied. They relied on the "perpetual leases" re-issued periodically by the sub-soil owners, or on the customary "white" deeds in their keeping. In short, such persons were invisible in bureaucratic terms, since none of them appeared in the district registers."

- It should be noticed that such “invisible landownership” was not an intention of the Chinese government, but rather a result of the failure to enforce the corresponding laws. Hayes (1983, p. 9) observes that:

“Changes of ownership without registration were an offence against the laws of successive dynasties, but as the government did not have the capacity to enforce the recording of all changes in the subsoil ownership, and the public did not wish to register on account of the fee charged and the general inconvenience of travelling to the district yamen, the situation was chaotic, and very different in practice than on paper. In these circumstances custom took a hand in regularizing the position in the interests of all concerned.”

- In a way, this “invisible land ownership system” facilitates the efficient operation of a “land market”. Hayes (1983, p.9~10) argues that

“...such a system promoted the independence of the actual cultivators and in time rendered them practically independent of the holders of the subsoil rights. Whether holders of large or small properties, these were usually absentee. Over a number of centuries,..., they could lose all knowledge of where their land was located, what it looked like and who their tenants were, being content so long as they received the annual payments from the cultivators...

In the Hong Kong region, for at least a century before 1898, surviving documents and the accounts given by old people indicate that the villagers were accustomed to dividing up hill land as private plots for grass-cutting, forestry, grazing and associated use. They would sell, mortgage, loan, borrow or give away these tracts as though they were private fields; though with the important difference that custom precluded them from doing so to persons outside the village. Like fields and houses, hillside plots would descend from father to son over the generations. These practices, which rested upon customary rights, continued into the twentieth century under British rule.

All these transactions consumed a great deal of time and energy because they had grown up a system of alienation by different means which require the operation of middlemen, witnesses, guarantors, writers and consultation with agnates (real or formality) before sale to outsiders could be permitted. There was, in practice, a great deal of freedom and flexibility in the system, evidence in the variety of the contents in the otherwise formal wording of the land deeds that were drawn up in their millions to record the transactions. As in so many other aspects, then, the land system of the southern provinces of the Chinese empire aided the development of independent men. Together with the primary motivation of strained resources and inadequate opportunities for employment, this independent spirit contributed to the movement of Kwangtung men to Hong Kong and overseas in search of work and fortune.”

- And while the “land ownership structure” may not be completely visible to the government, we now have some preliminary evidence that the land ownership could be concentrated, at least in some areas.

For instance, in Faure (1986, p.41), *“Before and possibly also during the eighteenth century, Sha Tin came under the domination of the tang lineage of Lung Yeuk Tau. In 1905-6, when the Hong Kong government registered the farmland of the region, an individual of some importance in the lineage still owned much land in the district, and numerous deeds found in Sha Tin quote people of the tang surname as bottom-soil owners or owners of absolute rights... The Lung Yeuk Tau Tangs, in any case, were large bottom-soil owners, controlling bottom-soil rights from beyond Shenzhen in the north to as far as Kowloon in the south, and Sha Tin would have fallen well within their sphere of influence.”*

- Before the British takeover, the New Territories unfortunately experienced her own hardship, which might have made the native residents more sensitive.

According to Hase (2008, p.42), *“The nineteenth century saw a growing land shortage in the New Territories, as the population outstripped the arable land available to sustain it. Reclamation of shallow inshore waters, to extend the area of arable, was undertaken between about 1820 and 1890 in every bay capable of reclamation by the hand-technology available to the villagers, and even the most marginal mountain-side land was brought under the plough during the same period... The resulting social stresses led inevitably to conflict.... These conflicts often became inter-village wars. Some thirty are known, almost all from the period 1855-1880. Most of these inter-village wars saw ten or twenty deaths on each side. Martial arts were, in consequence, highly valued, and the society became rather militarized. As a result of this drive to independence, the small villages managed themselves without outside interference, and became very self-reliant...”*

- From the very beginning, the British takeover was not warmly welcome.

