RESEARCH ARTICLE

Concentration Analysis of New Private Residential Units Market in Hong Kong

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Abstract

The new residential property price in Hong Kong has rocketed in the last decade and has ranked within the top three metropolitan cities in the world. Housing is a necessity for most people, high residential property price has its social ramification. The rocketing price seems not solely the result of the market. As such, this raised the issue of competition in this market. This study employs Concentration Ratio and Hirfindahl-Hirschman index to evaluate the market concentration of the New Private Resident Units Market in Hong Kong. Using the best information available in the public domains and applying universal thresholds, the New Private Resident Units Market in Hong Kong is considered moderately concentrated. It is noted that the big five listed developers in Hong Kong are collectively holding a dominant position of the potential supply. Moreover, the top three have comparable market shares thus suggesting no monopoly exists. It is also found that the substantial land banks held by the five big listed developers, amount to 60% of that owned by the Government. These developers will therefore retain their dominant market power in the future. Further study is recommended to examine whether the big developers have abused their market power.

Keywords

Market concentration, competition, barriers to entry

Introduction

The rise or fall of the property price is often used as thermometer of an economy. In recent years, the extra low interest rate resulted from the quantitative easing practiced in many countries has held the cost of borrowing at a record low. This inevitably has led to an upsurge of asset values. Real estate property is one of the mostly affected markets. In 2014, among the top five countries with a strong surge in property price, Hong Kong held the front position with 16.43 per cent of price growth in that year (Anderson, 2015). Housing is a necessity for most people, therefore high residential property prices have immense social ramifications. In fact, unaffordable property prices have been identified as one of the major causes of social discontent.

The average residential property price increased by 63% from July 2003 to May 2005 (Poon, 2011). While the market price slightly took a dip in 2008, by 2009 the cost for purchasing residential properties still ranked 4th among all the international metropolitan cities (Poon, 2011). Figure 1 gives the price index provided by the Hong Kong Rating and Valuation Department, which demonstrates the trend of property prices in Hong Kong from 1997 to 2015. The residential property prices in Hong Kong have risen 117.2% from December 2008 to December 2012. The trend of property price continues and at a rate far exceeded inflation during the period of 2012 to 2015. Similarly, the growth of property price of an average residential unit in the United Kingdom rose by 9.2% just in 2015, a rise that cannot be explained solely by the inflation factor (Cordell, 2016).
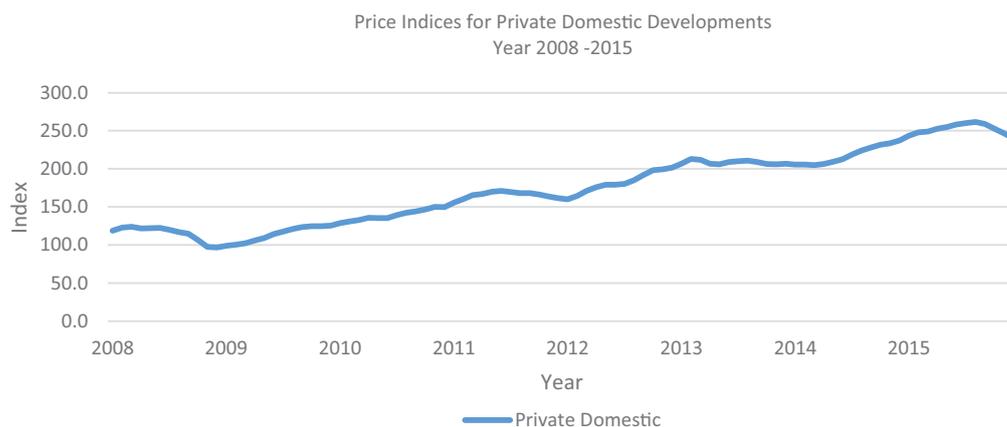
Figure 1   Price Indices for Hong Kong Private Property Market
Source: (Based on the information by Rating and Valuation Department of Hong Kong, http://www.rvd.gov.hk/doc/en/statistics/graph2.pdf, date of access: March 9th, 2017)

Hong Kong's government has attempted to suppress the rise of housing price rises since 2010. The measures are summarised as follows (Delmendo, 2016; Hong Kong ISD, 2016):

A: In November 2010, the government imposed a "flip tax" of 15% on property resold within six months, and doubled stamp duties to 8.5% on properties worth more than HK $20 million (US$2.6 million).

B: Buyer's Stamp Duty (BSD) was introduced on October 26, 2012. Non-Hong Kong permanent residents are required to pay a 15% tax on property purchases.

C: In February 2013, the government doubled the stamp duty on all property transactions worth more than HK$2 million (US$257,902). This measure ended in May 2014.

D: In April 2013, the Residential Properties (First-hand Sales) Ordinance came into full effect.

E: In May 2014, the government proposed to relax the "six-month" timeframe for owners who wish to upgrade their flats. Homebuyers do not need to pay DSD if their old unit is sold within six months of signing a formal agreement.

F: In February 2015, the need for lager down payments for buyers of self-used residential properties valued under HK\$7 million (US\$900,000) was introduced.

G: In November 2016, the stamp duty on property transactions increased to 15% for the 2nd property, applying to all residential property acquisitions by individuals or companies.

