What motivates the developer to sell before completion?

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December 2016

Abstract

Presale or selling before completion is a very common phenomenon in the housing market. However, not all developers presell their units and that the proportion of units presold varies over time and across projects. This study examines the factors that affect developer's decision to presell their units. Based on housing transaction records in more than one thousand projects in Hong Kong, we found that presale is used as a tool to hedge against future price fluctuation so as to reduce the risk (volatility) of the performance of the developer's real estate development portfolio. However, the effectiveness of presale as a future hedging strategy varies with the size of the development portfolio held by the companies and the companies with a larger development portfolio have higher tendency to presell. When the flexibility of presale is constrained, its effectiveness also declined and thus less incentive for the developer to presell. Another reason for the developer to presell is to exploit its information advantage over the potential buyers that cannot inspect the completed property. Contrary to industry wisdom, presale is not an important source of financing, at least not for listed developers. Developer's decision to presell is also not conditioned on the historical price trend which home buyers relied on. These results are robust across different model specifications.

Key words Developers · Presale · Hedging · Institutions · Risk.

JEL Classification D02 · D22 · D81 · R31

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Introduction

We investigate why developers presell and why presale and spot sale (or sale after completion) coexist in the marketplace. Presale refers to a developer selling a residential unit in a development prior to completion of the unit (or even before its construction). Developers and home buyers agree on the price at the date of presale but the underlying unit will only be transferred to the buyers at the date of completion. Presale contracts are attractive to both developers and home buyers. This is because for developers, they can mitigate the risk associated with future price uncertainty by securing the transaction prices with home buyers at an early stage. In some justifications, the revenue from presale can also be used to finance the development. By entering into a presale contract, home buyers can also benefit from future price fluctuations. Presale payment arrangements can also be used to overcome initial payment constraints. Short term speculators may also make use of the presale payment arrangements to create a highly geared option or forward contract with the expectation to resell the property for a profit before completions. Presale transactions also serve the function of price discovery in the spot market by revealing forward contract prices. The presale price and trading volume have also been used for forecasting future housing prices.

As a result of these advantages to both buyers and sellers, presale has been a popular tool for selling properties over the past several decades. The presale system in Hong Kong and Tai Wan were first introduced in 1950s and 1960s, respectively. Later, Shenzhen followed the same system and launched the first presold project in 1980, but only until 1994 was it formally adopted in Mainland China (Deng and Liu 2009). It is also the dominant property disposal strategy by developers in Singapore as showed in Ong (1997, 1999) and Hwang and Quigley (2009). Nevertheless, the functions of the presale system are not always appreciated, at least by the government. The presale market in Hong Kong has long been criticized as conducive to speculative activities since the high leverage and no transaction tax (stamp duties) for a presale transaction (before 1994) had attracted short term speculators into presale market (Chang and Ward 1993). The Hong Kong Government introduced a series of regulations like the Consent Scheme in 1961 and anti-speculation measures in 1994[2] (relaxed till the downturn of the property market in 1998) aiming to prevent such speculative activities and protect the interests of home buyers. However, without clear understanding toward the functions of this system, the well-intended Government intervention may cause negative implications on the market as a whole. For example, the study by Wong, Yiu, Tse, and Chau (2006) suggested that the anti-speculation measures increased volatility of housing prices.

Yet, even with decades of practice with the presale system in so many markets, it has not received much attention by academics. A literature search shows that the most frequently addressed issues relate to presale pricing and price discovery (Chang and Ward 1993; Wang, Zhou, Chan, and Chau 2000; Chau, Wong and Yiu 2003; Wong, Yiu, Tse, and Chau 2006; Fan, Ming, and Ong 2012). But if presale is an institutional arrangement that benefits both buyers and sellers, it should supersede other property disposal arrangements, including spot sale. Why not all developers presell their units? Why do both presale and spot sale co-exist? In reality, the developer's decision on the method of property disposal is not a straight dichromic decision between presale and spot sale but a choice on the continuum between presale and spot sale. This then raises another issue: why do the proportion of units presold vary over time and across projects? Only a very small part of the real option literature addresses the related issues theoretically under institution-free assumptions (Lai, Wang, and Zhou 2004; Chan, Fang, and Yang 2008; Edelstein, Peng,

[2] Details are given in the following section.

and Fang 2012). The problem is even more complicated if there are institutional constraints on developers' complete flexibility to presell.

In reality, institutions and regulatory constraints matter a great deal in the property market as they could severely limit the developer's flexibility to presell and deviates significantly from the institutional free assumption adopted in the previous theoretical analyses (Yao and Pretorius 2014). Unraveling institutional constraints for the purpose of easily modeling concerning a presale contract certainly will hamper the general diffusion of any proposed approach into the presale market. This may partly explain despite the burgeoning theoretical development in the academic literature, the presale practice in the real world has not obtained any useful guidance.

The purpose of this paper is to understand the presale system in a distinctive institutional setting with specific regulatory constraints. Mainly two objectives follow. The first is to examine the motivations for a developer to presell by identifying the set of factors that are critical for determining its presale decision (measured by the proportion of units presold). The second one is to demonstrate how institutions and regulations frame the presale flexibility, as opposed to unconstrained presale assumptions underlie many theoretical analyses, and how the presale flexibility affects a developer's presale decision. The result of this paper, on one hand, will shed light on the functions of the presale system subjected to a unique set of rules, and generate insights on the long co-existence for the housing spot and presale markets. On the other, it can provide important implications for policy makers to understand the effects of their policy on the presale system before the implementation, therefore avoiding or minimizing the unforeseen costs associated with their intervention.

The abundance of presales data in Hong Kong (as shown in *Table 1*) together with its unique institutions and regulation changes of the presale system allow us to fulfil the above two objectives. Hong Kong has been a pioneer in preselling properties, and the presale market is very active for multiple reasons. For one thing, home buyers are motivated to enter a presale agreement with a low entry fee due to the capital constraint caused by the spiraling increasing property price. The high leverage and lower transaction cost also make presale an attractive short-term investment tool. For another, developers can utilize the presale method as an alternative source of development finance due to the usually large development scale associated with high project costs, and hedge their production risk incurred by the volatile market. *Figure 1* shows the volatile property market of Hong Kong in recent decades. Without the presale system, for example, most developers in Hong Kong who started projects around 1997 would have encountered serious trouble in selling their projects by the time of completion.

[Insert *Table 1* and *Figure 1* here]

Although Hong Kong is known as a lassie-faire economy, the presale housing market suffers from heavy regulations. Property projects in Hong Kong are governed by the respective Consent Scheme and Non-consent Scheme. The Consent Scheme projects are subjected to regulatory constraints on the timing of launching presales, whereas the Non-consent Scheme ones are allowed with complete presale flexibility, typically as assumed in the theoretical literature. This difference is even enlarged during the period when the anti-speculation measures were imposed on the Consent Scheme projects to further hamper developers' flexibility to presell. Such institutional changes enable the comparison among presales confined to varying presale flexibility.

The main contribution of this paper is to provide an empirical test of the function of the presale system, mainly from the perspective of developers, subjected to institution and regulatory constraints. The

remainder of the paper is proceeded as follows. Due to the significance of the institution complexities involved in the presale system, we will describe in detail the Hong Kong presale system in the next section. Then, Section 3 will provide a brief review of the main literature concerning presales. A set of testable hypotheses are developed in Section 4, followed by empirical models incorporating the Hong Kong uniqueness in Section 5 to test these hypotheses. Empirical data is introduced in Section 6, with results presented in Section 7. The last section concludes the paper.

Hong Kong presale system

Transaction of uncompleted residential properties in Hong Kong was first recorded in 1954 in a housing estate of over a hundred blocks of 3-floor buildings (Leung, Hui, and Seabrooke 2007a). After decades of development, presale has become a dominating practice for new property transactions. By presale, developers can reduce their financing and inventory costs, discover the market value of properties, and hedge the project pipeline risk and risk associated with volatile market conditions. It is also appreciated by home buyers since they are required to give a much lower initial down payment to enter a presale transaction, as well as a lower barrier to exit due to the absence of provisions banning the resale of uncompleted units. Above all, this lasting dominance mainly results from a sound institutional guarantee for both builders and buyers evolved from decades.

To reduce the risk of default by the developer, two critical rules were introduced. First, the developer need to show proofs of its financial ability to complete the development such as the guarantee from banks or associated financial community. Before the instruction of this rule in the early 1960s, a number of developers collapsed before the projects were completed due to cash flow problems, and this had damaged the interests of home buyers in purchasing presale properties. The Consent Scheme was then introduced to regulate the presales. Consent to presale under this Scheme will be given to a developer if the Lands Department is satisfied with, among others, its financial arrangements and the stage of development reached[3]. The allowed presale period, the maximum presale time prior to building completion, is limited to certain length, which is also recognized as a measure to prevent speculative dealings on the buyers' side in undeveloped land. Second, unlike Mainland China, where the presale funds from buyers are transferred to developers all at once (Deng, and Liu, 2008), the funds paid by home buyers at the presale stage will be kept by a solicitor and released to the developer by progress. Still, a considerable amount of financing cost can be saved if the interest rate is high, but the interest of presale buyers is protected in a better way. Both the presale consents and the payment release by progress are taken as assurances for buyers to urge developers to complete the projects as specified in the contract.

The Consent Scheme only applies to buildings that are erected on land governed by a building covenant, however, and buildings not erected on land granted by the Government for development purposes are governed by the Non-consent Scheme instead. An example is one built on a piece of land obtained by a developer after the original building being demolished. Theoretically, no regulation is imposed on the presale system under this Non-consent Scheme though it is required that buyers are protected in a way similar to that offered by the Consent Scheme. Developers can freely choose the presale timing without

[3] Currently, consent can be given if the foundation works of the development have been completed and approval to commence construction works on the superstructure has been given.

the need to apply for consent from the Lands Department. Undoubtedly, developers with Non-consent Scheme projects are in a better position to optimize the presale benefits. The earlier they are able to presell their uncompleted units, the higher possible gains from this alternative source of development finance, as well as greater flexibility to cope with the future price uncertainty will be.

Other institutional means are also applied to protect the presale buyers. For example, to deter intentional delay on completion, home buyers are given the right to rescind the agreement or receive the interest loss on the payment made and other necessary expenses if no extension of the construction has been approved (Leung, et al. 2007). Besides, a one-year liability warranty is issued to deter building defects so that developers shall remedy any defects to the completed property in the first year. These protective measures perform quite well evidenced by the active presale market. This activeness, on the contrary, is criticized for being responsible for the jumping property price in the early 1990s since presale is deemed as conducive to speculative activities.

So presale rules were changed in mid-1994 when the government adopted anti-speculation measures aiming to rein in the spiraling increases of property prices and protect the interests of potential home buyers who are end users in Hong Kong (Lands Department 1999). Four policies that had important bearing on the functioning of the presale system were modified. First, the resale of uncompleted units bought through presale arrangements were prohibited before the Certificate of Compliance[4] or the consent-to-assign was given. Second, the permitted period of presale was further shortened from 24 months to no more than 9 months prior to the anticipated completion date. Third, the proportion of uncompleted flats for internal sales was reduced from 50% to 10%, which forces the developers to bear the risk of marketing completed units directly to the public. Finally, the initial deposit required upon signing the preliminary sale and purchase agreement was increased from not more than 5% to 10% of the purchase price and half of the deposit would be forfeited in the case of failure in signing the Agreement of Sale and Purchase. These changes were a significant disincentive to deter home buyers from adopting short-term investment strategies in the presale housing market as both the advantage of lower barrier to enter and to exit in the presale system are heavily restrained. Similar for developers, the effectiveness of the presales system as an alternative source of project financing and a risk hedging are substantially weakened due to the presale timing restriction.