According to Hase (2008, p.44~46), *“...The Convention of Peking, which set out the framework for a Lease of the New Territories to Britain, was signed on 9 June 1898. Ratifications were exchanged on 11 June 1898, and the treaty was thus formally agreed. Under International Law, however, the area of the leased territory could only come into the control of the Hong Kong Government after it had been “taken over” in some clear public ceremony... the New Territories were only to be taken over by the Hong Kong Government in a Flag-Raising Ceremony held on 16 April 1899, over nine months after the Convention came into effect....*

In October 1898 it became known in Hong Kong that some local people, both within the boundaries of the territory which was to be leased, and north of it, in the Sham Chun area, were agitating against the lease, and threatening violence to stop it going ahead...

A number of meetings to discuss armed opposition to the British takeover were held in mid-March 1899 in Ping Shan, probably in the Tat Tak Kung Sog, the Militia and Market Offices there, initially involving only the Tang clan of Ping Shan, but then widening to include also the Tangs of Ha Tsuen and later still, the Tangs of Kam Tin...

An inflammatory public notice (more probably a series of such notices) was accordingly issued, on 28 March.

A translation of one version of the notice issued on 28 March stated:

We hate the English Barbarians, who are about to enter our boundaries and take our land, and will cause us endless evil.... Let all our friends and relatives bring their firearms to the ground and do what they can do to extirpate the traitors. Our ancestors will be pleased and so will our neighbours. This is our sincere wish. Practice takes place every day.

A translation of another version reads:

The English barbarians are about to enter our territory, and ruin will come upon our villages and hamlets. All we villagers must enthusiastically come forward to offer armed resistance and act in unison... Should anyone hesitate to take part or to hinder or obstruct our military plans he will most certainly be severely punished, and no leniency will be shown. This is issued as a forewarning."

- Clearly, misunderstanding and fears play a part in the British takeover of the New Territories. Tax and Sanitary Board were two important concerns.

According to Hase (2008, p.53~), "... Another potent source of disquiet was the fear that, with the British Government in place, taxes would be raised. According to statements by the villagers, some made before the insurrection, some after it came to an end, they were afraid that a Poll Tax would be levied, that houses would be taxed, that licenses would be required for domestic animals, and that port dues would be charged on all movements of boats. Local customs would, they feared, be prohibited: wood-cutting could be prohibited, and fishing as well. Marriage and funeral customs would be changed, and births and deaths would have to be registered—in these latter two cases the fees charged were clearly the main worry... The Hongkong Daily Press, on 20 April, noted that these concerns were seen as significant by the Chinese: "They fear they will have to pay duty on their salt; also that a house-tax and other imposts will be levied." ...

A further major worry was the possibility of the establishment of a Sanitary Board in the New Territories. This worry is explained more fully in the petition of the Sha Tau Kok elders against the leasing of the New Territories:

...worst of all, when the plague epidemic broke out some years ago the Sanitary Board made strict search for sick people, and that when they found any Chinaman who was thin, delicate, they falsely declared that he was sick, and forcibly removed him to the Board, when they cruelly dosed him with arsenic, until he died of its poisonous effects... those who suffered in this way were innumerable, that if a sick man was found in a house, no matter how much the house was worth, it was destroyed by fire, and the houses adjacent to it closed, that the cruelties experienced were truly great ,... your petitioners having been made acquainted with these circumstances found them on enquiry to be true....

These areas of concern were all... legitimate, insofar as the things complained of did indeed occurred in the City... Certainly the Sanitary Board had been given, and had exercised, emergency powers during the plague outbreak, although sick patients had definitely not been poisoned with arsenic!...

Most of the points of concern raised by the villagers had, in fact, been considered by the Government, well before March 1899, and the decision taken not to extend the laws and policies in question to the New Territories since there were considered to be measures inappropriate to a rural area, but without this vital information having been passed on to the villagers.”

