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The consequences of Chinese outward real estate investment: Evidence from Hong Kong land market

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Xin Li
School of Architecture,
Southern China University of Technology
Guangzhou, China
Email: arlixinlynn@scut.edu.cn

Eddie C.M. Hui
Department of Building and Real Estate
The Hong Kong Polytechnic University
Hum Hong, Hong Kong
Email: bscmhui@polyu.edu.hk

Jianfu Shen*
Department of Building and Real Estate
The Hong Kong Polytechnic University
Hum Hong, Hong Kong
Email: jeff.jf.shen@polyu.edu.hk

*Corresponding author: Jianfu Shen

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Abstract:

This paper explores the Chinese outward real estate investment in Hong Kong's land market from 2011 to 2019. The property developers from Mainland China are attracted to Hong Kong market and win a significant portion of land parcels in government land auctions since 2011. The results reveal that these developers pay much higher land premium to acquire land than local developers. The expected gain from the land development, measured by the stock market reaction to land acquisition, is significantly positive for Chinese developers and much larger than the gain for local developers. Taken together, our findings indicate that outward real estate investment helps Chinese property developers seek new markets and improves the profitability and financial performance; meanwhile, the Chinese outward investment also pushes up the real estate price in the host market.

Keywords: Chinese outward real estate investment; Hong Kong; land acquisition; land price; economic profit; cumulative abnormal return

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1. Introduction

A recent phenomenon is that Chinese companies substantially invest abroad in the past decade although China is still one of largest recipient of global direct investments. According to the statistics from the Ministry of Commerce of the People's Republic of China (MOFCOM, 2019), the outward foreign direct investment (FDI) surges from 2.70 billion US$ in 2002 to 143.04 billion US$ in 2018, with an average annual growth rate 33.76%. In 2018, Chinese outward FDI accounts for 14.1% of global FDI flows, ranked the second place after Japan in the world (MOFCOM, 2019). Panel A of Figure 1 shows the overall trend of outward FDI from China between 2002 and 2018. The increases of China's outward FDI in the global market are impressive as the annual outward FDI flow is accounted for only 1% of world total in 2004 (Morck, Yeung and Zhao, 2008). Recent studies have investigated the motivations of Chinese outward FDI and the effects of home country factors on outward FDI (See a summary in Buckley et al., 2018). Relatively few studies have explored the impacts of Chinese outward FDI on host markets and investing companies.

[Insert Figure 1]

This paper focuses on the outward real estate investment from China and aims to assess the consequences of Chinese outward real estate investment in Hong Kong.[1] This reflects the economic influence of China to Hong Kong by its significant economic growth and increasingly open market. Panel B of Figure 1 shows that the trend of China's outward real estate investment is similar to its overall outward FDI: the annual outward FDI flows in the real estate sector are tiny in early 2000s but increase rapidly after 2010. Interestingly, on average around 64% of the outward real estate FDI flows to Hong Kong between 2004 and 2018. In 2016, the overall Chinese outward real estate investment reaches a historical record 15.25 billion US$ (or 7.77% of total China's outward FDI), among which 9.24 billion US$ (or 60.62%) are invested in Hong Kong.[2] Although Chinese real estate companies have substantially invested abroad since 2010 (Hamzah, 2019), the effects of China's outward real estate FDI have not be thoroughly investigated in the literature.

[1] China refers to Mainland China only hereafter in this paper.

[2] The investments in overseas real estate significantly drop in 2017 and 2018 as real estate sector is categorized as restricted investment by Chinese government. See the Opinions on Further Guiding and Regulating Outbound Investment, available at: http://www.gov.cn/zhengce/content/2017-08/18/content_5218665.htm.

We choose Hong Kong land market as the host market to examine the consequences of outward real estate investment from Chinese companies in this paper for several reasons. First, our statistics below indicate that a large portion of Chinese outward real estate funds are used by Chinese property developers to acquire land in Hong Kong after 2010. Second, the land market in Hong Kong is dominated by government-led land auctions which are highly transparent and provide well-documented land sale information (Tse, Pretorius and Chau, 2011; Shen, Pretorius and Chau, 2018). The detailed land sale data in Hong Kong market allow us to investigate the impacts of China's outward FDI on local market at project level.