However, notwithstanding the afore-mentioned measures, the housing price in the private sector continued to rise. Figure 2 shows the upward trend in house price together with the housing policy. The measures as identified by A to G are plotted in Figure 2 for ease of reference. It is commonly accepted that the cooling measures are not effective, as the demand for housing is evidently very strong. In addition to internal demand from Hong Kong residents, purchasers from Mainland China have further fueled the price bubble. Other than extra tax to be levied, overseas investors are free to purchase property in Hong Kong.
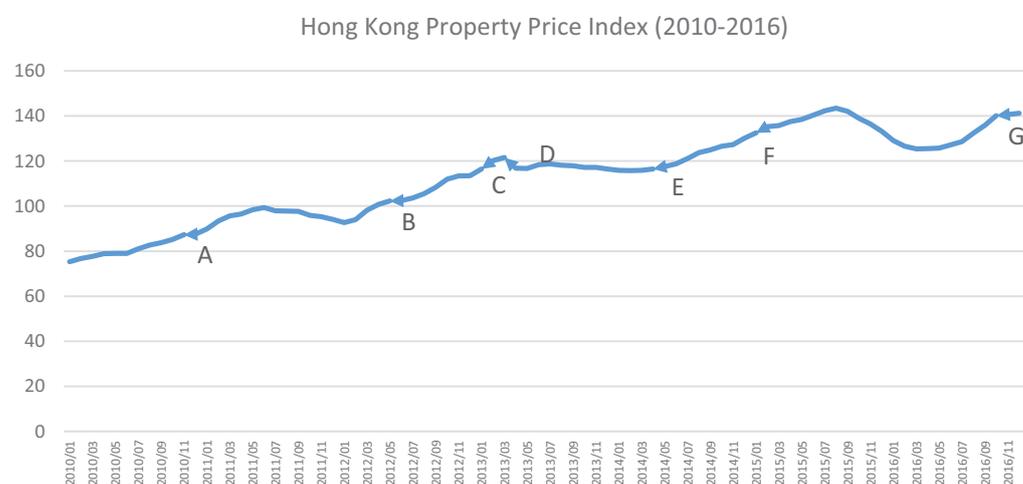

Figure 2   Hong Kong Property Price Index (2010-2016) (Source: Centa-city index)

This study aims to examine whether competition is a contributor to the sharp rise in property price. The Hong Kong housing market is principally divided into two sectors; public and private. The public sector refers to the subsidized housing provided by the Government forlower income households. This sector is mostly rental and therefore not market driver. On the other hand, the price of new private residential units should respond to the supply and demand condition of the market. This study focuses on the private sector and is reported in six parts: I) the concepts of competition, II) the new private residential unit market in Hong Kong, III) measurement of concentration, IV) data analysis, V) discussions and suggestions and VI) concluding remarks.

Concepts of Competition

In traditional static economic analysis, welfare is assumed to be enhanced with competition intensity. Perfect competition is almost synchronous as welfare maximization (Audretsch, Baumol and Burke, 2001). Optimum competition would bring greater economic efficiency, including more effective use of resources and greater productivity gains for the economy, since market players are spurred to be more efficient, and innovative and responsive to consumer needs (HKCC, 2015a; Whish and Bailey, 2012).

In a market with de-monopolization, liberalization, and privatization, market players need to win consumers by offering lower prices and/or better products that will increase consumers' welfare (Hussein, Manap and Nor, 2012). However, the presence of competition may also affect the equity consideration between market individuals. There are instances where an individual may single-handedly control the material payoff, thus affecting market outcomes, and creating an imperfect market competition (Fehr and Schmidt, 1999).

It has long been recognized that Hong Kong is one of the freest economies in the world (Chen and Lin, 2002; HKCC, 2015a). The Hong Kong government has adopted a laissez faire approach under which market forces inform resources allocation (Chen and Lin, 2002). However, laissez faire will not guarantee perfect competition (Chen and Lin, 2002). Anti-competition conducts such as price fixing and bid riggings have been reported in Hong Kong (HKCC, 2015a). Furthermore, unrestrained laissez faire economic policy does not encourage wealth distribution among citizens. In Hong Kong, Williams (2009) reported that about 25% of the population are officially recognized as being below the poverty line, while most of the remaining ones are on the borderline, with only a very small portion holding an overwhelming share of wealth. Therefore, in many developed economies, legislative intervention has been instigated to protect trades and engender competition. The earliest example of competition law can be traced back to Roman legislation around 50 BC (Wilberforce et al., 1966). Competition law in modern times began with the United States Sherman Act of 1890 and the Clayton Act of 1914 (Hovenkamp, 1988). By 1996, 22 of the 26 transition economies of Eastern Europe and the former Soviet Union had established competition laws (Dutz and Vagliasindi, 2000). By 1998, approximately 82 countries already had competition legislation (Chen and Lin, 2002). In Hong Kong, the first-ever competition law – the Hong Kong Competition Ordinance (HKCO) was enacted in June 2012. The HKCO has two conduct rules to regulate anti-competition conduct that prevents, restricts, or distorts competition in Hong Kong. The First Conduct Rule (FCR) regulates restrictive agreements while the Second Conduct Rule (SCR) prohibits abuses of substantial market power. In addition, the HKCO also has a merger rule to prohibit merges that substantially lessen competition.

The following HKCO SCR is relevant to this study:

> **"An undertaking that has a substantial degree of market power in a market must not abuse that power by engaging in conduct that has as its object or effect the prevention, restriction or distortion of competition in Hong Kong"**

Possession of market power refers to situation where providers of goods or a service can consistently raise prices above the price level established by a competitive market (Alvarado, 1998). Accumulation of market power is indicated by the concentration of resources in the hands of a few merchandise/service providers (Alvarado, 1998). Therefore, organizations with market power can affect either the price and supply quantity, or both, of their products/services. Abusive use of dominant market power could therefore significantly influence the level of competition of the market. What competition laws therefore seek to control is abusive use of market power. Under the HKCO, undertakings with substantial degree of market power therefore have a special responsibility not to engage in conducts that harm competition (HKCC, 2015b).

Guidelines of competition laws of different jurisdictions have suggested ways to identify the existence of dominant market power. Table 1 summarizes the guidelines used in Singapore, Malaysia, UK, Australia, Europe, and US. Market share is the most commonly used indicator. As such, market share higher than 40% to 60% of an undertaking is likely to be considered as having dominant market power. Furthermore, other indicators such as entry barrier and consumers' bargaining power are also considered in most jurisdictions. The afore-listed indicators are not exhaustive.