- The third item was Fung Shui.

According to Hase (2008, p.55~56), “... Another area of concern to the insurgent villagers was Fung Shui: the Fung Shui of the villages would, they felt, be damaged by the building, above all, of new Police Stations and roads... During March 1899, however, May, with a Party of Police, visited Ping Shan, looking for a site for a Police Station there. Colossal insensitivity was used in identifying the site: the Police wanted a site right on the summit of the Fung Shui Hill behind the village, directly behind the two main Ancestral Halls of the Tang clan, and on the direct Fung Shui line of the Halls. The Ping Shan hill is shaped “Like a crab”, with the village sheltered between the crab’s claws to the west, and screened from the east by the body of the crab. The very name of Ping Shan, indeed, reflects this Fung Shui situation (Ping Shan, means “Screen Hill”). The Police Station was “like a rock, crushing in the crab’s head”. This insensitivity seems to have played a major part in driving the tangs of Ping Shan into armed insurrection...”

- Clearly, the land ownership is a major issue between the British and the New Territories people.

According to Hase (2008, p.56~59), "...Finally, there was the question of land. The New Territories villagers were all rice subsistence farmers, to whom ownership of rice-lands, was, literally, a matter of life and death. *Between July 1898 and April 1899 rumor and scare-mongering abounded in the villages on the question of land-holding under the future British administration. There were three basic scare-stories circulating: that the British would confiscate land without compensation and give it to cronies of senior British officials..., that Hong Kong land development companies would be allowed to buy land for a fraction of its real value, and that the rights of the ancient great clans to receive rent-charges from the actual cultivators would be stopped.* Once again, the Hong Kong Government failed to explain to the villagers what they proposed to do about land after the takeover... There was never anything other than fear behind the confiscation-without-compensation scare, but there were real factors behind the other two scare-stories.

The Colonial Secretary, Stewart Lockhart, had built up a network of contacts who kept him apprised as to the feelings and views of the Chinese community... However, a certain Land Development Company... was buying up land widely in what was to become the New Territories in the year before the takeover, since this company was of the opinion that New Territories land would become significantly more valuable after the area had been taken over by the British,... Rumors thus abounded throughout the New Territories that these agents of Li Sing's Land Development Company were using threats to acquire land at less than its true value, by intimating that they had contacts in the Government, and that people who would not sell their land at low prices would face problems after the takeover, or even see the rest of their land confiscated. The Governor was extremely concerned about this rumour, seeing how quickly it could become a factor of major social unrest.... Stewart Lockhart did not believe that any land had in fact been sold at below its true value, and no evidence of forced or undervalued sales was in fact brought to light, despite an investigation. Nonetheless, it is clear that the villagers widely believed the rumour that underhand action was taking place, by people connecting with the Government, forcing or coercing sales of land to "the company". It is, furthermore, clear that this rumour was particularly strongly believed in Ping Shan, where at least one doubtful land-sale had gone through. Whether there were any improper land sales or not, the important thing was that rumours of such sales were rife, and no effort was made by the Government before the Governor's Proclamation of 7-9 April 1899 to explain or clarify the situation...

The final problem was, perhaps, the single most significant. As noted above, under the traditional Land Law that had been in place in the New Territories since at least the later seventeenth century, the ownership of land was divided into two, the Sub-Soil Rights and the Top-Soil Rights.

The owners of the Sub-Soil Rights were inevitably the ancient great clans which had been present in the area since the Ming, four hundred years before the Lease. The holders of the Top-Soil Rights were the “small families”, many of whom had settled in the area in the late seventeenth or eighteenth centuries. Rumours abounded in 1899 that the British would forbid the Sub-Soil/Top-Soil system, and would prohibit the continued payment of the rent-charges, on the ground that these rent-charges were illegal except where the Land Tax was actually being paid by the Sub-Soil land-holder for the land in question. In this case, this is precisely what the British did do, and thus the rumour had considerable substance.