These restrictions were only partly relaxed until the downturn of property market in late 1997. In May and September of 1998, the Lands Department made announcements to relax the permitted period of pre-sale from 9 months to no more than 15 months, reduce the initial deposit from 10% to 5%, suspense the sub-sales restriction on uncompleted flats, and increase the proportion of flats allocated for private internal sales by developers from 10% to 20%. Obviously, to reduce the opportunities for speculation between sale and assignment, the flexibility of the presale system is significantly dampened, with the presale period being reduced to 24 months before the completion date in the Consent Scheme, and further shortened to not more than 9 months during the intervention period. But it is worth noting that these anti-speculation measures were only applicable to projects under the Consent Scheme. In other words, Consent Scheme projects are further restrained in the flexibility to presell compared with Non-consent Scheme projects during the intervention period.

The default risk of home buyers is also minimized. Under the common law regime in Hong Kong, failure to perform the Agreement of Sale and Purchase constitutes a breach of contracts. The considerable default

[4] The Certificate of Compliance is issued when the development is completed and in compliance with all the positive obligations stipulated in the lease.

costs force buyers to comply with the presale contract by the time of delivery[5]. Hence, the presale contract can be recognized as a forward contract, once being signed it is implicitly assumed that a buyer will purchase the property when it is completed. There are a few exceptions, however. In Hong Kong, a small percentage of consumers buy a property in the form of a company, in most cases, a shell company without real assets. These company buyers are more likely to default at the price of giving up the already-paid funds in case of unexpectedly market falls. This is because the right of recourse in Hong Kong is only applicable to the company instead of the individuals inside it. Developers certainly bear a stronger default risk trading with company buyers. To deal with such increased risk, the usual way is to charge more for company buyers. Under this circumstance, the presale contracts can be treated as a real option given the option to default, but a higher price is charged for this added option.

To conclude, a well-developed presale system is observed in Hong Kong with both the interests of buyers and developers being well-protected. Characterized apart from other markets, the special institutional arrangements between the Consent Scheme and Non-consent Scheme and the changes in the presale rules in Hong Kong provide an excellent empirical arena to look into the critical factors motivating a developer to presell.

Literature

Only a sparse set of theoretical foundations are established to account for the presale contracts. Assuming risk-neutral market participants in the model by Chan, et al. (2008), both buyers and developers will be indifferent between a presale method and a spot sale method in an efficient market without financial constraints. However, when financing may not be available to developers at a reasonable cost, the presale system becomes superior to selling till completion for both developers and buyers. It can provide prepayment to mitigate developers' financing constraint on one hand while on the other home buyers can enjoy a lower selling price. Deng and Liu (2009) estimated a financing benefit of about 250 basis points for condominiums using presale contracts in Beijing, China. Several years later, Edelstein, et al. (2012) introduced risk-averse buyers with heterogeneous beliefs about the future real estate price distribution and derived similar conclusion from an equilibrium model. Besides the financing cost saving, they find the presale benefit is also a function of developers' belief about the future housing price, future real estate risk, the purchaser's heterogeneity, and the default probability of buyers and developers. It is noteworthy that they incorporate the default option of buyers as one of the factors that will affect developers' presale benefit, which makes the use of the real option and forward contract framework comparable when modelling a presale contract.

Edelstein, et al. (2012) emphasized the function of a presale to mitigate the real estate valuation risk for buyers and a presale premium is required by developers to compensate them for insuring the future price risk. Admitting that presale is mainly for risk-sharing purpose, Lai, et al. (2004) suggested the benefit is more for the developer's side in a real-option framework. They concluded that developers should optimally presell whenever they are allowed so that they can reduce the uncertainty of their revenue by agreeing a price for their products at the start of the production process. Presales provide an insurance for developers against future price uncertainty and home buyers on the other side of the transaction would

[5] Buyers are only allowed to default unless there are clear stipulations of allowing default in the presale contract they signed with developers.

expect a discount for buying a presale housing unit (Deng and Liu 2009). Chang and Ward (1993) also insisted a price discount as the risk premium for home buyers who have to take the risk that developers want to hedge away. Nevertheless, they observed a presale premium for developers instead in Taipei during the period 1988-1990 after taking the carrying costs such as depreciation into account. But it seems problematic to compare the presale prices with the average prices of all existing houses, which depreciate a lot.

In summary, at least two presale benefits for developers are identified though lacking of empirical evidence. First, developers produce dwelling units with sales price uncertainty and can utilize the presale system as a future hedging strategy. This risk-hedging function is also applicable to buyers. Second, the developer can access additional financing. However, these presale benefits are assumed to be appreciated equally among all developers, which obviously doesn't make sense. For example, the demand for this alternative financing among developers should vary with their financial situations. It would be better appreciated by a financially constrained developer. Only Lai, et al. (2004) provide an exception, and they claimed the importance of developers' reputation on the initiative to select presale contracts with high down payments. Moreover, the presale superiority should be subjected to the institutions of the underlying market (Wang and Zou 2003), which has almost been overlooked in the literature. The choice of presale can to a large extent be limited by the underlying legal regime, notably under what conditions a presale is allowed. If a presale is only allowed when the market remains flat, the risk-sharing function will play no role. This requires the consideration of the institutional factors related to the presale system when examining its practical function.

As a result, the investigation of the presale system from previous studies is insufficient. The theoretical results vary with their specific assumptions, whilst only a few empirical studies provide explanations for the existence of the presale system. As a pervasive practice for property sales, a comprehensive understanding of the function of the presale system becomes important in particular when the presale market is frequently criticized as being conducive to speculative activities. Therefore, it would be fruitful to test why an idiosyncratic developer, the main initiator of the presale system, presells subjected to varying institutional limitations. The empirical results should provide insights in improving the theoretical foundations and recommendations for the Government when they want to cool down the property market by suppressing the presale market.

Hypotheses

We start with the presale model by Chan, et al. (2008)—in an environment where developers can easily obtain access to capital, both developers and buyers should be indifferent between a presale and a spot sale. Developers will adjust the presale price to reflect the carrying cost, information cost, and other financial arrangements. This conclusion is reached based on four major assumptions: 1) no financial constraints for developers, 2) risk neutral developers and home buyers, 3) no institutional constraints, and 4) homogeneous developers and buyers. In fact, however, these assumptions are not applicable to most markets. The main proposition of this study is that the relaxation of these assumptions would make presale

practically a decision variable for developers. Following this proposition, five testable hypotheses are developed.

Financial constraint and presale

Developing a project is usually costly due to the time-consuming process and high production costs required. One benefit of presale is to help developers overcome their financial constraints caused by this high production cost in the long development period. Contrary to the assumption of no financial constraint, developers always have to finance their projects at a considerable cost, particularly in a tight capital market where it is expensive to borrow. They are motivated to employ the presale strategy because the prepayment from home buyers (at an early stage) can either be directly used as an alternative source supporting production, or help reduce the costs using debt financing by increasing their equity capital. Moreover, the cash infusion from the presale even allows a developer to increase its development size if permitted. The potential reduction in the marginal development cost of the project and the increase in project size make the presale method much preferred during the period with tight capital supply. In such period, borrowing costs, either from the bank or other financial communities, are very high as reflected by high interest rates of the time. In other words, developers' motivation to presell would be stronger when the real interest rate is high. This leads to our first hypothesis:

Hypothesis 1(H1) A developer has stronger incentive to presell when the real interest is high, *ceteris paribus*.

Real estate risk and presale

Usually, it will take developers one or two years to complete a residential development. This means they have to start construction only based on a projected future demand and bear the risk of future decline in demand. If the demand unexpectedly fell, a financially-constrained developer would suffer a big loss and be unable to repay the construction loans. The extreme case is to announce bankruptcy due to the default in the development loans. Given such bankruptcy risk, developers facing financial constraints should be more risk averse than buyers (Lai et al. 2004). Chan et al.'s study keeps the assumption of risk neutral developers when the assumption of no financial constraint is being relaxed, however. This is logically problematic since developers with financing constraints are subjected to the risk of bankruptcy. The assumption of risk averse for developers facing financial constraints is therefore more reasonable (Sandmo 1971).

These risk-averse developers can minimize their risk of bankruptcy by binding with home buyers through presale. They can reduce their exposure to the risk of future real estate price fluctuation by locking in the selling price at an early stage on one hand while on the other secure at least a portion of the sale proceeds of the property in case of unexpected market crash. A presale contract therefore must be of more value to a developer if the expected future property price becomes volatile. This leads to our second hypothesis:

Hypothesis 2 A developer has stronger incentive to presell when the uncertainty associated with future real estate prices increases, *ceteris paribus*.

Relaxing the homogeneous developer assumption, the idiosyncratic characteristics of developers as well can account for their propensity to presell. Without the presale system, developers suffer from the production risk, in particular when they take on a large-scale project relative to the value of their capital

base (Lai et al. 2004). It is possible that their development may be suspended or interrupted by insufficient fund, construction failure, building code enforcement, etc. When the size of the development is too large relative to its own capital, that is, very concentrated investment, the project specific risk (or production risk) will be considerably high. Thus, there exists the incentive for developers to reduce its capital constraint as soon as possible when holding very large projects. Presale is one way to be able to reduce their exposure to such production risk. This leads to our third hypothesis:

Hypothesis 3 A developer has stronger incentive to presell when the size of the development relative to its equity is high, *ceteris paribus*.

Presale flexibility

The presale system is consistently assumed to be free from institutional limitations. Lai, et al. (2004), for example, claimed that a presale is superior to selling upon completion at any time when a developer needs to make a decision. However, such superiority can only be realized if the developer has complete flexibility to choose presell parameters, i.e. there is no constraint on the developer's timing and quantity of presale. Given limited choice on when to presell and how much to presell, developers cannot fully appreciate its financial benefit and risk-hedging function. We use presale flexibility to represent the degree to which the developer can choose the presale parameters, and it can be limited by policies and regulations to different degrees. Once the flexibility to presell is constrained, its advantages will be weakened, making it a less attractive option for the developer. This leads to our fourth hypothesis:

Hypothesis 4 A developer with limited presale flexibility has less incentive to presell, c*eteris paribus*.

Information asymmetry and presale

In the study of Edelstein et al. (2012), by assuming heterogeneous home buyers, they observed that a higher level of buyer heterogeneity is associated with both a higher presale price and a larger presale transaction volume. Developers can charge a higher price for presale contracts by taking advantage of the divergent expectations among consumers. The possible explanation suggested for the consumption heterogeneity is the information asymmetry in the presale market.

At the presale stage, consumers have to rely on the sales brochures and promotion activities held by developers and they have no idea about the real quality of the unit they bought before completion. But after the presale contract has been entered, developers may have the incentive to lower the product quality to a level that does not constitute a breach of contract. This is a typical moral hazard problem, first identified by Ong and Gwin (1997) and Ong (2000) in the presale market. Though Chau, Wong, and Yiu (2007) have provided the evidence that the real estate market is able to capitalize developers' reputations into presale prices, the sample size of their empirical data limits the general application of their conclusion. It is therefore reasonable to argue that information asymmetry may cause stronger heterogeneity among buyers in terms of their beliefs about the quality of the completed property in the future, making it possible for the developer to charge a higher price during the presale stage. This leads to our last hypothesis:

Hypothesis 5 A developer has stronger incentive to presell when information asymmetry about the quality of the property is higher, c*eteris paribus*.

Empirical Tests

As demonstrated in the previous section, this study highlights the impact of financial constraints, real estate risk, information asymmetry, and presale flexibility on a developer's propensity to presell. The next goal is to empirically test how these factors contribute to a developer's presale decision. This presale decision is quantified by the presale scale in this study, calculated as the percentage of units presold by a developer in each project (*PRE*). *PRE* equals to 0 for projects without presales. Higher *PRE* is associated with stronger motivation to presell. Developers not only determine how many units to presell, but also when they would start the presale. Presell early doesn't equal to stronger presell motivation, however. It may simply be a result of choosing the right timing to mitigate the market risk using presale. So the length of the period between the dates of presale and completion is unable to interpret developers' presell motivation in this study.