Table 1   Guidelines on Market Power

	Hong Kong	Singapore	Malaysia	UK	Australia	EU	US
Legislation	Competition Ordinance 2012	Competition Act 2004	Laws Of Malaysia Act 712 Competition Act 2010	Competition Act 1998	Competition and Consumer Act 2010	Article 102 of the Treaty on the Functioning of the European Union	The Sherman Antitrust Act (1890)
Market (definition)	Two dimensions 1. product dimension 2. geographical dimension	Two dimensions: 1. product dimension 2. geographical dimension	Three dimensions: 1. product dimension 2. geographical dimension 3. time dimension	Two dimensions: 1. product dimension 2. geographical dimension	Three dimensions: 1. product dimension 2. function dimension 3. geographical dimension 4. time dimension	Two dimensions: 1. product dimension 2. geographical dimension	Two dimensions: 1. product dimension 2. geographical dimension
Assessing existence of dominant market power	1. Market Share 2. Barrier to entry 3. Buyer countervailing power	1. Market share →60% 2. Entry barriers due to sunk cost or technological barriers 3. Consumers' bargaining power 4. Economic regulations imposed by government	1. Market share →60% 2. Entry barriers 3. Consumers' bargaining power 4. Economic regulations imposed by government	1. Market share → 50% 2. Entry barriers 3. Buyer's power 4. Intellectual property rights (IPRs)	1. Market concentration degree 2. Entry barriers 3. Product differentiation degree 4. Vertical integration	1. Market share (←40% Not likely dominant) 2. Entry barriers and potential expansion 3. Consumers' bargaining power	Monopolization –Significant and durable market power (market share →50% and sustainable over time)

Table 1 *(Continued)*

	Hong Kong	Singapore	Malaysia	UK	Australia	EU	US
Anti-competitive activities	1. Predatory behaviour, 2. Tying & bundling 3. Margin squeeze 4. Refusal to supply essential facilities	1. Exclusive dealing 2. Predatory pricing 3. Discount Scheme 4. Refusal to supply	1. Exclusive dealing 2. Predatory pricing 3. Bundling and tying 4. Loyalty rebates and discounts 5. Buying up scarce good or resource	1. Exclusive dealing 2. Predatory pricing 3. Discount Scheme 4. Vertical re-straints	1. Exclusive dealing 2. Predatory pricing 3. Tying arrange-ments 4. Refusal to deal	1. Exclusive dealing 2. Predation 3. Tying and bundling 4. Refusal to supply and margin squeeze	1. Exclusive supply or purchase agree-ments 2. Tying 3. Pred-atory pricing 4. Refusal to deal
Guidelines	-Guidelines on the Second Con-duct Rule	CCS Guidelines On The Section 47 Prohibition	Malaysia Competition Commission Guidelines Chapter 2 Pro-hibition	Abuse of A Dominant Position-Under-standing Com-petition Law	--(No guidelines)	Guidance on the Commis-sion's enforce-ment priorit-ies in applying Article 82 of the EC Treaty to abusive exclusionary conduct by dominant un-dertakings	An FTC Guide To the Antitrust Laws

Table 1 *(Continued)*

	Hong Kong	Singapore	Malaysia	UK	Australia	EU	US
Exemption and exclusions	1. Conduct for compliance with legal requirements; 2 An undertaking entrusted by the Government with the operation of services of general economic interest	1. Services of general economic interest 2. Activities necessary to comply with legal requirements or to avoid conflict with Singapore's international obligations 3. Activities arising from compelling reasons of public policy 4. Vertical agreements 5. Conduct directly related to the implementation of a merger 6. Goods, services and mergers regulated under any other law or competition codes, and other specified activities 7. Other Specified activities	An enterprise in a dominant position from taking any step which has reasonable commercial justification or represents a reasonable commercial response to the market entry or market conduct of a competitor	1. Conduct of general economic interest 2. Conduct in order to comply with a legal requirement 3. Conduct necessary to avoid conflict with international obligations & ordered by the Secretary of State 4. Conduct subject to the EC Merger Regulation 5. Conduct necessary for compelling reasons of public policy & ordered by the Secretary of State	1. An authorization or clearance is in force. 2. The corporation has given the Commission a collective bargaining notice and the notice is in force.	--(No exemption listed for Article 102)	1 Of legitimate business justification by court (the monopolist may be competing on the merits in a way that benefits consumers). 2. Obtaining a monopoly by superior products, innovation, or business acumen is legal

Like the Guidelines summarised in Table 1, the Guideline on the Second Conduct Rule (GSCR) of the HKCO suggests the use of a) market share and market concentration; b) potential entry or expansion; and c) countervailing buyer power, to evaluate whether an undertaking has a substantial degree of market power (HKCC, 2015b).

The New Private Resident Unit Market in Hong Kong

Competition affects supply and thus the price of a commodity. Private residential unit (PRN) in Hong Kong is a type of commodity. Inadequate supply has been identified as one of the triggers of the high property price in Hong Kong. In 1996, the Hong Kong Consumer Council firstly raised this issue and reported that the Hong Kong private residential property market was quite concentrated (HKCC, 1996). The objective of this study is to measure the concentration of the New Private Residential Unit Market (NPRUM) to evaluate the level of competition in that market. The concepts embedded in the Hong Kong Competition Ordinance on market concentration are used for this study.

a) Market share and market concentration

Market share distribution reflects the extent to which market power is distributed among incumbents (Adelman, 1951; Ye, Lu and Jiang, 2009). Measurement of concentration is a principal way to evaluate the relative power of the market players and is instrumental to gauge the intensity of competition (Adelman, 1951; Willekens and Achmadi, 2003). In this regard, the GSCR suggests the use of market share as the initial screening device in assessing market power. In general, a higher market share suggests greater market power. The issue of competition is more acute where the number of suppliers is limited and barrier to entry is high (McCloughan, 2004; McCloughan and Abounoori, 2003). The use of concentration measures to gauge competition level is based on the proposition that a highly concentrated market is characterized by dominance by a few large firms. A concentrated market is fertile for the abuse of market power that is most competition policies aim to curtail (McCloughan, 2004; McCloughan and Abounoori, 2003).