Using overall 161 residential land parcels sold by Hong Kong government between 2011 and 2019 August, we find that 18.63% of the land parcels (or 26.93% in term of dollar amount) are acquired by Chinese developers, which indicates that property companies from China actively engage in real estate development in Hong Kong in recent years. The majority of Chinese developers that join land auctions in Hong Kong are publicly listed in Hong Kong stock exchange. Our results show that Chinese developers pay significantly higher prices than local developers in land acquisitions; and meanwhile they are also expected to gain significant economic profits from the land developments in Hong Kong. The findings indicate that Chinese real estate companies tend to avoid the fierce competition and government regulations in home market that reduce their profit margins, and seek profitable opportunities from new markets through outward real estate investments.

This paper contributes to the literature of outward real estate FDI and the studies of land market. It is the first to investigate the impacts of China's outward real estate investment on the host market and the financial performance of investing companies. Unlike the aggregate state-level investigations in the previous Chinese outward FDI studies (e.g., Buckley et al., 2007; Ramasamy, Yeung and Laforet, 2012), we provide project-level evidence on the effects of China's outward investment on host market. In addition, this study sheds light on the profitability of outward real estate investment using a novel method through the stock market reaction to the land acquistion. It also shows that land price in a country (region) could be influenced by the entry of non-local developers, which has not been documented in the literature of urban studies.

The paper is structured as follows. Section 2 gives literature review in Chinese outward FDI. It follows by the discussions of Hong Kong real estate market and the statistics of China's

outward real estate investment in Hong Kong in Section 3. Section 4 provides the data, variables and methodologies. Section 5 discusses the empirical results. Last section concludes.

2. Literature review

There is an abundance of studies in Chinese outward direct investment since China has been one of the largest contribution to world FDI in the recent decades. Previous studies focus on the determinants of outward direct investment in China, including seeking resources, technology, markets, diversification and strategic assets (Deng, 2004). Empirical studies show that some factors such as the host country market size, natural resource endowment, cultural proximity to China, technology and management skills are the significant determinants of China's outward direct investment decisions (Buckley et al., 2007; Luo, Xue and Han, 2010; Kolstad and Wiig, 2012; Ramasamy, Yeung and Laforet, 2012; Wang et al., 2012). Recent studies explore China's outward FDI decision in different industry sectors. Amighini and Franco (2013) find that Chinese automotive multinational corporations are market-seeking in the low- and middle-income countries. Rogers and Koh (2017) argue that China's state-led housing cooling measures in 2010 motivate the Chinese developers to seek out foreign investment opportunities. Zhang, Lee and Chan (2019) find that the factors such as market size, geographic distance, cultural proximity and real estate transparency, are positively associated with the amount of Chinese outward real estate investment.

Some studies investigate the effects of outward FDI on the host countries and investing firms. Wang, Mao and Gou (2014) reveal that the investment of Chinese multinational enterprises provides enormous job creation and capital to host countries but also associated with corporate misbehaviors in the developing countries. Cozza, Rabellotti and Sanfilippo (2015) find that the Chinese outward FDI in European developed countries enhance the productivity and financial performance in the investing firms. Similarly, the following studies (Huang and Zhang, 2017; Li et al., 2017) show that Chinese outward FDI increases the productivity of the parent companies and the positive effect is related to the absorptive capacity in the technical and non-technical resources acquired from the host countries.

Chinese outward real estate investment is understudied in the literature as it rises only in recent years. Chow and Xie (2010) show that the surge in the foreign real estate investment is positively related to the increase of housing price in Singapore. Hui and Chan (2014) conjecture

that real estate market in China could be overheated by the foreign direct investment. Gholipour (2013) finds that foreign real estate investments lead to housing price appreciations in emerging economies; but the effect is not found in the developed economies (Gholipour, Al-mulali and Mohammed, 2014). This study fills the research gaps in the literature of Chinese outward FDI in real estate by focusing the investments in land market in Hong Kong.