Mainly two advantages of using *PRE* are appreciated. One is its continuity to capture developers' differing presale motivations, and another is a complete account of projects on the market with or without presales. Unlike the previous study focusing on the presale pricing confined to presale projects only, we rely on *PRE* to understand why sometimes a developer presells all, sometimes presells none, and sometimes presells only half. However, *PRE* may lead to an underestimation of developers' motivation to presell because some units might be listed as presale but failed to be sold before completion due to not-as-expected market conditions.[6] In the contrary, this presold percentage can better measure if the developer is really want to presell or simply listing in advance on the market to test the market reactions. Even if such underestimation may exist, it would be excluded by the inclusion of control variables on market conditions as explained later.

Before the introduction of our explanatory variables, it is essentially basic to estimate the time (T_D) when a developer makes the presale decision to generate the time-varying variables like real estate risk. The main principle to estimate T_D for each project is demonstrated in *Figure 2*. We first identify whether a project is a presale project or a spot sale project by comparing their transaction dates and dates of occupation. It will be classified as a presale project as long as one unit at least is sold before completion; otherwise, as a spot sale project. We assume developers start to sell once they decide to presell. It is then reasonable to use the earliest transaction date of a presale project (T_{DP}) as its presale decision time. At T_{DP}, by referring to its financial situation and expectation toward future price movement based on the historical market conditions and regulation signals, a developer decides to presell to maximize its profits. But for spot sale projects, at any time during the allowed presale period (ΔTP), developers make the decision not to sell before completion. For the purpose of an empirical test, the decision time (T_{DS}) for a spot sale project is modeled as 9 months[7] before the dates of occupation permit. Our research question then becomes why some developers make the decision of presale at T_{DP}, while others decide not to presell at T_{DS}. We do robustness check by varying T_{DS} in the last second section.

[Insert *Figure 2* here]

[6] Thanks for Prof. Liu for making this comments.

[7] This is jointly determined by the maximum allowed presale period for Consent Scheme projects and the average presale period for all projects in our sample.

With T_D, a complete list of variables is developed, with descriptions listed in *Table 2*. We classify them into variables related to market characteristics, developer characteristics, property characteristics, and policies. This can provide a comprehensive understanding toward why a property is presold. Six models are built to test our hypotheses. Eq. (1) (as shown below) is a baseline mode including the whole sample while Eq. (2) and (3) only includes projects developed by listed companies and unlisted companies, respectively. Based on Eq. (2), two more variables *DER* and *PROR* that are only available for listed companies are included, modeled as Eq. (4). Then, the listed-developer sample is further divided as Consent Scheme projects and Non-consent Scheme projects and Eq. (4) is repeated (without *CONS*) in Eq. (5) and (6) using the two respective subsamples. More specific explanations concerning the above equations are provided as follows.

$$PRE = \beta_0 + \beta_1 RIR + \beta_2 VOL + \beta_3 I94\_98 + \beta_4 MSH + \beta_5 CONS + \beta_6 SIZE + \beta_7 LVA + \beta_8 ASFA + \beta_9 BDP + \beta_{10} ADP + \varepsilon \quad (1)$$

[Insert *Table 2* here]

Financial constraint and presale

Presale can function as a viable source of development finance for developers in Hong Kong (Renaud 1997). The funds of purchasing price paid by buyers at the presale stage are put into an escrow account and allocated to the developer gradually according to the construction progress. During the process of presale, developers usually can obtain a considerable amount of prepayment, in particular for large-scale developments, to pay back either their construction loans or land loans if necessary. The conventional way of obtaining working capital for development is to construct loans with properties as collateral, while listed developers can also obtain equity capital from the stock market. Other forms of financial participation in property developments in Hong Kong are almost absent, which drives up a developer's financing cost. This makes the financial benefits from presale better appreciated in particular when its borrowing costs are high. Such importance of financial benefits of presale can account for the much lower percentage of presales in the property market of the U.S., where there is very developed financial system for property companies to raise funds for their developments.

The best measure of the cost to borrow is the real interest rate for developers to borrow for each project, but data deficiency leads us to two alternative proxies: the real interest rate of the market (*RIR*) and developers' debt-to-equity ratio (*DER*). *RIR* measures financing cost variation due to market changes while *DER* indicates developers' differing financial constraints. *RIR* is calculated as the 12-month Hong Kong Interbank Offered rate minus inflation rate 1 month before T_D, and the inflation rate is derived from the Hong Kong Consumer Price Index. Higher *RIR* implies that borrowing from banks is expensive and the function of the presale system to reduce their financing cost will be better appreciated. This will lead to a higher *PRE*, that is, $\beta_1 > 0$ (*H1*). Compared with the unlisted, listed developers have alternative financing source from the stock market. It is very likely that they would suffer from less financial pressure when involved in large-scale development in Hong Kong. We therefore divide the whole sample into two: projects by listed developers and unlisted developers, and repeat Eq. (1) using the two subsamples in Eq. (2) and (3), respectively. It aims to figure out the possible difference in their sensitivity to *RIR*.

We further include *DER* to test the impact of developers' varying financial strength on their presale decisions. It is calculated as the ratio of the book value of debt to market value of equity. Unfortunately, the use of *DER* is only applicable to projects developed by listed companies due to the difficulty in obtaining accounting information of those private firms. Hence, it is only included in Eq. (4) for listed-developer projects. Likewise, developers with higher *DER* are thought with higher borrowing costs from financial communities. In this situation, they'll presell more to reduce their financing costs. This leads to the prediction that $\beta_{11}>0$ in Eq. (4) (*H1*) as follows:

$$PRE = \beta_0 + \beta_1 RIR + \beta_2 VOL + \beta_3 I94\_98 + \beta_4 MSH + \beta_5 CONS + \beta_6 SIZE + \beta_7 ASFA + \beta_8 LVA + \beta_9 BDP + \beta_{10} ADP + \beta_{11} DER + \beta_{12} PROR + \varepsilon \quad (4)$$

Real estate risk and presale

Developers produce properties with sales price uncertainty and can utilize the presale method as a risk hedging strategy. This is a practical concern in Hong Kong where the property price has undergone radical changes in recent decades (as showed in *Figure 1*). To describe such risk, we follow the commonly used method to compute the simple variance of the monthly percentage change in property prices over the previous two years of T_D (Bulan, Mayer, and Somerville 2009). Should a developer be unable to forecast house prices, current observed volatility should be the best measure of future price uncertainty (Cunningham 2006). All else equal, a higher return volatility (*VOL*) implies stronger future price uncertainty, more presales to be expected. It is therefore predicted that $\beta_2>0$ *(H2)*. But compared with the historical price movement in the spot market, a better indicator of the future price fluctuation should be the recent presale prices. Suggested by the price discovery function, the presale market with stronger liquidity should move faster, and the presale price should lead the spot price upwards and downwards (Chang and Ward 1993; Chau et al 2003). This is because the presale market is dominated by developers and liquidity providers while the spot market consists mainly of end-buyers. The traders in the spot market primarily form their expectations about future property prices based on information from the presale market.

However, the price discovery function of presale is seriously impaired during the anti-speculation period from 1994-1998. The original aim was to curb the spiraling property price, but the ban on resale of presold units and increased transaction costs for presale considerably obstructed the channel to get price information from presale traders, thereby hindering the price discovery function. Unexpectedly, this regulation provides an ideal indicator of future price volatility changes. The "close" of the presale market will alert developers that the future spot market price will be more volatile due to the blocked price discovery function of the presale market, whilst its "reopen" means this function to be recovered and less volatility is expected. Wong, et al (2006) provided the evidence that after controlling other possible coincided events, like Asian financial crisis in 1997, the price volatility of spot market increased significantly during the intervention period, but decreased again after the partly relaxation of these measures in 1998. As a prompt response, developers should carry out more presales to reduce their exposure to such risk during the intervention period and reduce the amount once the intervention relaxed. Therefore, we create a dummy, *I94_98*, representing the intervention period from 1994 to 1998, to capture this anticipated volatility increase. Other things being constant, more presales should be expected during

this period, that is, $\beta_3 > 0$ (*H2*). A combination of *VOL* (backward looking) and *I94_98* (forward looking) would be able to capture most of the future price uncertainty.

Utilizing the presale method, developers can further hedge between presale price and land price. Specifically, they trade profits with certainty by presale, and the potential loss from early transactions can be offset by a lower land price traded at the presale stage. This is feasible in Hong Kong for two reasons. First, land price and property price move in the same direction. Mainly two ways are available to obtain the scarce land resource (from the government) in Hong Kong, one is through public auction held by the Government, and another is land conversion, which means to convert the use of undeveloped land a developer owned and obtain changed development rights (Yao and Pretorius 2014). The fee for land use change is known as the land conversion premium. Both the land conversion premium and land price through public auction depends on, among other things, the state of the market when such conversion or auction is negotiated. Second, land price has become the main contributor to the high property price whereas construction cost is rather stable and accounts for much less of the property value (Wong, Yiu, and Chau 2012).

Yet, the effectiveness of presale to hedge future price risk by land price will vary with the size of the development portfolio held by the developer. If with a big portfolio, normally they have continuous demand for developable land, and will maintain sustainable access to land source. Such sustainable land access is very critical to use land price as a hedge. Otherwise, the difficulty to obtain land source in Hong Kong will discourage the use of this hedge. It is thus expected that companies with a larger development portfolio have higher tendency to presell since they can further hedge the future real estate price risk by land price at the presale stage. This leads to a further prediction:

Hypothesis 2.1 A developer with a larger development portfolio has stronger incentive to presell, *ceteris paribus*.

The development portfolio is measured by a developer' market share (*MSH*[8]). Developers with a higher *MSH* tend to have stable access to land, therefore associated with stronger ability to hedge between presale price and land price. More presales would take place under this circumstance. $\beta_4 > 0$ is expected (*H2.1*). Large market share doesn't necessarily mean heavy financial burden, at least for developers in Hong Kong who are financially sound. For example, Sun Hung Kai Properties and Cheung Kong (Holdings) are two leading property companies in Hong Kong who usually construct several projects parallelly. But this could not be regarded as a financial burden for them at all considering their conservative low debt-to-equity ratios[9].

Developers can also hedge their production risk by presale. The presale method is superior to selling after completion when a developer is vulnerable to idiosyncratic production problem or failure (Lai et al. 2004). This is of concern since Hong Kong is characterized apart from other real estate economies with its high-rise scale-intensive projects with capital-intensive supply processes, which is mainly caused by the limited land supply (Renaud et al. 1997). The high project costs involved in a development with hundreds of or even thousands of units contribute to higher production risk borne by developers in a volatile property market. Such production risk (*PROR*) can be indicated by the relative value of the development size to developers' capital value at that time. Size is the number of units in each project, while capital value is

[8] It is common practice for developers to jointly develop a project. In this case, the development size is distributed among the developers by their interests to calculate their market share. For development with more than one developer, MSH equals to that of the developer with the highest interest in the development. If there are more than one developer with equal interest, MSH is calculated as a weighted average market share of developers with equaling interest in that development.

[9] By reference to Bloomberg.

measured by developers' market capitalization. They are more likely to presell with higher *PROR*. Like *DER*, the use of this ratio only applies to developments by listed developers. For unlisted developers, it is difficult to model their company value due to data limitation. *PROR* is thus included in Eq. (4) and $\beta_{12} > 0$ is expected (*H3*).