The DGSCR suggests two methods to measure market concentration; i) Concentration Ratios (CR) and ii) Hirfindahl-Hirschman Index (HHI). CR focuses on the market share of the leading market participants while HHI weights the share of all participants to show inequality in market share distribution. More details on these two measures are given in the next section.

b) Potential Entry or Expansion

Barriers to entry may arise from a variety of sources (HKCC, 2015a). For example, structural barriers are those inherent in the market and examples include sunk cost, network effects and economics of scale. Strategic barriers are those intentionally created by incumbent undertakings like brand proliferation and product diversification. Barriers to entry have a large impact on competition. In general, market players holding dominant positions would not be shaken by new entries if the barrier is high. On the other hand, lowering barriers would encourage potential market entrants thus providing a counter force against monopoly pricing through competition (Heflebower, 1957). The characteristic features of the Hong Kong land supply system are discussed in the section on Discussion and Suggestions. This may explain how it might have worked as a barrier to entry.

c) Countervailing buyer power

Countervailing buyer power is the strength of buyers to freely choose among alternative suppliers (HKCC, 2015a) and is likely to exist when buyers could switch substantial purchases

between suppliers with little cost. Usually countervailing buyer power is stronger with the availability of alternatives and/or substitutes. On the other hand, abusive use of market power by dominant market holders can stifle countervailing buyer power.

MEASUREMENT OF CONCENTRATION

Concentration Ratio (CR) and Hirfindahl-Hirschman Index (HHI) are the two most commonly used to measure concentration. CR is commonly used to denote the concentration of production management within an industry whereas HHI is commonly adopted to reflect market structure and the corresponding industry (Pulaj and Kume, 2013). CR and HHI have recently been used in assessing market concentration of the construction industry. For example, both CR_4 and HHI methods were applied to prove the construction industry in Vlora region in Albania is not concentrated (Pulaj and Kume, 2013). More recently, CR and HHI have also been applied to evaluate competition in Hong Kong's Ten Mega Project program (Cheung and Shen 2016).

As far as the HKCO is concerned, the GSCR suggests the use of both CR and HHI to measure market power. Therefore, it is advisable to use CR and HHI in this study to enhance the interpretation and evaluation and findings. A brief account on CR and HHI follows.

CONCENTRATION RATIO (CR)

Concentration Ratio (CR) is the most widely used measure of industrial concentration. CR is represented by the percentage of the market share occupied by the largest firms in a certain industry (Parker, 1991). For example, CR was used to indicate the market power and level of competition of the Belgian audit market (Willekens and Achmadi, 2003).

In terms of operation, CRn represents the market share occupied by the biggest n firms of that market. Pearcy and Calkin (1983) suggested the use of four-firm concentration ratio (Hall and Tideman, 1967; McCloughan, 2004; McCloughan and Abounoori, 2003). Furthermore, when market share of individual firms is not available, CR could be estimated by grouped data (McCloughan and Abounoori, 2003). As for the threshold and the corresponding interpretation, Baldwin and Gorecki (1994) proposed that CR_4 above 75% indicates high probability of having a "competition problem". In addition, McCloughan (2004) proposed that a CR_5 higher than 70% denotes a highly-concentrated market and a CR_5 less than 10% signals a highly-fragmented market.

HIRFINDAHL-HIRSCHMAN INDEX (HHI)

Although CR is commonly used for ease of understanding, nevertheless it has also been criticized for the narrow focus on a few large firms (Ye, Lu and Jiang, 2009). As such, HHI has been proposed to measure concentration of control over a corporation, a market or foreign trade (Hirschman, 1980). HHI is the sum of the squared market shares of the top 50 firms (or all the firms if they are less than fifty) in a sector (Chiang, Tang and Leung, 2001; Nawrocki and Carter, 2010; Ye, Lu and Jiang, 2009). When Hirschman (1980) developed this index to measure concentration, it had been stressed that an important condition of perfect competition implies the presence of both a relatively equal market share by many producing firms. Unlike CR, all participants in that market are considered in the calculation of HHI. Besides, HHI weights each firm by its own relative market share, giving higher weights to larger firms. HHI has been adopted as a formal numerical index in U.S. Department of Justice Merger Guidelines since 1982, as an indicator of competition (Rhoades, 1993).

Data Analysis

For the NPRM, annual Gross Floor Area (GFA) of building production is used to denote the market share condition in this study. GFA is defined as the area contained within the external walls of the building measured at each floor level (Buildings Department, 2016). GFA Production is another way to represent the output of developers. In addition, the annual completion in GFA is generally available in the annual report of all listed companies and therefore used in this study.

To evaluate the concentration status of NPRM, developers listed on the Hong Kong Stock Exchange are ranked by their market capitalisation. Table 2 summarizes the top 9 developers by net capital value. However, not all of them are active in providing new private residential units. As a result, only 5 developers (A, D, E, F, and G) who are active in NPRM are included in this study. Studying these developers' annual reports of 2012 to 2015, the market shares are computed by comparing their respective annual GFA Completions of residential development GFA to the total completion figure obtained from the Key Statistics on Business Performance and Operating Characteristics of the Building, Construction and Real Estate Sectors by Census and Statistics Department of Hong Kong.

To analyse entry barrier, the land sale records in Hong Kong from financial year 2011/2012 to 2014/2015 were retrieved from the Hong Kong Lands Department website. The developers' land banks were collected from their respective annual reports.

The calculation of CR and HHI for 2012 is detailed as demonstration. CRs and HHIs for 2013, 2014 and 2015 are calculated similarly.

Table 2   Top property developers listed in the Hong Kong Stock Exchange

Company Name	Range of Operation	Market Capitalisation as shown in 2015 annual report (million HKD)
A	property development property investment property related business telecommunications infrastructure	456,818
B	property development property investment property management	340,859
C	property development property investment property related business	317,180
D	property development property related business infrastructure	315,060
E	property development property investment hotel and serviced suite operation	269,587

Table 2 continues on next page

Table 2   (*Continued*)

Company Name	Range of Operation	Market Capitalisation as shown in 2015 annual report (million HKD)
F	land reserve property development property investment	260,108
G	property development property investment property management	251,297
H	property development property investment land reserve property management	129,946
I	property development property investment property related business property management	30,580

a) Calculation of Concentration Ratio (CR)

The range of concentration ratio is from 0 to 1, with close to zero indicating that the market is perfectly competitive and one indicates a monopoly (Hill, 1987; Parker, 1991; Rosenbluth, 1955; Ye, Lu and Jiang, 2009). The calculation of CR can be conducted by the following formula:

$$CR_n \sum_{i=1}^{k} S_i$$

where S_i denotes the market share of firm i and k denotes the total number of firms whose market shares are included. For purposes of completeness and enhancing interpretation of findings, CR_3, CR_4 and CR_5 are used in this study.