- Some local landlords who had clear vested interests might enjoy the spreading of all the misunderstanding.

Given that most of the leaders of the 1899 insurrection were members of ancient great clans, to whom continuing receipt of the rent-charges was financially important, it is likely that this rumour was important in inducing them into the insurrection...

Mr. Robert Hotung, in a Report to the Government in October 1898, also pin-pointed this factor as the critical one:

...though the owners of property in the neighborhood of Kam T'in village hold deeds they have to pay tax to the said village. If England got the place it is feared that the benefit will be deprived of. The shops and houses of the [Yuen] Long village[s] have also got to pay their tax... [every] year.

Chau Kwan-nam, a villager of the Yuen Long area, commenting after the insurrection was at an end, was also of this view:

... the resistance really originated with the avaricious gentry... They wished it to be arranged with the British Government that while the land should belong to Great Britain... the gentry might [still] be able to squeeze the people and enrich themselves. This was the real reason for their inciting the people...

There can be little doubt that it was this factor, affecting the gentry above all, which induced this group to start the insurrection, although rumours and scare-stories about high taxes and threats to land, and the believed high risk to village Fung Shui, led the ordinary villagers to support them once the decision to go ahead had been made by the gentry.”

According to Hase (2008, p.43), *“The Six-Day War broke out in this society. The insurgents were mostly from the great Punti villages of the Yuen Long plain, with their tenants and allies, and with some of the independent village areas nearby who were coerced into joining in...”*

- The misunderstanding eventually leads to disastrous Six-Day War.

According to Hase (2008, p.115~7), *“... There is, however, one official British Report which speaks of heavy insurgent casualties. This Report is quoted by Gen. James Hunt in his book Imperial Sunset. It reads:*

On the 17th April at 4p.m. very heavy fire was heard... men of the Hongkong Regiment... soon became hotly engaged, and did the work splendidly. The enemy were forced to retire... the Hongkong Regiment followed up the retreating foe with great bravery and tenacity and inflicted serious loss upon them. Captain Berger’s force... utterly routed the Chinese. On the 18th April 1899 hostilities were renewed... The Hongkong Regiment force of about 400 under command of Captain Berger and directed by Colonel the O’Gorman, were attacked by the Chinese to the number of about 2,600; they gallantly repulsed the attack and utterly routed the enemy....

Taking all these points into consideration, therefore, it seems possible that up to 600 men of insurgents died: at the lowest likely estimate there must have been about 450: a death rate of 500 can be taken as extremely likely. The suggestion that only about a dozen of the insurgents died, as O’Gorman implies, can be dismissed out of hand: there are probably right or ten times that number buried in the mass grave at Sha Po alone....

There can be little doubt that the figures for the dead from these village sources, from the unofficial British reports, from the Press, from the Governor’s formal Report to the Secretary of State, and from Retallick’s Standing Order, all of which state that the losses to the insurgents were serious, and constituting an “utter rout”, a “disastrous defeat”, with “many dead and many wounded” are much closer to the truth than the bland statements of “slight loss” in the British official Reports in the official collections.

- What matters is a significant change in the attitude of the British Government after this battle.

According to Hase (2008, p.121~129), *“... There was a very major difference of opinion between the Governor, Sir Henry Blake, and the Colonial Secretary, Stewart Lockhart, whom the Governor had appointed Political Official in attendance on the campaign, as to what the correct attitude to the insurgents and their leaders should be, which makes a deliberate attempt to hide the facts a definite possibility...”*

On 2 and 4 August, Blake visited the New Territories, and met the newly appointed councilors, chosen from the village elders. He made no mention, even very distantly, to the recent fighting...