Presale flexibility and presale

The effectiveness of presale also varies with the associated presale flexibility. We take advantage of the flexibility variation brought with the introduction of the Consent Scheme in the Hong Kong property market to account for its impact on developers' presale decision. Comparing the two schemes in Hong Kong, developments under the Non-consent Scheme are allowed for more choices in preselling, whereas the Consent Scheme projects are subjected to heavy regulation, among other things, the limitation of the maximum presale period and the time-consuming application process. The allowed presale period is confined within two years prior to the anticipated date of completion before June 1994, then further shortened into no more than nine months during the intervention period, and changed back to no more than fifteen months after September 1998. And even worse, the presale consent has to be approved by the Lands Department. The waiting time varies a lot and it will last very long if there are too many applications accumulated at the same time. In the extreme case, developers didn't obtain their presale consents from the Lands Department until completion.

Given less presale flexibility over the whole time period, the usefulness of the presale system will be considerably weakened for those Consent Scheme projects, thus less incentive for the developer to presell. We include a Consent Scheme project dummy (*CONS*) to test this impact. Other things being equal, less presales should be observed in the *CONS* group, that is $\beta_5 < 0$ (*H4*). When the flexibility of presale, in particular the flexibility to choose the presale timing, is constrained, developers are unable to timely response to risk changes at the presale stage. In this situation, the effectiveness of presale as a risk hedging will certainly decline. Then it is reasonable to derive a sub-hypothesis that:

Hypothesis 4.1 A developer's presale decision should be less sensitive to increases in real estate risk if with limited presale flexibility in timing, *ceteris paribus*.

We test it by further splitting the listed-developer sample into two: Consent Scheme group and Non-consent Scheme group. Eq. (4) is repeated by using the two subsamples respectively. Given less flexibility in presale timing, we expect weaker positive signs for the variables indicating real estate risk varying with time (*VOL* and *I94_98)* in Eq. (5) for Consent Scheme projects than in Eq. (6) for Non-consent Scheme projects.

Information asymmetry and presale

The last motivation for a developer to presell we consider is to exploit its information advantage over potential buyers when projects are not completed. Though there are measures to deter building defects upon completion, but feature mismatch is still a practical concern in the presale market of Hong Kong. Many developments haven been disguised as luxury estates in their show flats or sales brochures, but turn out to be no difference from the ordinary ones without the necessary up-market decoration inside and outside, nor the luxurious recreational facilities described in the brochures (Leung et al. 2007a). But developers are required to be liable of any defects related to the building structure within one-year after the new property is purchased. So feature mismatch is more likely to be found with recreational facilities

because of the difficulty to identify the quality before completion and the lack of developers' guarantee. Leung (2010) provided the evidence that developers are able to earn a premium by selling uncompleted units with more recreational facilities. We use development size (*SIZE*) to represent the possible mismatch resulting from information asymmetry associated with recreational facilities. Large-scale developments are always tied with amounts of recreational facilities, like club house, swimming pool, outdoor garden, etc., to support their advertisement of luxury, and are more likely to have feature mismatch. Developers' incentive to presell ought to increase with *SIZE*. It is thus predicted that $\beta_6 > 0$ *(H5).*

Control

Our controls mainly focus on the demand side of the transaction to exclude any possible impact of consumers' varying demand on *PRE*. The first one concerns about the financial strength of home buyers. Presale also helps relieving the financial pressure of home buyers because they can purchase a presale unit only paying a small amount of initial deposit. However, this benefit would be less appreciated if the home buyer is financially sound. We use the average saleable floor area of flats in each development (*ASFA*) as a proxy of buyers' financial strength. Buyers of large-size flats are more likely to be investors who are less suffering from financial constraint (Li and Chau 2017). They would have less demand for presale, contributing to a lower *PRE*. But home buyers with small-size flats would be in stronger demand for presale to alleviate their financial pressure and a higher *PRE* would result. Therefore, a negative *ASFA* is expected.

As proposed by Wong, Yiu, and Chau (2012), the housing quality is not fully asymmetric as information about land attributes are much more transparent than building structures. The latent problems in the building structure can only be discovered after a period of possession, whereas accessibility, views and location can be easily identified through a site inspection or even through a map. This also applies to the presale market where home buyers cannot observe the quality of the building structure they are going to purchase before completion. Though given the one-year defect guarantee, home buyers would prefer properties with a higher contribution of land value to reduce the risk of feature mismatch. Restricted by data availability, the coefficients of the districts from a hedonic model including all the transactions in the private residential property market are used as a rough measure of the land valuation (*LVA*) (See Appendix A). We assume similar construction cost for developments in different districts. Higher *LVA* indicates less information asymmetry, thus attracting more home buyers in the presale market.

Home buyers would be willing to buy an uncompleted unit in the presale market during periods with climbing property price. Being risk averse, they are afraid that the property price will keep rising so that they are unable to afford the same property when it is completed in the future using planned budget (Lai, et al. 2004). Leung, Hui, and Seabrooke (2007b) provide the evidence using the Hong Kong presales data that consumers pay a premium for uncompleted units when the spot market was in a boom. However, on the other side of the transaction, developers would have less incentive to sell in the presale market if the expected spot price at the end of the contract period increases (Chang and Ward 1993). Interestingly, in cases of anticipated price appreciation in the near future, developers and home buyers would have opposite demands for presale. We include the recent historical price change in the housing market, which is the easiest channel as reference for future price predictions, as control. It is calculated as the yearly price change in the spot market over the previous two years of T_D (*BDP*). The empirical result will tell us the dominating side.

Normally a consumer has three options to buy a property: a current spot unit, a current presale unit, and a future completed unit. They make the final choice by comparing the benefits from all three. When deciding

whether to buy a presale unit or not, they need to compare not only with the future hypothetical price of buying a completed unit, but with the current spot price. Unfortunately, this is almost overlooked in the literature except for Lai et al. (2004) and Leung et al. (2007). They argue that the profit of a presale contract is an increasing function of the current spot market price. When a developer launches presales in the market with a listing price, the presale units tend to be more attractive to home buyers than the spot units if the spot market price is increasing. As *PRE* measures the presale scale during a period, it is therefore necessary to exclude the influence of consumer demand changes caused by the relative difference between the presale price and the current spot market price. We add the ratio of the price index at T_{OP} to that at T_{DP} (*ADP*) as another control, indicating the price change in the spot market during the presale period for presale projects. But for spot sale projects, *ADP* is assumed equaling to 1 since *ADP* should exert no effect on their zero presale amount. A positive *ADP* is expected.

Hong Kong Data

Our data are drawn from projects developed from 1995[10] to 2015 in Hong Kong. Using the transaction records provided by EPRC Ltd, the sample includes 1,104 private residential developments. More than half of them are partly or completely sold through the presale method. The project information is collected from the monthly reports issued by the Building Department, developer information mainly comes from their annual reports and the Lands Department, and the market related information are obtained from Rating and Valuation Department. We also use the Bloomberg Financial Database to generate the accounting variables.

Table 3 shows the summary statistics: the full sample and sub-samples stratified by developers in Panel A and sub-samples stratified by the (Consent/Non-consent) Scheme in Panel B. In the full sample, the average residential building has a scale of 307 units, is 946 square feet large by flat, and developed on land with 12.4% less value compared to Aberdeen by a developer occupying 6.3% of the market share. Half of them are under the Consent Scheme. Their average presale scale is 37%, with 48% of listed-developer projects and 27.6% of unlisted-developer projects presold. Based on the summary statistics of the sub-samples, it is clear that the average listed-developer project is substantially different from the average unlisted-developer project. The average listed-developer project has considerably larger development scale and saleable floor area for flat, but developed on less expensive land. This matches with their financial strength because the high project cost involved requires the access to large capitals (Renaud et al. 1997). Such large pieces of developable land are only available in less-developed districts with lower land value. This also leads to a much higher percentage of listed-developer projects under the Consent Scheme because Consent Scheme projects are more likely to be developed on new land, that is, less-developed districts. The average market share in the listed-developer sample is 13.5% compared to a

[10] This is determined by data availability. Online property transaction records only start after 1990. This means if we include all the projects in the records, it is difficult to tell whether a unit is presold or not in the early years. So we only use the projects after 1995 (1995 included) and minimize the possible mistakes to overlook the presale transactions.

negligible 0.1% in the unlisted-developer sample[11]. Listed developers tend to possess most of the residential buildings and occupy considerably higher market shares.

[Insert *Table 3* here]

We further divide the listed developer sample into projects under the Consent Scheme and Non-consent Scheme, and summary statistics are presented in Panel B[12]. Similarly, significant differences are found between the two Schemes. Most Non-consent Scheme projects are smaller in development scale due to limited land resource in developed area though their average saleable floor area for flats is higher. They are mainly built on a piece of land obtained by the developer after demolishing the old buildings that were on the land. Such land is always located at the already-developed district like Hong Kong Island where the land price is extremely high due to scarcity. So we also observe a higher average land valuation for Non-consent Scheme projects. Moreover, developers with Consent Scheme projects occupy a higher market share since they are stronger in undertaking large-scale developments.

So either to compare the sensitivity to interest rate changes between the listed-developer and unlisted-developer sample or the reaction to volatility changes between the Consent and Non-consent Scheme projects, we need to deal with the problem of selection bias. The principle is to limit the influence from observations that are dissimilar between the listed-developer and unlisted-developer sample, and between the listed-developer Consent Scheme and Non-consent Scheme sample. We utilize a propensity-score matching procedure to fulfil this and the comparison is made between the matched samples. Each listed-developer project is matched with the most similar unlisted developer project, and each listed-developer Consent Scheme project is matched with the most similar listed-developer Non-consent Scheme project in terms of relevant variables. The Probit model (as specified in Eq.(7) and (8)) is applied to measure the probability that a unlisted-developer project is a listed-developer project, and a (listed-developer) Consent Scheme project is a (listed-developer) Non-consent Scheme project, respectively.

$$\Pr\{LIS = 1\} = \Phi\{\gamma_0 + \gamma_1 RIR + \gamma_2 VOL + \gamma_3 I94\_98 + \gamma_4 MSH + \gamma_5 CONS + \gamma_6 SIZE + \gamma_7 ASFA + \gamma_8 LVA + \gamma_9 BDP + \gamma_{10} ADP\} \quad (7)$$

We treat the listed-developer group as the treatment group compared with the unlisted-developer group. The first binary dependent variable is *LIS*, equaling to 1 if the project is developed by a listed developer and 0 if by an unlisted developer. The independent variables include all shown in Eq. (1).

$$\Pr\{NCONS = 1\} = \Phi\{\alpha_0 + \alpha_1 RIR + \alpha_2 VOL + \alpha_3 I94\_98 + \alpha_4 MSH + \alpha_5 SIZE + \alpha_6 ASFA + \alpha_7 LVA + \alpha_8 BDP + \alpha_9 ADP + \alpha_{10} DER + \alpha_{11} PROR\} \quad (8)$$

The second binary dependent variable is *NCONS*, taking on a value of 1 if the development is under the Non-consent Scheme and 0 if under the Consent Scheme. This is determined because there are fewer

[11] *MSH* for unlisted developers might be underestimated. This is because the developer information is not available for all projects in Hong Kong. The small part of projects without developer information are assumed to be developed by unlisted small developers with a very low market share.

[12] The reason that we are not comparing the Consent and Non-consent Scheme projects within the full sample is because we try to include *DER* and *PROR* which are unavailable in the full sample. A complete consideration of our variables limits our sample to listed-developer projects only.

observations of Non-consent scheme projects in the listed-developer sample. The independent variables include all shown except for *CONS* in Eq. (4).