1)   Individual market share (S_1 to S_5)

$$S_1 = \frac{3645000\,(\text{ft}^2)}{10775945(\text{ft}^2)} = 33.83\%$$

$$S_2 = \frac{2266759(\text{ft}^2)}{10775945(\text{ft}^2)} = 21.04\%$$

$$S_3 = \frac{1559149\,(\text{ft}^2)}{10775945(\text{ft}^2)} = 14.47\%$$

$$S_4 = \frac{535892(\text{ft}^2)}{10775945(\text{ft}^2)} = 4.97\%$$

$$S_5 = \frac{465266 \left(ft^2\right)}{10775945\left(ft^2\right)} = 4.32\%$$

2)   Concentration Ratio (CR$_3$, CR$_4$, CR$_5$)

$$CR_3 = \sum_{i=1}^{3} S_i = S_1 + S_2 + S_3 = 33.83\% + 21.04\% + 14.47\% = \textbf{69.34\%}$$

$$CR_4 = \sum_{i=1}^{4} S_i = CR_3 + S_4 = 69.34\% + 4.97\% = \textbf{74.31\%}$$

$$CR_5 = \sum_{i=1}^{5} S_i = CR_4 + S_5 = 74.31\% + 4.32\% = \textbf{78.63\%}$$

Table 3 summarizes the concentration ratios of the big five listed developers in Hong Kong for the period together with the possible thresholds that may be used by the Hong Kong Competition Commission.

Table 3   CRs of the NPRUM in Hong Kong for the Top Listed Developers

		CR$_3$ (57.94)	CR$_4$ (66.20)	CR$_5$ (72.25)
CR Thresholds	Singapore (60%)		✓	✓
	Malaysia (60%)		✓	✓
	UK (50%)	✓	✓	✓
	Europe (40%)	✓	✓	✓
	US (sustainably over 40%)	✓	✓	✓

b) Calculation of Hirfindahl-Hirschman Index (HHI)

Herfindahl-Hirschman index (HHI) is a commonly accepted measure of market concentration. It is calculated by squaring the market share of each firm competing in a market, and then summing the resulting numbers, and can range from close to zero to 10,000. If, for example, there were only one firm in an industry, that firm would have 100% market share, and the HHI would equal 10,000, indicating a monopoly. If, there were thousands of firms competing, each would have nearly 0% market share, and the HHI would be close to zero, indicating nearly perfect competition (Chiang, Tang and Leung, 2001; Nawrocki and Carter, 2010). In the following formula, S_i and S_k have the same denotations as they do in the CR formula.

$$HHI = \sum_{i=1}^{3} S_i^2$$

Since HHI outcomes are compared against the threshold index suggested in Merger Guidelines of U.S. Department of Justice and the Federal Trade Commission and other studies (Cardell, Hitt and Hogan, 1997; Kerber, Kretschmer and von Wangenheim, 2009) that follow the index format convention in the Merger Guidelines, percent sign (%) is left out for both S_i and HHI expressions. For example, S_1 is expressed as 33.83 rather than 33.83%.

Reservation in using HHI is the difficulty in collecting data of every single firm in the market (Adelman, 1951). In this regard, Hirschman (1980) suggested that where data of most large firms are predominant, the remaining few can be lumped as "other firms". As a result, an approximate determination could be made by setting a maximum and a minimum limit to the remaining firms (Hirschman, 1980).

1) Squared market share for top-5 firms (S_1^2 to S_5^2)

$S_1^2 = 33.83 \times 33.83 = 1144.47$

$S_2^2 = 21.04 \times 21.04 = 442.68$

$S_3^2 = 14.47 \times 14.47 = 209.38$

$S_4^2 = 4.97 \times 4.97 = 24.70$

$S_5^2 = 4.32 \times 4.32 = 18.66$

2) Upper limit for the remaining firms

Contributions of the rest of firms' market shares (HHIr) toward HHI are taken into consideration using an upper limit and a lower limit suggested by Hirschman (1945). Since the top-5 firms are holding the largest market shares ranked from 1st to 5th, any of the remaining firm would have a market share no larger than S_5 (4.32). As a higher HHI suggest a more concentrated market, HHI_{max} could be achieved when S_6 occupies the same amount of S_5, and so does S_7, S_8 until S_x when $\sum_{i=1}^{x} S_i = 100$.

In this case,

$$\sum_{i=1}^{5} S_i = 78.62,$$

and $\dfrac{100 - 78.62}{4.32} = 4.95$,

HHI_{max} can be achieved when assuming there are 3 firms whose market shares $S_6 = S_7 = S_8 = 4.32$, and another firm $S_9 = 100 - 78.62 - 4.32 \times 3 = 8.42$. At this extreme situation, firms1 to 9 have all market shares while the other firms have no market share.

$$HHI_{max} = \sum_{i=1}^{9} S_i^2 \; S_1^2 + S_2^2 + S_3^2 + S_4^2 + S_5^2 + S_6^2 + S_7^2 + S_8^2 + S_9^2 = 1144.47 + 442.68 +$$

$209.38 + 24.70 + 18.66 + 18.66 + 18.66 + 18.66 + 70.90 = 1967$

3) Lower limit for the remaining firms

The lower limit considering the remaining firms' market shares could be achieved when all remaining firms equally share the market (Hirschman 1945).

$$HHI_{min} = S_1^2 + S_2^2 + S_3^2 + S_4^2 + S_5^2 \; \sum_{i=6}^{n} \left(\frac{100 - 78.62}{n} \right)^2,$$

where n is the total number of market participants. It is not easy to determine the exact number of market participants in the NPRUM since not all developers are listed. Notwithstanding, the major ones are all listed without a definitive value of n, and thus the lower limit for the remaining firms is therefore adopted.

$$\sum_{i=6}^{n}\left(\frac{100-78.62}{n}\right)^{2} > 0$$

So $HHI_{min} > S_1^2 + S_2^2 + S_3^2 + S_4^2 + S_5^2 = 1840$

The HHI of 2012 NPRUM is between 1967 and 1840.