3. Chinese outward real estate investment in Hong Kong's land market

3.1 Real estate market in Hong Kong

Hong Kong is unique in its land ownership, land policy and real estate market while the market transparency is ensured (Haila, 2000; Shen and Pretorius, 2013). The government owns all land (with only one exception) and allocates the land through long lease (Huang, Shen and Zheng, 2015). Property developers mainly acquire lands for residential developments from the land sales organized by Lands Department in Hong Kong.[3] Due to the short land supply and the high-rise development, the land parcels are sold at extremely high values and the land cost could account for more 50% of the gross development value in a typical project (Shen, Pretorius and Li, 2019). The land parcels are sold either in open auction before 2011 or public tender after 2011. In either ways, the detailed land information including the auction/tender dates, site conditions, sale conditions and plan, is provided to the public normally four weeks before the closing date of the land sale; and the bidder with the highest price (and more than the reserve price set by the government) wins the land parcel (Tse, Pretorius and Chau, 2011; Shen, Pretorius and Chau, 2018). Lands Department announces the land sale outcomes through its website and lists both the winners and the participants that join the land auctions.

Hong Kong is an ideal destination of Chinese outward real estate investment for several reasons. First, the housing market in Hong Kong rises significantly after the 2008 global financial crisis. We show the real residential property prices in Figure 2. The average annual real residential property appreciation in Hong Kong is 10.24% from 2009 to 2018 (BIS, 2019). In comparison, due to the housing cooling measures from 2010 (Rogers and Koh, 2017), the average annual

[3] Developers can obtain land from other sources in Hong Kong, including property development sites from the Mass Transit Railway Corporation (MTRC) and the Urban Renewal Authority (URA). However, only a few numbers of land parcels are sold by MTRC and URA each year. For instance, only two (three) parcels were sold by MTRC (URA) in 2016. We do not include the land sales from MTRC and URA in our sample.

growth rate of residential property price in China is only 1.82% during the period (BIS, 2019). The rising property market in Hong Kong provides great investment opportunities for Chinese developers when the competition in home country is fierce. Second, Chinese property developers are attracted to Hong Kong because of geographic proximity and cultural proximity (Buckley et al., 2007). A large number of big property developers from China had been listed in Hong Kong exchange (Wong, Wei and Chau, 2014). These developers are familiar with Hong Kong real estate market and land sale system, which make them easily participate in real estate development.

[Insert Figure 2]

3.2 Land acquisition by Chinese developers

Land acquisition is the first step for Chinese developers to involve the real estate development market in Hong Kong. Table 1 shows the statistics of residential land sold by the Hong Kong government and acquired by Chinese developers from 2011 to 2019 (August). Panel A shows that developers from China only successfully won 1 residential land parcel out of 17 in 2011. The winner, China Overseas Land and Investment Limited, is a state-owned firm from China, but it has been involved in Hong Kong's real estate development since the 1980s. More Chinese companies invested in Hong Kong after 2011 and acquired 30 land parcels in total since then, which accounts for 18.63% of the overall 161 residential land parcels. The new entrants, i.e., those that had never participated in real estate development in Hong Kong before 2011, acquired 21 land parcels in the land sales. And in 2017, they purchased 7 land parcels out of 10. Panel B gives the premiums from the land sales by year. Among the overall residential land premium HK$ 443.59 billion (or US$ 56.97 billion), Chinese developers contribute 26.93% of the total amount (HK$119.47 billion or US$15.35 billion). The portion is extremely high like 73.69% in 2017. The data indicate that Chinese developers become important players in Hong Kong in recent years.

[Insert Table 1]

Table 2 gives the winners and participants of land sales from China between 2011 and 2019. Panel A shows that 30 parcels of residential land were won by 15 Chinese companies. The biggest winner is China Overseas Land and Investment Limited that successfully bid 9 parcels of land, following by HNA Group Co., Ltd., a conglomerate involving aviation and financial services, and Poly Property Group Co., Limited, a major property developer in China. About half of these winners are state-owned firms that have strong financing capacity by accessing credit markets in China (Deng et al., 2015; Shen and Yin, 2016); and 12 out 15 publicly listed on the Hong Kong

stock exchange. Among the 30 land parcels, only 6 were won jointly with local developers. Panel B gives the list of major participants from China and the number of bids they submitted in Hong Kong's land sales. The frequent participants include China Overseas Land and Investment Limited, Vanke Property (Hong Kong) Company Limited, Poly Property Group Co., Limited, Shimao Property Holdings Limited and KWG Property Holding Limited. They are also the top developers in Chinese real estate market. 17 of 20 participants are listed on the Hong Kong Stock Exchange.