Results from the two Probit estimations are demonstrated in *Table 4*. Panel A shows that listed-developer projects are significantly more likely to be developed on expensive land under the Consent Scheme by developers with higher market share. In Panel B, Non-consent Scheme projects are significantly more likely to be developed by developers with lower market share on more valuable land. Both their development scale and flat size are smaller than those under the Consent Scheme. By reference to the marginal effect, the strongest influence on property selection by developer is from developer's market share, whilst that on property selection by Scheme is from land valuation. Propensity score is calculated based on the Probit results and then used to match each listed-developer project with the nearest-neighbor propensity score matched unlisted-developer project, and each (listed-developer) Non-consent Scheme project with the nearest-neighbor propensity score matched (listed-developer) Consent Scheme project. The matching procedure is performed with replacement. After match, we have even observations (in total 1,028 observations) of listed-developer and unlisted-developer projects from the full sample and also, even observations (in total 314 observations) of Consent Scheme and Non-consent Scheme projects from the listed-developer sample. Summary statistics for the propensity-score matched samples are presented in the last column of *Table 3*. Evidently, the differences between the listed-developer and unlisted-developer projects, and between the Consent Scheme and Non-consent Scheme projects have been reduced as a result of the matching procedure. Having addressed the selection bias, we can perform our comparisons using the matched samples.

[Insert *Table 4* here]

Besides the results presented in *Table 4*, we also compare the presale period (*PRE_OPD*) for each presale project to demonstrate the difference between Consent and Non-consent Scheme. It is calculated as the difference between the date of its first presale and date of occupation permit. Due to the regulation limitation on their presale flexibility, Consent Scheme projects should have a lower *PRE_OPD*. Our full sample data shows the average *PRE_OPD* for presale projects under the Consent Scheme is only 8.78 months, while that under the Non-consent Scheme is 13.19 months. Without restriction, developers with Non-consent projects can take better use of the presale method by choosing the timing to presell. Since the presale flexibility of Consent Scheme projects is further weakened during the intervention period from 1994 to 1998, an even lower *PRE_OPD* should be observed. We do find two months shorter an average *PRE_OPD* for Consent Scheme projects in this period. Therefore, as a result of the restrictions on the presale timing, Consent Scheme projects are presold much closer to their completion dates.

Before carrying out the econometric tests, we first examine the correlation among our major variables. *Table 5* shows the pair-wise correlations in our two baseline models. The lower triangle is for Eq. (1) and the upper one for Eq. (4). Generally, correlations among independent variables were low. With the exception of the correlation between *RIR* and *BDP*, which will be tackled in the next section, multi-collinearity should not be a concern.

[Insert *Table 5* here]

Results

We start by testing the effect of the financing cost saving on a developer's presale decision. *Table 6* presents the OLS regression results. From Eq. (1) and (3) before match in Panel A, *RIR* is positively correlated with *PRE*, whilst the correlation turns as insignificant in Eq. (2) using the listed-developer sample. Having addressed the issue of selection bias via the propensity-score matching procedure, we are able to compare the results from Eq. (2) and (3) in the post-match column. The results of all three equations remain quite stable after match. The last column is the difference test and expectedly, we found a significantly lower *RIR* for listed developers under the column of df. while other variables remain almost the same except for *SIZE* and *ASFA* which might be caused by their mean value differences even after match. But the correlation matrix in *Table 5* shows that *RIR* is highly correlated with *BDP*, so we further compare the difference of *RIR* by excluding this *BDP*, and the result is presented under the column of df.'. The difference becomes even significant, excluding the possible bias resulting from multi-collinearity. Besides, *DER* for listed developers in Eq. (4) as shown in Panel B is found to be insignificant, with the coefficients of the rest variables being consistent with those in Eq. (2).

Seemingly, this is inconsistent with the prediction of significantly positive signs for *RIR* and *DER* from the financial constraint hypothesis, which states that higher borrowing cost will motivate more presales. But the result suggests that the financing cost is only a concern for private small developers rather than for those listed developers. In other words, the presale method is not mainly used as an alternative source of financing in Hong Kong, at least for listed developers occupying significant market shares. This difference becomes reasonable in the case of Hong Kong. It is widely known that the Hong Kong property market is dominated by super-large and vertically integrated corporations due to high projects costs and the limited land supply. These leading developers either have excellent business relationships with the financial community for easier access to working capital or maintain very conservative financial structures and generally seem to be cash-rich (Renaud et al. 1997). The alternative source of financing through preselling is therefore not appreciated by them.

Regressions of price risk variables on *PRE* find strong support from almost all equations for the claim that the presale method is utilized as a risk hedging. Property developments are more likely to be presold in the case of higher *VOL*. A higher volatility of the historical price movements lead developers to expectations of a higher future real estate risk. It then encourages them to employ the presale method to mitigate the increased valuation risk. We also observe a higher *PRE* during the intervention period between 1994 and 1998. We argue it is because the imposition of anti-speculation measures raised developers' concern about future real estate price fluctuation, and inspired them to presell more. The property market of Hong Kong has suffered from strict Government regulations for a long time. Developers are vigilant to any news of implementing new regulations that may exert possible impacts on the property market. Our results suggest that they are ready to make corresponding adjustments to reduce their exposure to any increased risk resulting from regulation changes.

Results related to the effects of developers' real estate portfolio on their presale decision are also consistent with our predictions. *PRE* is found to increase with *MSH* in all equations except for Eq. (3). The insignificance in Eq. (3) might result from their much lower *MSH* with insufficient variation for unlisted developers. Normally, a developer can hedge the future real estate price risk by entering a presale agreement and sharing the risk with buyers. But those with a big development portfolio, that is, a higher market share, can further hedge the presale price by simultaneously trading at the land market. This is

because developers with a greater market share tend to have continuous access to developable land, and this makes it possible for them to hedge the presale price with land price, indirectly mitigating the future real estate risk. The impact of the last real estate risk, production risk, on *PRE* obtains support from our regressions as well. *PROR* represents how much production risk borne by developers, and it is only calculated for projects developed by listed developers. Higher *PROR* implies a stronger need for the presale method as a hedge tool, and more presales are expected. As it turns out, *PROR* is positively correlated to *PRE* in Eq. (4).

Besides the size of the development portfolio, presale flexibility is another factor that can contribute to varying effectiveness of utilizing the presale method as a hedge. Flexibility in choosing the time to presell is the guarantee to counteract the negative impact from the increased future price fluctuation. As expected, a lower *PRE* for the Consent Scheme group which is allowed with weaker flexibility to presell is observed in all equations. We further examine the flexibility influence by splitting the sample into Consent and Non-consent Scheme groups and run them in Eq. (5) and (6), respectively. Both the pre-match and post-match columns in Panel B demonstrate that *VOL* and *I94_98* are insignificant in Eq. (5) for Consent Scheme projects but being significantly positive in Eq. (6) for Non-consent Scheme projects. The last column in Panel B presents the difference of coefficients between the two equations after match. We find weaker positive coefficients for *VOL* and *I94_98* for the Consent Scheme group, though at a week significance level for *VOL*. This can be explained by its restricted flexibility to presell. Given the freedom to choose the presale timing, developers with Non-consent projects are more capable of responding to risk changes by preselling than those with Consent projects.

Developers should be motivated to presell more since they can exploit its information advantage over potential buyers when projects are not completed. Our result shows *PRE* consistently increases with *SIZE* and confirms our prediction. The rest is about our control variables. If the saleable floor area for flats is larger, a lower *PRE* is obtained. This negative correlation supports our argument that financially sound consumers are in less demand for presales. *LVA* increases with *PRE* suggesting a stronger demand from consumers for presale in more developed districts in Hong Kong. Interesting results are obtained concerning the impact of the spot market movement. The historical price movement exerts significantly positive impact on a developer's presale decision. Developers' decision to presell seems to be not conditioned on its own expectation about future price increase but on consumers' instead. An alternative explanation is that developers are better at predicting the future market trend than consumers. We find that this recent historical price trend is very weakly related to the future real price change, suggesting that home buyers tend to be misguided by the historical data while developers make wiser decisions based on it. Last, a significant and positive impact of *ADP*, which indicates the current spot price change from T_D to T_{OP}, is observed. It demonstrates that more units will be presold if the consumers perceive a more favorable price from buying a presale unit compared with buying a spot unit in the current market.

In conclusion, our empirical results suggest that the presale scale is mainly a function of future real estate price risk and production risk. The risk hedging function is stronger for projects under the Non-consent Scheme due to its greater presale flexibility. Financing cost saving by presale is only concerned by unlisted developers, however. The presale motivation from taking advantage of the information asymmetry borne by consumers also obtains some evidence.

[Insert *Table 6* here]

Robustness

The first robustness check is by varying T_{DS}, the decision time for spot sale projects. Since at any time point during the allowed presale period (ΔTP as showed in *Figure 3*), developers make the decision not to presell, the results should remain the same when changing T_{DS} within ΔTP. We replace T_{DS} with T_{DS}' and T_{DS}'' in all equations, respectively. T_{DS}' equals to the time 6 months before the dates of occupation permit, while T_{DS}'' the time 3 months before the dates of occupation permit. The regression results are demonstrated in *Table 7a* and *7b*, being rather consistent with those in *Table 6*. This lend support for the assumption of presale decision time for spot sale projects.

[Insert *Table 7a* and *7b* here]

The second robustness check is to exclude the developer-specific impacts. For example, some developers might have the tradition and prefer to (or not to) presell their residential buildings. So we introduce the developer fixed effects to Eq. (4) and results are demonstrated in *Table 8*. We find 31 listed developers in our sample and Kerry Properties is defaulted. Our findings are consistent after the inclusion of developer dummies except for *MSH* and *SIZE* which are closely related to developers. The results of developer dummies tell that Cheung Kong (Holdings), Paliburg (Holdings), Sun Hung Kai Properties, and Wheelock Properties in general presell more, whereas HKR international presell less than the rest developers. This might be determined by the size of their development portfolio, their development scale, or their traditions or preferences.

[Insert *Table 8* here]

Conclusion

This study investigates what motivates a developer to presell. We propose that the standard neoclassical economic analysis cannot answer this question. Information asymmetry, risk aversion, regulatory and policy changes, source of project finance are all important factors in explaining the developer's propensity to presell. Our empirical results from Hong Kong suggest that developers use presale to hedge against future real estate price fluctuation. When the presale flexibility is deterred by policies or regulations, the developer's motivation to presell declines. There is also empirical evidence which suggests that the likeliness of presale increases with the degree of information asymmetry. However, presale as an alternative source of finance is only important for smaller developers.

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Appendix A Results for district dummies from the hedonic pricing model (HK-A is defaulted)

Var.	Coef.	t-Stat.	Var.	Coef.	t-Stat.
HK-C	0.408[a]	22.42	KL-KT	-0.220[a]	-20.55
HK-CB	0.333[a]	62.35	KL-KYT	-0.280[a]	-39.65
HK-CW	-0.186[a]	-15.57	KL-LCK	-0.055[a]	-10.61
HK-HV	0.400[a]	79.82	KL-MK	-0.039[a]	-8.77
HK-KT	0.052[a]	16.34	KL-NCW	-0.234[a]	-51.23
HK-MLC	0.379[a]	84.83	KL-NTK	-0.083[a]	-9.73
HK-MLE	0.360[a]	65.78	KL-SKM	0.247[a]	48.00
HK-MW	0.282[a]	76.24	KL-SPK	-0.173[a]	-40.06
HK-NP	0.092[a]	24.87	KL-SSP	-0.224[a]	-58.17
HK-NPH	0.337[a]	41.90	KL-TKT	-0.042[a]	-15.04
HK-P	0.988[a]	58.03	KL-TST	0.278[a]	90.82
HK-PFL	0.199[a]	54.40	KL-TWS	-0.213[a]	-21.72
HK-QB	0.128[a]	36.63	KL-WTS	-0.141[a]	-27.51
HK-RB	0.725[a]	52.24	KL-YMT	0.061[a]	16.53
HK-SKW	0.014[a]	3.62	NT-FL	-0.515[a]	-182.84
HK-SL	0.510[a]	57.51	NT-ISL	-0.589[a]	-214.27
HK-SSW	-0.214[a]	-59.90	NT-KC	-0.357[a]	-93.01
HK-SW	0.260[a]	58.67	NT-MOS	-0.391[a]	-134.18
HK-SYP	0.084[a]	22.89	NT-SK	-0.282[a]	-40.85
HK-TT	0.418[a]	24.88	NT-SS	-0.471[a]	-136.20
HK-WC	0.300[a]	83.52	NT-ST	-0.226[a]	-79.22
HK-WCH	0.460[a]	44.02	NT-TKO	-0.359[a]	-133.52

KL-CSW	-0.219[a]	-75.55	NT-TM	-0.622[a]	-232.21
KL-DH	-0.136[a]	-30.26	NT-TP	-0.418[a]	-138.76
KL-HH	-0.000	0.63	NT-TW	-0.340[a]	-136.72
KL-HMT	0.120[a]	32.01	NT-TY	-0.325[a]	-110.85
KL-KC	-0.115[a]	-39.21	NT-YL	-0.669[a]	-262.23
KL-KL	0.301[a]	63.50			

Notes: a, b, and c denote significance at the 1%, 5%, and 10% levels, respectively.