Findings

Applying the calculation method presented in the preceding section, the data on market share of the five major developers are shown in Table 4. HHI is shown within a range in between HHI_{max} and HHI_{min}.
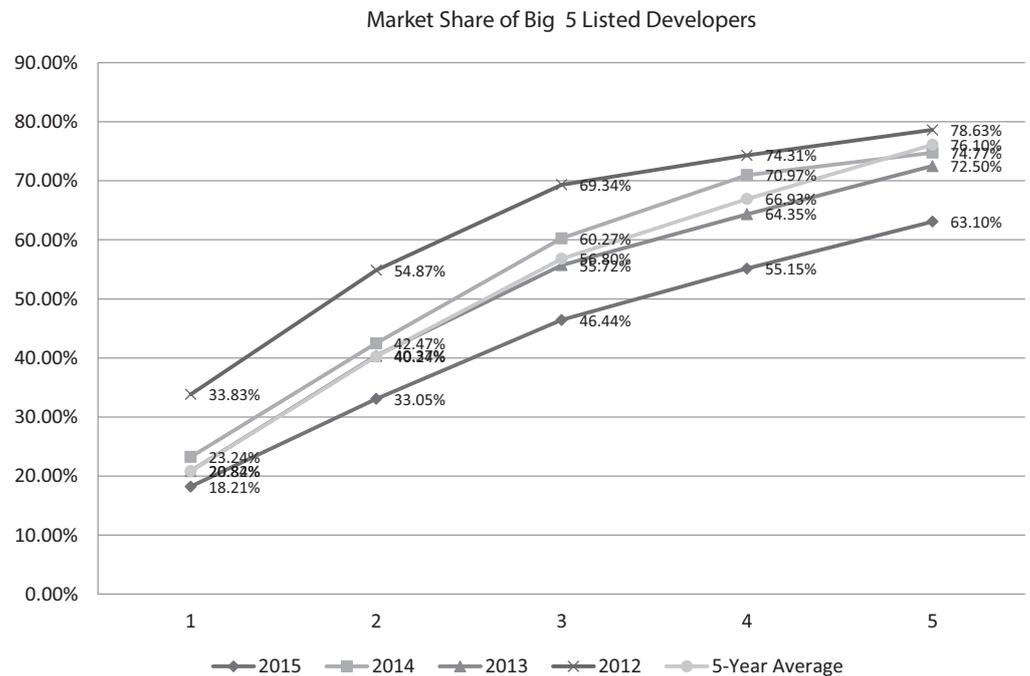

Market Share of Big 5 Listed Developers

Figure 3   Cumulative Market Share of Big 5 listed Developers

CR_4 and CR_5 are compared against the thresholds used in the competition guidelines listed in Table 4. For example, the EU guidelines consider market share under 40% as "unlikely" to be dominant. Goyder (2003) reported that the European Commission considers 50% or more market share as having a dominant position. The values of CR_4 and CR_5 from 2012 to 2015 all exceed 50%, meaning the top-4 and top-5 firms have collective dominance in the NPRUM in Hong Kong. The CR_5 of year 2012 is almost 80% suggesting a "super-dominant" position. Goyder (2003) pointed out that in such situation, the top five firms shall have a special responsibility not to indulge in abusive behaviours. The guidelines of UK Competition Act 1998 and the US Sherman Antitrust Act 1890 both suggest 50% as the threshold of dominant power. The Singapore Competition Act 2004 and Laws of Malaysia Act 712 Competition Act 2010 set 60% as the threshold. Thus, in the light of these thresholds, CR_5 suggest that the largest 5 developers in the Hong Kong NPRUM are collectively holding a dominant market position. These countries are studied because the thresholds they used are considered by the Hong Kong Competition Commission.

Table 4 Market Share Distribution

Developer	2012		2013		2014		2015		Average	
	Annual GFA Completion (ft2)	Market Share (%)	Annual GFA Completion (ft2)	Market Share (%)	Annual GFA Completion (ft2)	Market Share (%)	Annual GFA Completion (ft2)	Market Share (%)	Annual GFA Completion (ft2)	Market Share (%)
S1	3645000	33.83%	1027740	15.35%	2342377	19.23%	920000	7.95%	1983779	19.25%
S2	2266759	21.04%	1395812	20.84%	2168187	17.80%	1716837	14.84%	1886899	18.31%
S3	1559149	14.47%	545619	8.15%	1303216	10.70%	1548551	13.39%	1239134	12.03%
S4	535892	4.97%	1307696	19.53%	2069437	23.24%	1008062	8.71%	1230272	11.94%
S5	465266	4.32%	578029	8.63%	463274	3.80%	2106689	18.21%	903315	8.77%
Total	10775945		6696957		12178050		11566746		10304425	
CR3	69.34%		55.72%		60.27%		46.44%		57.94%	
CR4	74.31%		64.35%		70.97%		55.15%		66.20%	
CR5	78.63%		72.50%		74.77%		63.10%		72.25%	
HHI	1840 - 1967		1192 - 1401		1105 - 1551		870 - 1073		1252 - 1498	

Table 5 gives the CR threshold commonly used. Table 6 shows the HHI threshold used in the U.S. Merger Guideline in 1992 and 2010. Both versions are listed to indicate the changes instigated to respond to the changes in business module.

Table 5   CR Thresholds as Screening Tools

Region	Legislations	Suggested Threshold
Singa-pore	Competition Act 2004	→60%
Malaysia	Laws of Malaysia Act 712 Competition Act 2010	→60%
UK	Competition Act 1998	→50%
Australia	Competition and Consumer Act 2010	(No threshold suggested)
Europe	Article 102 of the Treaty on the Functioning of the European Union	←40% not likely dominant
US	The Sherman Antitrust Act (1890)	→50% and sustainable over time

Table 6   HHI Thresholds as Screening Tools

Version		2010	1992
US Horizontal Merger Guideline	Non-concentrated	Under 1500	Under 1000
	Moderately concentrated	1500 - 2500	1000 - 1800
	Highly concentrated	Over 2500	Over 1800

With CR_4, the NPRUM is marginally less concentrated than that of CR_5. These figures again flag potential competition issues (Baldwin and Gorecki, 1994; McCloughan, 2004). It is further noted that there is a declining trend of CR_4 and CR_5 from 2012 to 2015. The upward shift of HHIs suggest the rising trend of having larger firms that hold substantial market shares.