When the fighting ended Blake wanted the whole matter forgotten as quickly as possible, so that affairs could move towards his goals without being encumbered by bitter memories of the fighting. The leaders of the insurgency were, Blake insisted, to be treated well. No extra-legal or legal penalties were to be imposed on them, on their villages, or on the men who had followed them... As he said to the Secretary of State on 13 May, the insurgents were merely: "A number of Chinese subjects who objected to being cut off from the Empire and handed over to a foreign government", or, in other words, that they should be viewed as a group of misguided but brave men demonstrating manly independence....

His instructions to Lockhart were explicit (26 April): "I do not consider it advisable that any land should be confiscated in connection with the recent troubles... I do not consider it just or expedient that a vindictive retribution should be exacted". He went on: "doubtless clemency may be misunderstood", but, nonetheless, that was the way he wanted to play things...

Blake thus, at least three times, stated that leaders of the insurgency should be considered as members of the district councils he wished to establish...

The elders would have been very well aware that, had they risen up against the Government of Ch'ing China, retribution would have been harsh and widespread. Blake's obvious willingness to forget the past and start afresh, without any retribution, and even to allow leaders of the insurrection a public role in the new system, to the extent of taking tea and cakes with him, and discussing local affairs with him in a frank and friendly way, must have been a huge relief to them....

- Blake's "Forgive and Forget" policy does have a long-term impact in Hong Kong.

According to Hase (2008, p.190), "...By August 1899, therefore, and Blake's meeting with the village leaders, it is almost as if the War had never happened. If it were not that the contemporary correspondence was printed in the Extension Papers and the Despatches and Disturbances compilations, it would be easy to believe that no such insurrection had ever occurred...

Blake's policy towards the New Territories, that it should be a place where the administration should be based on amicable co-operation and mutual confidence between a benevolent and paternalistic administration, with village leaders enjoying easy and amicable access to the

District Officers, quickly became settled Hong Kong Government policy towards the area. May, and, later Stubbs, and other pre-War Governors, all held to the same policy. The New Territories Administration quickly developed an “office culture” which lasted at least down to the 1980s, which entirely stems from Blake’s views and stance.

- It should be noticed that Hong Kong in those days was not as safe as today. Hayes (2006, p. 48~49) comments that

“...The unsettled times in China after the 1911 Revolution were reflected in growing lawlessness in Hong Kong and the New Territories. Armed robbery and kidnapping for ransom were prevalent, and the work of the police rendered more difficult though the plentiful availability of firearms across the border and the large numbers of men trained in their use....

In a published memoir, an ex-Chief Inspector recalled how he led a police operation against a gang of thieves intent upon the robbery, abduction and blackmail of the operator of a distillery built in a remote location on the coast at Gindrinker Bay, though not far from Kowloon. The raid was foiled, and the chief robber was shot dead by the author,...

Among the many incidents featured in annual police reports, those occurring at Cheung Chau in 1912 and Tai O in 1925 received the most detailed coverage. The Cheung Chau police station was attacked, three Indian constables shot, the safe (containing the Crown Rent collection and taxes) was ransacked, all arms and accoutrements were taken, and a pawn shop looted, before the gang of “pirates and robbers about 40 strong” escaped as they had come, by sea. In the Tai O attack, a gang of “60 armed bandits” landed from a large white launch, held by and robbed the inmates of 35 houses and shops, killed a woman and wounded another, kidnapped two villagers, and left without hindrance from the police who were in entire ignorance of the raid throughout.”

- It should be noticed that the Police Force of Hong Kong at that time is limited, especially when they were faced the challenge to secure a very long coastal line. According to Hayes (2006, p.49)

“...By the 1930s, the Police Force comprised four Contingents (as they were styled), European, Indian, Chinese (Cantonese) and Chinese (Wei Hai Wei), meaning from North China). In 1935, these numbered 265, 796, 712 and 300 respectively. There was a Marine Division, with steam launches and motor boats, and Police also controlled the Anti-Piracy Guards employed and paid for by shipping companies, and registered and supervised private watchmen.”

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