Tables and Figures

Table 1■ Number of presales to total number of sales in the first-hand property market of Hong Kong, 1993-2014.

Year	No. of 1st hand sales	No. of 1st hand presales	% of 1st hand presales	Year	No. of 1st hand sales	No. of 1st hand presales	% of 1st hand presales
1993	23432	17801	75.97%	2004	23955	11986	50.04%
1994	14171	8252	58.23%	2005	14276	8659	60.65%
1995	17499	7211	41.21%	2006	12083	7054	58.38%
1996	19587	7873	40.20%	2007	16995	4999	29.41%
1997	20673	14660	70.91%	2008	7923	5622	70.96%
1998	28720	22109	76.98%	2009	13660	9418	68.95%
1999	19352	13148	67.94%	2010	10600	7909	74.61%
2000	16689	10591	63.46%	2011	10040	5853	58.30%
2001	22042	12766	57.92%	2012	11221	9237	82.32%
2002	24747	12684	51.25%	2013	9580	7967	83.16%
2003	27831	14381	51.67%	2014	14533	11010	75.76%

Source: raw data from the Economic and Property Research Centre (EPRC).

Table 2■ variable descriptions

Variables	Descriptions
Dependent variable	
PRE	the presale percentage in each project or phase if the project is developed in multiple phases in the 1st hand market
Independent variables	
# Market characteristics	
RIR	the 12-month Hong Kong Interbank Offered Rate minus inflation rate at (T_D -1month)
VOL	standard deviation of monthly property returns between (T_D -2 years) and T_D, using price index from Rating and Valuation Department
BDP	the ratio of the price index at T_D to that at (T_D -2 years)
ADP	the ratio of the price index at T_{OP} to that at T_D
#Developer characteristics	
DER	the ratio of the book value of debt to the market value of equity at T_D
MSH	the percentage of total supply of private residential units in Hong Kong by each developer since 1995
PROR	the ratio of the development size to market capitalization of the listed developers at (T_D-1 quarter)
# Property characteristics	
LIS	1 if the estate is developed by a listed developer; otherwise, 0
UNLIS	1 if the estate is developed by an unlisted developer; otherwise, 0
SIZE	total units in the project or phase if the project is developed in multiple phases
LVA	average deflated unit sale price by district derived from the coefficients of districts in a hedonic regression
ASFA	average saleable floor area for flats in each development
# Policy	
I94_98	1 if the estate starts sale within the range of 1994 and 1998; otherwise, 0
NCONS	1 if the estate is under the Non-consent Scheme; otherwise, 0
CONS	1 if the estate is under the Consent Scheme; otherwise, 0

Table 3■ Summary statistics

Panel A.

	Full sample (obs.=1,104)		Listed (obs.=514)		Unlisted: pre-match (obs.=590)		Unlisted: post-match (obs.=514)	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
PRE	0.371	0.401	0.480	0.405	0.276	0.373	0.267	0.369
RIR	0.020	0.050	0.024	0.050	0.015	0.050	0.020	0.051
VOL	0.026	0.011	0.025	0.011	0.028	0.010	0.028	0.011
I94_98	0.271	0.445	0.093	0.291	0.425	0.495	0.341	0.474
MSH	0.063	0.104	0.135	0.116	0.001	0.004	0.001	0.005
CONS	0.499	0.500	0.695	0.461	0.329	0.470	0.358	0.480
SIZE	307.4	509.867	559.7	636.581	87.65	173.120	89.74	175.187
ASFA	946.3	965.913	969.7	937.227	926.0	990.572	967.2	1036.713
LVA	-0.124	0.365	-0.144	0.360	-0.106	0.368	-0.071	0.368
BDP	1.050	0.138	1.044	0.139	1.056	0.136	1.041	0.134
ADP	1.021	0.146	1.021	0.137	1.021	0.154	1.035	0.148

Panel B.

	Listed (obs.=514)		Listed & NCONS (obs.=157)		Listed & CONS: pre-match (obs.=357)		Listed & CONS: post-match (obs.=157)	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
PRE	0.480	0.405	0.484	0.404	0.478	0.407	0.383	0.399
RIR	0.024	0.050	0.019	0.052	0.027	0.048	0.022	0.052
DER	0.727	1.541	0.849	1.481	0.674	1.566	0.834	2.167
VOL	0.025	0.011	0.024	0.011	0.025	0.011	0.024	0.012
I94_98	0.093	0.291	0.070	0.256	0.104	0.305	0.057	0.233
MSH	0.135	0.116	0.095	0.090	0.153	0.122	0.115	0.100
PROR	-5.165	1.926	-5.833	2.041	-4.872	1.799	-5.516	1.864
SIZE	559.7	636.581	199.7	328.886	718	674.000	335.7	400.845
ASFA	969.7	937.227	999.1	1246.238	956.7	764.623	1069.0	880.569
LVA	-0.144	0.360	-0.080	0.318	-0.243	0.332	-0.038	0.342
BDP	1.044	0.139	1.123	0.280	1.077	0.288	1.099	0.274
ADP	1.021	0.137	1.048	0.165	1.01	0.121	1.026	0.091

Note: "Listed" means projects developed by listed developers; "Unlisted" means projects developed by private developers; "Listed & NCONS" means listed-developer projects under the Non-consent Scheme; "Listed & CONS" means listed-developer projects under the Consent Scheme.

Table 4■ Results of Probit models

Variable	Coefficient	(Wald X^2)	Marginal effect
Panel A. Probit for listed-developer projects (LIS)			
Constant	-0.281	(0.14)	-
RIR	-6.674[b]	(4.90)	-0.817
VOL	-4.213	(0.36)	-0.516
I94_98	-1.534[a]	(40.7)	-0.188
MSH	755.9[a]	(57.6)	9.258
CONS	0.282[c]	(3.8)	0.035
SIZE	6.7E-05	(0.06)	8.2E-06
ASFA	-4.9E-05	(0.61)	-6.0E-06
LVA	0.554[a]	(8.40)	0.068
BDP	-0.571	(1.50)	-0.070
ADP	0.250	(0.29)	0.031
Panel B. Probit for Non-consent Scheme projects (NCONS)			
Constant	-1.700[c]	(2.80)	-
RIR	1.260	(0.69)	0.320
DER	0.056	(1.50)	0.014
VOL	4.912	(0.46)	1.246
I94_98	0.111	(0.17)	0.028
MSH	-2.069[b]	(5.10)	-0.525
PROR	-0.177[a]	(9.90)	-0.045
SIZE	-6.6E-04[a]	(8.90)	-1.7E-04
ASFA	-3.9E-04[a]	(21.3)	-9.8E-05
LVA	1.459[a]	(47.0)	3.700
BDP	0.277	(0.33)	0.070
ADP	0.771	(1.70)	0.195

Note: a, b, and c denote significance of estimated coefficient, based on the Wald X^2 test statistic at the 1%, 5%, and 10% levels, respectively.

Table 5■ Pair-wise correlation matrix (variables in Eq. (1) and (4))

	RIR	VOL	I94_98	MSH	CONS	SIZE	ASFA	LVA	BDP	ADP	PROR	DER
RIR		0.430	-0.202	0.019	0.079	0.114	-0.092	-0.034	-0.700	-0.410	0.218	0.055
VOL	0.342		0.125	0.066	0.064	0.127	-0.028	-0.079	-0.080	-0.313	0.097	-0.093
I94_98	-0.444	0.024		0.010	0.049	0.122	-0.066	-0.082	0.229	-0.125	0.078	-0.090
MSH	0.055	-0.063	-0.242		0.221	0.415	-0.112	-0.216	0.010	-0.003	-0.260	-0.334
CONS	0.108	-0.049	-0.182	0.356		0.365	0.004	-0.344	-0.055	-0.118	0.212	-0.065
SIZE	0.098	-0.001	-0.138	0.473	0.422		-0.273	-0.298	-0.095	-0.090	0.420	-0.166
ASFA	-0.016	-0.047	-0.151	-0.041	0.063	-0.162		0.237	0.124	-0.036	-0.420	-0.046
LVA	-0.032	-0.058	-0.031	-0.119	-0.245	-0.194	0.231		0.001	0.045	-0.183	0.005
BDP	-0.697	0.075	0.273	-0.026	-0.096	-0.078	0.062	0.005		0.142	-0.237	-0.126
ADP	-0.277	-0.223	-0.023	-0.007	-0.082	-0.052	-0.001	0.048	0.049		-0.109	0.003
PROR												0.382

Table 6■ Regression results

Panel A.

	Pre-match			**Post-match**				
	Eq. (1)	Eq. (2)	Eq. (3)	Eq. (1)	Eq. (2)	Eq. (3)	Eq. (2) - Eq. (3)	
	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.	df.	df.'
C	-1.269[a]	-0.829[a]	-1.553[a]	-1.034[a]	-0.829[a]	-1.132[a]	0.303	0.443[b]
	(-6.61)	(-2.61)	(-6.65)	(-5.14)	(-2.61)	(-4.26)	(0.73)	(2.301)
RIR	1.555[a]	-0.363	3.470[a]	0.646	-0.363	1.732[b]	-2.095[c]	-2.108[a]
	(3.14)	(-0.48)	(5.36)	(1.22)	(-0.48)	(2.17)	(-1.90)	(-3.94)
VOL	1.746	4.770[a]	-1.737	1.555	4.770[a]	0.770	4.000	3.439
	(0.14)	(2.75)	(-1.04)	(1.24)	(2.75)	(0.42)	(1.59)	(1.58)
I94_98	0.101[a]	0.088	0.234[a]	0.074[b]	0.088	0.165[a]	-0.076	-0.036
	(3.24)	(1.51)	(5.86)	(2.16)	(1.51)	(3.37)	(-1.00)	(-0.51)
MSH	0.697[a]	0.449[a]	-5.036	0.719[a]	0.449[a]	-3.571	4.020	3.300
	(5.45)	(3.05)	(-1.31)	(5.66)	(3.05)	(-0.91)	(0.99)	(0.81)
CONS	-0.031	-0.074[c]	-0.059[c]	-0.039	-0.074[c]	-0.069[b]	-0.005	6.0E-05
	(-1.24)	(-1.90)	(-1.81)	(-1.51)	(-1.90)	(-2.01)	(-0.09)	(0.01)
SIZE	2.0E-04[a]	1.5E-04[a]	6.3E-04[a]	2.0E-04[a]	1.5E-04[a]	5.9E-04[a]	-4.5E-04[a]	-4.4E-04[a]
	(7.63)	(5.01)	(6.30)	(7.52)	(5.01)	(5.54)	(-3.91)	(-3.88)
ASFA	-8.3E-05[a]	-1.1E-04[a]	-5.3E-05[a]	-7.8E-05[a]	-1.1E-04[a]	-4.8E-05[a]	-6.4E-05[a]	-6.3E-05[a]
	(-7.00)	(-6.16)	(-3.51)	(-6.52)	(-6.16)	(-3.09)	(-2.68)	(-2.65)
LVA	0.101[a]	0.028	0.125[a]	0.078[b]	0.028	0.093[b]	-0.065	-0.066
	(3.12)	(0.56)	(3.08)	(2.30)	(0.56)	(2.10)	(-0.97)	(-0.98)
BDP	0.846[a]	0.522[b]	1.059[a]	0.534[a]	0.522[b]	0.500[b]	0.022	
	(5.71)	(2.25)	(5.63)	(3.28)	(2.25)	(2.07)	(0.07)	
ADP	0.674[a]	0.655[a]	0.624[a]	0.749[a]	0.655[a]	0.769[a]	-0.114	-0.221
	(8.73)	(4.94)	(6.85)	(9.28)	(4.94)	(7.59)	(-0.69)	(-1.37)
Adj-R^2	0.250	0.272	0.216	0.265	0.272	0.221		

Notes: 1) "Pre-match" and "Post-match" means before and after the match via propensity score; 2) df. under Eq. (2) - Eq. (3) is the difference test, and df.' is a robust difference test without *BDP*; 3) a, b, and c denote significance at the 1%, 5%, and 10% levels, respectively; t-Statistics are in parentheses; 4) refer to *Table 2* for the variable descriptions.