Taking the US guideline as a reference, HHI steadily stayed as moderately concentrated when the 1992 version is applied. If the 2010 version is applied, the HHI values suggest the market is "non-concentrated". Unlike high CRs that have shown that market shares are significantly concentrated in the largest 5 developers, HHI demonstrated the competition condition of the NPRUM from another perspective. The squaring mechanism of HHI places more focus to the individual market shares. Although the total market share of the five developers is large in absolute value, their shares are quite evenly spread, especially among the top three. HHI of firms that have equal market share distribution is lower than for an uneven distribution. In this respect, the HHI assessment and CR analysis are in fact complementary. When CR analyses demonstrate that the top-3 to top-5 firms are holding a dominant position in the NPRUM, HHI analyses show that within the dominant group there is no single dominant firm (Figure 3). These results are discussed in the light of the characteristics of the land supply market in the next section.

Discussions and Suggestions

This section first dicusses the land supply system in Hong Kong.

a) Land Sale System

In Hong Kong, the Lands Department administers land disposal, which determines specified amounts of land for sales each year. These lands are disposed on a leasehold basis, where government retains the right to the land while developers can develop, use, transfer, and benefit from the land on lease.

The land leases are disposed either through land auctions, public tenders, application list and private treaty grants. Land Sale had been primarily through government land auction and tender before 1999, where list of specific sites was put up by the government for sale according to a timetable prepared by the Lands Department (Legislative Council Secretariat, 2006).

The Application List System was introduced in 1999 as another option and became the sole way to acquire government land from 2004 to 2011. Furthermore, an upper limit of 50 acres had been implemented for the period of 1984 to 1997. Under the Application List System, Lands Department provided a list of sites for sale. A developer could proactively apply to the Lands Department with a bidding price if interested in any of the listed sites. The price submitted was guaranteed as the "minimum" bidding price, and if considered acceptable to the government, the site put on sale for auction or open tender (Legislative Council Secretariat, 2006). In effect, the Application List System narrows the sites on sale down to those being targeted by potential buyers. The system is passive and there will be no sale if no submission of interest is received. This system was in operation from 2004 to 2011 during which the total number of land packages leased out for residential use were less than 10 each year (Figure 4) and the property price continued to rise while developers refrained from making applications.

The Application List System is considered as one of the prime drivers of property price escalation. From 2010, the Hong Kong government reverted to public tender and auction, along with the Application List System. The transaction numbers started to increase and have been maintained above 20 per year since 2012 (Figure 4). The reuse of public tender and public auction successfully re-energised residential land supply, with many medium and small sized developers joining the market. More recently, there has been a strong participation of developers from Mainland China.

Hong Kong Government Annual Land Disposal (Residential)
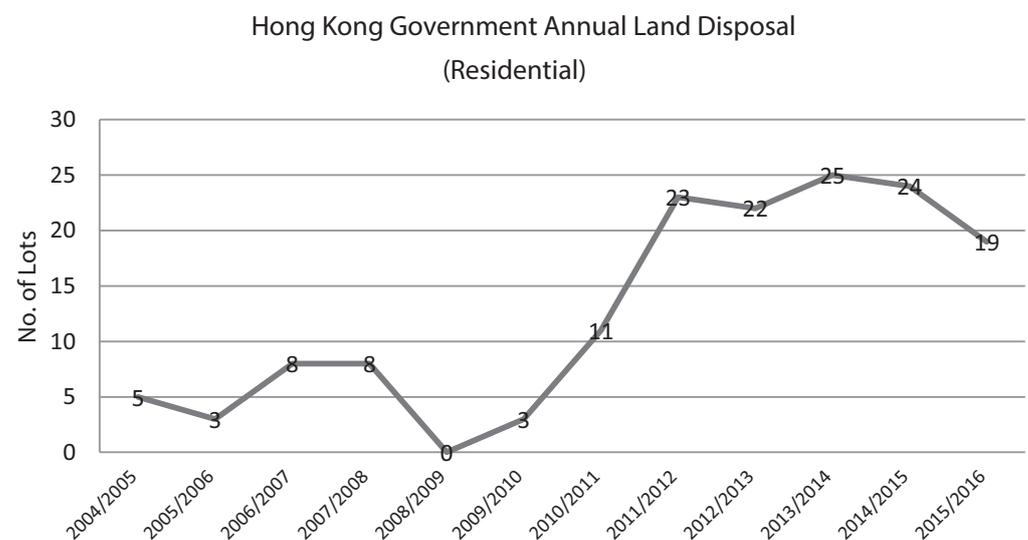

Figure 4   Hong Kong Government Annual Land Disposal (Residential)

The land sale mechanism by the Application List System was abolished in 2014. The government regularly provides land for sale to ensure supply for housing developments since 2014. The effect on the volume of land sales is quite apparent. In 2016, there were 17 lots sold for residential developers (Lands Department, 2016).

It is worth noting that from 2011 to 2013 when open public sale was restored, the land acquired by the "Big 5" developers has also gradually risen from 5% per year to 14% percent per year by area (Figure 4), thus reconfirming the active status of the "Big 5" in the NPRUM.

b) Land Bank

Strategic land purchase and selling of the built units at the right time, are crucial for property developers (Barlow, 1993). The investment on property development is irreversible, so that developers would assume greater risks if they cannot sell the units to realise profits (Titman, 1985). Land bank can serve as a buffer for developers against risk until they acquire enough information to decide an optimum time for development (Raymond, 1998). Major developers have acquired substantial land reserves and are identified as land banks in this study.

In Hong Kong, agricultural land is a major land bank source. With rapid urbanization, large areas of former farm land have been abandoned and lain idle for a long period. The "Big 5" have been acquiring substantial agricultural land from residents in the New Territories to build up their land reserves (Figure 5 refers). These lands could be used for future residential development through lease modification (Hui, 2004). Based on the Hong Kong Planning Standards and Guidelines, the maximum domestic plot ratio imposed in the case of lease modifications is 5 for R2 type and 3 for R3 type of residential development. Assuming the "Big 5" would convert their land bank of agricultural land for residential unit developments, the total GFA that could be provided will add up to over 90 million ft^2. When developers apply for conversion of land usage, they would have to pay an appropriate premium to be agreed with the government. Poon (2011) describes the process for rezoning land from agricultural to residential in Hong Kong as "simple". When developers negotiate with the government to determine the premium, there is no competition as there is in public tender or auction.
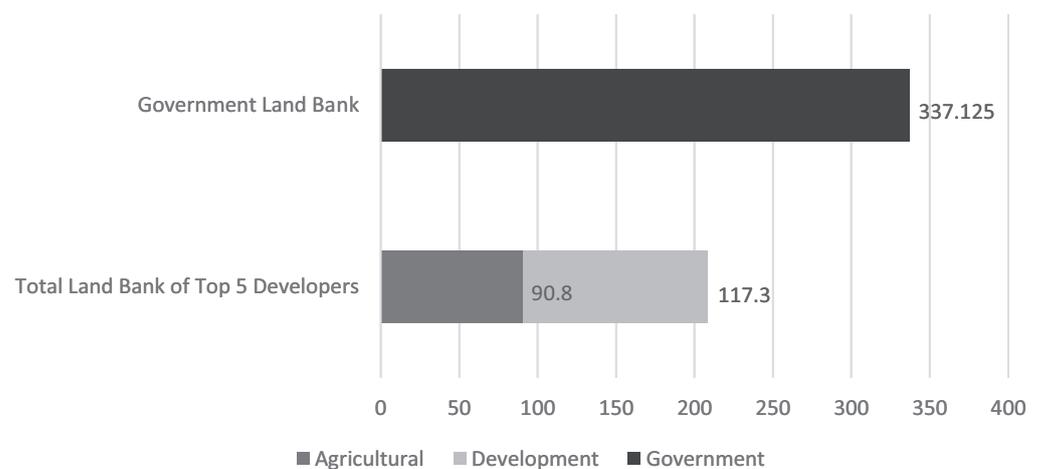

Figure 5   Land bank

The Hong Kong Development Bureau reported that the land reserved for residential use in Hong Kong was no more than 391.5 hectares, within which there are irregular-shaped lots that might not be suitable for residential development (Hong Kong SAR Development Bureau, 2013). These lands are in Hong Kong Island, Kowloon, and New Territories. Based on Hong Kong Planning Standards and Guidelines, the maximum domestic plot ratios range from 3 to 10. Optimistically assuming a plot ratio of 8 for all government land, it can provide 337 million ft² GFA. It can be seen from Figure 5 and Table 7 that the sum of land bank and agricultural land bank of the "Big 5" amounts to over 60% of the government's total.

Table 7   Government Land bank and Developer's Land Bank (as at June 2014)

	Land Bank (million ft²)	Agricultural Land Bank (million ft²)	Total Land Bank (million ft²)	Government Land Bank (million ft²)
Top 5 Developers	117.3	90.8	208.1	337.125

The absorption of land supply into land bank has not only raised the entry barrier to the NPRUM but also interferes with the operation of market. In early 2013, the Development Bureau reported that among 52 residential sites leased out from 2011 to 2013, there were only 6 projects granted consent to commence building works and others remaining undeveloped. The reply of the government highlighted that under the Building Covenant, residential developments are supposed to begin from 48 to 72 months from obtaining the lease, during which time they could prepare plans and submit applications for relevant approvals. However, it also mentioned that the Building Covenant period (BC period) can be extended if the property owners make applications and if such application could be justified by the Lands Department. It can be summarised that from both regulatory and structural aspects, the land sale system and land bank may have created barriers against potential entrants.

This study provides an application of the Second Conduct Rule by employing the concentration measures suggested in the HKCO GSCR to evaluate the market power of key players of the NPRUM. This study found that no single market player in that market has overwhelming power. Although the top 5 listed developers have a collective dominance, their respective shares are quite close. Nonetheless, up to the year 2015, the biggest five developers collectively held over 60% of the market share. The possibility that there has been, or will be, any misuse of dominant market power would be another interesting study.

LIMITATIONS

Firstly, the findings are to be read with the caveats that not all residential property developers are listed. Nonetheless, the most active developers of the NPRUM have been included in this study. Secondly, the plot ratios used for future land use are based on assumption that the agricultural land banks of the "Big 5" will be converted to residential use in the future. Thirdly, this study employs the two major indicators of market power suggested by the GCSR (Hong Kong Competition

Commission, 2015). Thus, CR and HHI should be read together with other indicators such as buyers' countervailing power and regulatory framework imposed. Specifically, this study highlighted the application list mechanism used in Hong Kong and the potential impact.

Conclusion

The new residential property price in Hong Kong has rocketed in the last decade and has been ranked within the top three metropolitan cities in the world. The rise after the 2008 global financial turmoil has been phenomenal and far beyond inflation. The concentration of this market had been suspected to be high, which raised the issue of competition. This study investigates this issue. The Guidelines of the Second Conduct Rule of the Hong Kong Competition Ordinance suggest the use of Concentration Ratio (CR) and Hirfindahl-Hirschman index (HHI) to evaluate the concentration level of a market. Accordingly, CR and HHI of the NPRM are calculated. The result suggests that the NPRM is quite concentrated. For the period from 2012 to 2015, the big five developers in Hong Kong collectively held a dominant position of the potential supply. It is further noted that the top three providers have very close market shares. As such there is no single monopoly. Regarding the commonly used thresholds, the NPRM in Hong Kong is considered moderately concentrated. In analysing barriers to entry, the land application system used in Hong Kong after the Asia financial turmoil in 2008 had limited the land supply, thus has indirectly lead to a concentrated market. Recently, to unleash the supply market, the Hong Kong Government has reactivated public land auctions to replace the land application mechanism. Lots of smaller lots are also being made available. With these, the supply of new private residential units is expected to rise. A lowering trend of concentration is noted from 2012 to 2015. Moreover, the substantial land banks of big listed developers, coupled with significant firm scale and sunk cost, will enable the big developers to continue to hold a collective dominant position.

Acknowledgements

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