Panel B.

	Pre-match			**Post-match**			
	Eq. (4)	Eq. (5)	Eq. (6)	Eq. (4)	Eq. (5)	Eq. (6)	Eq. (5) - Eq. (6)
	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.	df.
C	-0.719[b]	-0.653	-1.230[b]	-1.315[a]	-1.768[a]	-1.230[b]	-0.538
	(-2.22)	(-1.60)	(-2.32)	(-3.27)	(-2.72)	(-2.32)	(-0.64)
RIR	-0.394	0.710	-1.231	-0.412	0.788	-1.231	2.018
	(-0.52)	(0.73)	(-1.01)	(-0.45)	(0.56)	(-1.01)	(1.08)
DER	-0.009	-0.012	4.8E-04	-8.8E-04	1.6E-04	4.8E-04	-3.2E-04
	(-0.73)	(-0.84)	(0.022)	(-0.07)	(0.01)	(0.022)	(-0.01)
VOL	4.577[a]	0.787	9.487[a]	7.034[a]	3.149	9.487[a]	-6.338
	(2.64)	(0.35)	(3.52)	(3.41)	(0.94)	(3.52)	(-1.48)
I94_98	0.081	0.054	0.213[c]	0.033	-0.150	0.213[c]	-0.363[b]
	(1.38)	(0.79)	(1.86)	(0.39)	(-1.22)	(1.86)	(-2.15)
MSH	0.683[a]	0.572[a]	0.844[b]	0.598[b]	0.202	0.844[b]	-0.642
	(3.81)	(2.76)	(2.20)	(2.25)	(0.53)	(2.20)	(-1.17)
PROR	0.031[b]	0.014	0.032	0.027[c]	0.003	0.032	-0.029
	(2.39)	(0.86)	(1.44)	(1.72)	(0.10)	(1.44)	(-0.88)
CONS	-0.091[b]			-0.120[a]			
	(-2.32)			(-3.08)			
SIZE	1.0E-04[a]	1.1E-04[a]	1.4E-04	1.7E-04[b]	2.4E-04[b]	1.4E-04	1.0E-04
	(2.87)	(2.83)	(1.44)	(2.53)	(2.57)	(1.44)	(0.76)
ASFA	-9.3E-05[a]	-1.3E-04[a]	-6.7E-05[a]	-7.9E-05[a]	-1.2E-04[a]	-6.7E-05[a]	-5.0E-05
	(-4.77)	(-4.22)	(-2.70)	(-3.58)	(-2.69)	(-2.70)	(-1.02)
LVA	0.030	0.017	0.055	0.036	0.079	0.055	0.074
	(0.59)	(0.29)	(0.06)	(0.57)	(0.83)	(0.06)	(0.55)
BDP	0.562[b]	0.711[b]	0.508	0.656[b]	0.772[c]	0.508	0.264
	(2.42)	(2.47)	(1.30)	(2.19)	(1.68)	(1.30)	(0.44)
ADP	0.624[a]	0.380[b]	1.053[a]	1.038[a]	1.253[a]	1.053[a]	0.199
	(5.01)	(2.13)	(5.43)	(6.23)	(3.53)	(5.43)	(0.51)
Adj-R^2	0.277	0.235	0.437	0.346	0.254	0.437	

Notes: 1) "Pre-match" and "Post-match" means before and after the match via propensity score; 2) df. Under Eq. (5) - Eq. (6) is the difference test; 3) a, b, and c denote significance at the 1%, 5%, and 10% levels, respectively; t-Statistics are in parentheses; 4) refer to *Table 2* for the variable descriptions.

Table 7a■ Robustness check by varying T_{DS} to T_{DS}'

Panel A.

	Pre-match			**Post-match**				
	Eq. (1)	Eq. (2)	Eq. (3)	Eq. (1)	Eq. (2)	Eq. (3)	Eq. (2) - Eq. (3)	
	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.	df.	df.'
C	-1.287[a]	-0.759[b]	-1.634[a]	-1.024[a]	-0.759[b]	-1.179[a]	0.420	0.429[b]
	(-6.58)	(-2.33)	(-6.83)	(-4.95)	(-2.33)	(-4.20)	(0.98)	(2.34)
RIR	1.524[a]	-0.579	3.529[a]	0.566	-0.579	1.783[b]	-2.363[c]	-2.055[a]
	(2.84)	(-0.70)	(5.06)	(0.98)	(-0.70)	(2.02)	(-1.95)	(-3.73)
VOL	0.391	5.357[a]	-1.765	1.645	5.357[a]	0.483	4.875[c]	3.970[c]
	(0.29)	(2.78)	(-0.98)	(1.20)	(2.78)	(0.24)	(1.76)	(1.76)
I94_98	0.099[a]	0.083	0.232[a]	0.068[b]	0.083	0.163[a]	-0.080	-0.030
	(3.15)	(1.41)	(5.76)	(1.97)	(1.41)	(3.22)	(-1.03)	(-0.43)
MSH	0.698[a]	0.456[a]	-4.659	0.717[a]	0.456[a]	-3.908	4.364	3.543
	(5.48)	(3.10)	(-1.21)	(5.65)	(3.10)	(-0.99)	(1.07)	(0.87)
CONS	-0.032	-0.074[c]	-0.057[c]	-0.037	-0.074[c]	-0.062[c]	-0.012	-0.006
	(-1.29)	(-1.90)	(-1.77)	(-1.44)	(-1.90)	(-1.82)	(-0.23)	(0.11)
SIZE	2.0E-04[a]	1.5E-04[a]	6.2E-04[a]	2.0E-04[a]	1.5E-04[a]	6.0E-04[a]	-4.6E-04[a]	-4.5E-04[a]
	(7.64)	(4.97)	(6.27)	(7.53)	(4.97)	(5.64)	(-4.01)	(-3.93)
ASFA	-8.3E-05[a]	-1.1E-04[a]	-5.4E-05[a]	-7.9E-05[a]	-1.1E-04[a]	-4.9E-05[a]	-6.3E-05[a]	-6.3E-05[a]
	(-7.04)	(-6.17)	(-3.58)	(-6.62)	(-6.17)	(-3.19)	(-2.65)	(-2.68)
LVA	0.102[a]	0.032	0.127[a]	0.078[b]	0.032	0.092[b]	-0.060	-0.058
	(3.14)	(0.62)	(3.15)	(2.29)	(0.62)	(2.07)	(-0.90)	(-0.87)
BDP	0.866[a]	0.455[c]	1.134[a]	0.531[a]	0.455[c]	0.549[b]	-0.094	
	(5.58)	(1.87)	(5.70)	(3.09)	(1.87)	(2.10)	(-0.26)	
ADP	0.669[a]	0.647[a]	0.627[a]	0.743[a]	0.647[a]	0.768[a]	-0.121	-0.218
	(8.66)	(4.87)	(6.89)	(9.23)	(4.87)	(7.63)	(-0.73)	(-1.36)
Adj-R^2	0.254	0.271	0.220	0.267	0.271	0.221		

Notes: 1) "Pre-match" and "Post-match" means before and after the match via propensity score; 2) df. under Eq. (2) - Eq. (3) is the difference test, and df.' is a robust difference test without *BDP*; 3) a, b, and c denote significance at the 1%, 5%, and 10% levels, respectively; t-Statistics are in parentheses; 4) refer to *Table 2* for the variable descriptions.

Panel B.

	Pre-match			**Post-match**			
	Eq. (4)	Eq. (5)	Eq. (6)	Eq. (4)	Eq. (5)	Eq. (6)	Eq. (5) - Eq. (6)
	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.	df.
C	-0.643[c]	-0.482	-1.290[b]	-0.926[b]	-0.593	-1.290[b]	0.697
	(-1.94)	(-1.24)	(-2.46)	(-2.29)	(-0.85)	(-2.46)	(0.81)
RIR	-0.632	0.240	-1.437	-1.611	-1.682	-1.437	-0.246
	(-0.77)	(0.34)	(-1.09)	(-1.64)	(-1.09)	(-1.09)	(-0.12)
DER	-0.007	-0.010	0.005	-4.0E-04	-0.003	0.005	-0.008
	(-0.64)	(-0.75)	(0.20)	(-0.03)	(-0.22)	(0.20)	(-0.28)
VOL	5.133[a]	1.703	1.073[a]	9.453[a]	7.883[b]	10.730[a]	-2.844
	(2.66)	(0.69)	(3.56)	(4.04)	(2.06)	(3.56)	(-0.59)
I94_98	0.076	0.044	0.207[c]	0.071	-0.078	0.207[c]	-0.285[c]
	(1.28)	(0.64)	(1.79)	(0.87)	(-0.66)	(1.79)	(-1.71)
MSH	0.687[a]	0.572[a]	0.934[b]	0.620[b]	0.309	0.934[b]	-0.625
	(3.82)	(2.75)	(2.43)	(2.42)	(0.85)	(2.43)	(-1.16)
PROR	0.030[b]	0.013	0.033	0.033[b]	0.023	0.033	-0.011
	(2.31)	(0.80)	(1.52)	(2.12)	(0.91)	(1.52)	(-0.32)
CONS	-0.091[b]			-0.109[a]			
	(-2.31)			(-2.82)			
SIZE	1.0E-04[a]	1.1E-04[a]	1.3E-04	1.9E-04[a]	2.9E-04[a]	1.3E-04	1.5E-04
	(2.89)	(2.84)	(1.40)	(2.77)	(2.67)	(1.40)	(1.06)
ASFA	-9.3E-05[a]	-1.3E-04[a]	-6.9E-05[a]	-7.6E-05[a]	-9.0E-05[b]	-6.9E-05[a]	-2.1E-05
	(-4.77)	(-4.16)	(-2.79)	(-3.49)	(-2.12)	(-2.79)	(-0.44)
LVA	0.030	0.018	0.023	0.063	0.067	0.023	0.045
	(0.65)	(0.30)	(0.24)	(0.98)	(0.70)	(0.24)	(0.33)
BDP	0.488[b]	0.558[b]	0.534	0.364	0.116	0.534	-0.419
	(2.01)	(1.82)	(1.36)	(1.20)	(0.24)	(1.36)	(-0.67)
ADP	0.651[a]	0.352[b]	1.060[a]	0.948[a]	0.789[b]	1.060[a]	-0.271
	(4.91)	(1.96)	(5.48)	(5.76)	(2.32)	(5.48)	(-0.71)
Adj-R^2	0.276	0.232	0.445	0.359	0.244	0.445	

Notes: 1) “Pre-match” and “Post-match” means before and after the match via propensity score; 2) df. Under Eq. (5) - Eq. (6) is the difference test; 3) a, b, and c denote significance at the 1%, 5%, and 10% levels, respectively; t-Statistics are in parentheses; 4) refer to *Table 2* for the variable descriptions.

Table 7b■ Robustness check by varying T_{DS} to T_{DS}''

Panel A.

	Pre-match			**Post-match**				
	Eq. (1)	Eq. (2)	Eq. (3)	Eq. (1)	Eq. (2)	Eq. (3)	Eq. (2) - Eq. (3)	
	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.	df.	df.'
C	-1.170[a]	-0.806[b]	-1.439[a]	-0.969[a]	-0.806[b]	-1.072[a]	0.266	0.403[b]
	(-6.04)	(-2.47)	(-6.07)	(-4.73)	(-2.47)	(-3.89)	(0.63)	(2.11)
RIR	1.036[b]	-0.383	2.583[a]	0.310	-0.383	1.181	-1.563	-1.664[a]
	(1.97)	(-0.46)	(3.77)	(0.55)	(-0.46)	(1.39)	(-1.31)	(-3.04)
VOL	1.302	5.178[a]	-2.425	2.130	5.178[a]	1.371	3.806	3.499[c]
	(0.99)	(2.72)	(-0.14)	(1.57)	(2.72)	(0.71)	(1.40)	(1.58)
I94_98	0.079[b]	0.088	0.192[a]	0.062[c]	0.088	0.141[a]	-0.053	-0.013
	(2.57)	(1.50)	(4.76)	(1.80)	(1.50)	(2.79)	(-0.68)	(-0.19)
MSH	0.697[a]	0.456[a]	-4.249	0.715[a]	0.456[a]	-3.449	3.905	3.412
	(5.47)	(3.09)	(-1.10)	(5.64)	(3.09)	(-0.88)	(0.96)	(0.84)
CONS	-0.035	-0.077[b]	-0.061[c]	-0.040	-0.077[b]	-0.067[c]	-0.010	-0.004
	(-1.40)	(-1.97)	(-1.87)	(-1.58)	(-1.97)	(-1.95)	(-0.20)	(-0.72)
SIZE	2.1E-04[a]	1.5E-04[a]	6.3E-04[a]	2.0E-04[a]	1.5E-04[a]	6.0E-04[a]	-4.5E-04[a]	-4.4E-04[a]
	(7.71)	(4.96)	(6.33)	(7.57)	(4.96)	(5.58)	(-3.95)	(-3.87)
ASFA	-8.3E-05[a]	-1.1E-04[a]	-5.6E-05[a]	-7.8E-05[a]	-1.1E-04[a]	-4.9E-05[a]	-6.1E-05[a]	-6.3E-05[a]
	(-7.05)	(-6.08)	(-3.66)	(-6.55)	(-6.08)	(-3.14)	(-2.59)	(-2.66)
LVA	0.100[a]	0.029	0.127[a]	0.076[b]	0.029	0.090[b]	-0.061	-0.058
	(3.10)	(0.58)	(3.13)	(2.25)	(0.58)	(2.04)	(-0.91)	(-0.86)
BDP	0.769[a]	0.483[b]	0.961[a]	0.485[a]	0.483[b]	0.447[c]	0.035	
	(5.00)	(1.97)	(4.90)	(2.86)	(1.97)	(1.75)	(0.10)	
ADP	0.646[a]	0.664[a]	0.604[a]	0.733[a]	0.664[a]	0.765[a]	-0.102	-0.197
	(8.38)	(5.01)	(6.59)	(9.11)	(5.01)	(7.57)	(-0.61)	(-1.22)
Adj-R^2	0.254	0.269	0.209	0.268	0.269	0.221		

Notes: 1) "Pre-match" and "Post-match" means before and after the match via propensity score; 2) df. under Eq. (2) - Eq. (3) is the difference test, and df.' is a robust difference test without *BDP*; 3) a, b, and c denote significance at the 1%, 5%, and 10% levels, respectively; t-Statistics are in parentheses; 4) refer to *Table 2* for the variable descriptions.

Panel B.

	Pre-match			**Post-match**			
	Eq. (4)	Eq. (5)	Eq. (6)	Eq. (4)	Eq. (5)	Eq. (6)	Eq. (5) - Eq. (6)
	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.	df.
C	-0.687[b]	-0.348	-1.796[a]	-1.104[a]	-0.651	-1.796[a]	1.145
	(-2.07)	(-0.81)	(-3.43)	(-2.73)	(-0.95)	(-3.43)	(1.34)
RIR	-0.454	-0.089	1.053	-0.877	-0.675	0.011	-0.686
	(-0.55)	(-0.08)	(0.01)	(-0.88)	(-0.43)	(0.01)	(-0.34)
DER	-0.007	-0.011	0.006	0.002	-0.002	0.006	-0.008
	(-0.60)	(-0.76)	(0.25)	(0.13)	(-0.13)	(0.25)	(-0.27)
VOL	4.971[a]	2.145	9.731[a]	8.487[a]	5.670	9.731[a]	-4.061
	(2.61)	(0.87)	(3.34)	(3.69)	(1.50)	(3.34)	(-0.86)
I94_98	0.080	0.040	0.254[b]	-0.011	-0.220[c]	0.254[b]	-0.474[a]
	(1.36)	(0.58)	(2.26)	(-0.14)	(-1.93)	(2.26)	(-2.92)
MSH	0.688[a]	0.581[a]	0.891[b]	0.908[a]	0.870[b]	0.891[b]	-0.021
	(3.82)	(2.79)	(2.33)	(3.40)	(2.27)	(2.33)	(-0.04)
PROR	0.030[b]	0.013	0.034	0.038[b]	0.034	0.034	3.8E-04
	(2.29)	(0.81)	(1.55)	(2.40)	(1.33)	(1.55)	(0.01)
CONS	-0.094[b]			-0.108[a]			
	(-2.38)			(-2.75)			
SIZE	1.0E-04[a]	1.1E-04[a]	1.3E-04	1.8E-04[a]	2.5E-04[a]	1.3E-04	1.2E-04
	(2.90)	(2.81)	(1.34)	(2.77)	(2.72)	(1.34)	(0.91)
ASFA	-9.2E-05[a]	-1.3E-04[a]	-6.4E-05[b]	-6.8E-05[a]	-6.9E-05	-6.4E-05[b]	-5.4E-06
	(-4.68)	(-4.15)	(-2.60)	(-2.99)	(-1.52)	(-2.60)	(-0.11)
LVA	0.031	0.017	0.006	0.022	-0.010	0.006	-0.016
	(0.60)	(0.29)	(0.07)	(0.34)	(-0.11)	(0.07)	(-0.12)
BDP	0.513[b]	0.447	0.911[b]	0.554[c]	0.423	0.911[b]	-0.487
	(2.09)	(1.44)	(2.28)	(1.83)	(0.91)	(2.28)	(-0.80)
ADP	0.666[a]	0.330[c]	1.167[a]	0.940[a]	0.568	1.167[a]	-0.599
	(5.05)	(1.83)	(6.18)	(5.65)	(1.62)	(6.18)	(-1.55)
Adj-R^2	0.274	0.228	0.449	0.345	0.258	0.449	

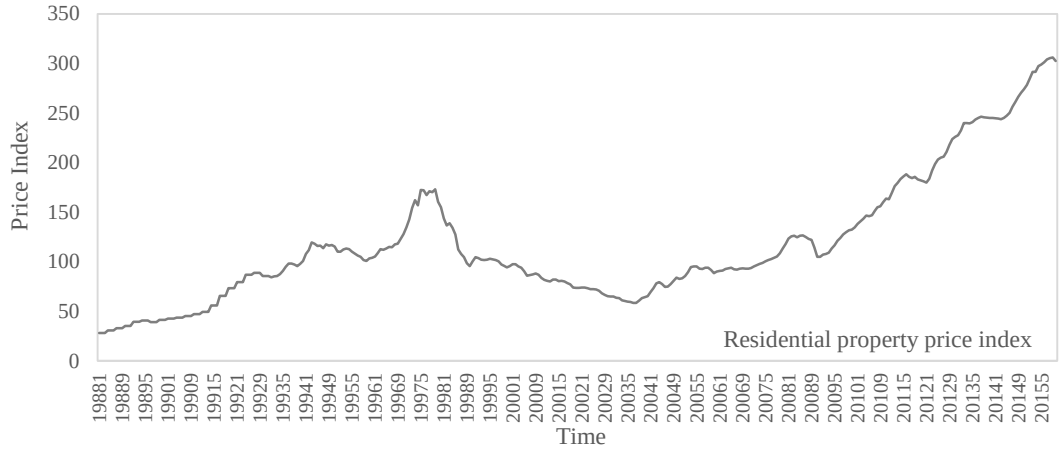
Notes: 1) "Pre-match" and "Post-match" means before and after the match via propensity score; 2) df. Under Eq. (5) - Eq. (6) is the difference test; 3) a, b, and c denote significance at the 1%, 5%, and 10% levels, respectively; t-Statistics are in parentheses; 4) refer to *Table 2* for the variable descriptions.

Table 8■ Robustness check by including developer fixed effects in Eq. (4) (pre-match)

Variables	Coef.	t-Stat.	Variables	Coef.	t-Stat.
C	-0.337	-1.08	CONS	-0.114[a]	-2.85
RIR	-1.195[c]	-1.78	SIZE	6.7E-05	1.65
DER	-0.037[b]	-2.04	ASFA	-8.7E-05[a]	-4.34
VOL	5.426[a]	3.12	LVA	0.062	1.25
I94_98	0.039	0.68	BDP	0.343[c]	1.84
MSH	-0.192	0.72	ADP	0.547[a]	4.22
PROR	0.056[a]	2.93			
Developers					
Cheuk Nang (Holdings)	0.230	0.63	Liu Chong Hing Investment	0.014	0.04
Cheung Kong (Holdings)	0.451[a]	2.77	New World Development	0.181	1.30
Chinese Estates (Holdings)	-0.036	-0.24	China Overseas Land and Investment	0.168	1.06
Chuang's Consortium International	0.065	0.33	Paliburg (Holdings)	0.659[c]	1.88
Chun Wo	0.386	1.10	Sea Group	0.085	0.32
Emperor Group	0.120	0.62	Shun Tak Holdings	0.136	0.71
Far East Consortium International	0.283	1.14	Sino Land Co.	0.186	1.35
Hang Lung Properties	-0.063	-0.37	Soundwill Properties	0.183	0.68
Henderson Land Development Co.	0.038	0.26	Sun Hung Kai Properties	0.338[b]	2.12
HKR International	-0.360[c]	-1.88	Swire Properties	0.177	1.07
Hon Kwok Land Investment Co.	0.008	0.04	Taic Cheung (Holdings)	-0.089	-0.39
Hopewell Properties	-0.119	-0.44	Wang On Group	0.085	0.47
Kerry Properties	-0.159	-1.05	Wharf (Holdings)	0.225	0.96
Kowloon Development Co.	0.245	1.34	Wheelock Properties	0.269[c]	1.76
Lai Sun Development Co.	-0.118	-0.58	Wing Tai Properties	0.152	0.93
Adj-R^2	0.343				

Notes: 1) the default developer is "Kerry Properties".; 3) a, b, and c denote significance at the 1%, 5%, and 10% levels, respectively: 4) refer to *Table 2* for the variable descriptions.

Figure 1■ Residential property price index of Hong Kong, 1988-2015.



Source: raw date from the Rating and Valuation Department.

Figure 2 ■ Simple model for the time of property presale decision in Hong Kong