Taken together, we find that Chinese property developers actively participated in the land tenders in Hong Kong after 2011 and successfully acquired a significant portion of land parcels. Some anecdotal evidences suggest that Chinese developers bid aggressively in the land auctions and pay much higher land prices than local developers, e.g., Minmetals Land Limited afforded a residential site by 4 billion HK$, which exceeded the market expectations by 40% (Nguy, 2016); KWG Property Holdings Limited and Logan Property Holdings Company Limited jointly paid 16.86 billion HK$ to acquire a luxury residential site in Hong Kong island, which was a record in the government land sale in Hong Kong (Cole, 2017). We empirically assess whether new entrants from China push up land prices in Hong Kong and the outward real estate investments can benefit the developers in the next section.

4. Data, variables and research methodology

We collect land sale data from Lands Department, Hong Kong and Economic Property Research Company Ltd (EPRC). Lands Department announces the land sales outcomes on its website and provide information including the land award date, site location, site area, land use, maximum/minimum gross floor areas, winners, and other bidders. The land data are supplemented by additional information from EPRC land auction/tender database such as district, street, lot number, floor area ratio, residential density zone of the land parcel, etc. Based on the land data, we manually collect the following information: 1) the distance from site location of each land parcel to Central, Hong Kong's CBD; 2) the listing status and code of each bidder; and 3) whether a bidder is from China. The sample contains all land parcels in residential use sold in the government auctions from 2011 to August 2019. There are totally 161 land parcels in the sample.

We employ a hedonic approach to explore whether outward investment by Chinese property developers push up the land prices in Hong Kong, i.e., whether these developers pay significantly higher prices than local developers in the land acquisitions. The regression model is

given as follows (Ooi et al., 2006; Yang et al., 2015; Shen, Pretorius and Chau, 2018; Shen, Pretorius and Li, 2019):

$$LNPRICE_i = \beta_0 + \beta_1 OFDI/OFDINEW_i + \beta_2 X_i + \beta_3 Y_i + \sum YEAR + \varepsilon \quad (1)$$

The dependent variable (*LNPRICE*) is the natural logarithm of land price in a land parcel *i*. We deflate the land prices by the residential real estate index in Hong Kong (Chau, 2006) to remove the effects of property price appreciation during the sample period.[4] The key independent variable (*OFDI*) is a dummy variable to measure whether the land parcel is won by property developers from China. In addition, we create another dummy variable (*OFDINEW*) indicating the land parcel is acquired by Chinese developers that participate real estate development in Hong Kong only after 2011. We include a series of land characteristics variables (*X*) as control variables, including site area (*AREA*), floor area ratio (*FAR*), distance to CBD (*DISTANCE*), residential density zone (*R1*, *R2*, *R3* and *R4*) and regions (*HK*, *KL* and *NT*).[5] The variables related to the land sales (*Y*) are the number of bidders (*LNBIDDER*), whether the land parcel is jointly won by developers (*JOINT*) and the annualize return of residential real estate index in the past 12 months before land sale (*RERET*). We also include year dummies (*YEAR*) in some models.

One potential concern in the regression analysis is the endogeneity issue in the outward real estate investment decision by Chinese property developers. That is, these developers may decide to join/win a land auction because the land parcel is potentially valuable; and hence the sites won by Chinese developers are associated with high land prices. We address this self-selection problem by a matching estimator approach (Ashenfelter 1978; Rosenbaum and Rubin, 1983; Abadie and Imbens 2002) and construct a subsample based on the treated land parcels (won by Chinese property developers) and their control observations (land parcels won by local developers) with similar land characteristics (Nanda an Ross, 2012; Shen, Pretorius and Li, 2019). In the first step, a logistic regression is run to estimate the treatment effect of land parcels won by Chinese property developers on the land characteristics variables (site area, floor area ratio, distance to CBD, residential density zone and regions). A propensity score for each land parcel is calculated from the regression and used to match the control observations to treated land parcels

[4] The results from the hedonic models are quantitative similar if raw land price, land price adjusted by CPI or unit land price is used as dependent variable.

[5] The areas in Hong Kong include the main urban areas and new towns are divided into three density zones: R1 (high), R2 (medium) and R3 (low). R4 is the very low density in new towns. See the discussions in Yu and Hui (2017; 2019). There are three main regions in Hong Kong: Hong Kong Island (HK), Kowloon (KL) and New Territories (NT).

according to the closeness of the scores. We allow up to three control land parcels to be matched to one treated parcel. After the matching, we run the Equation (1) in the matched sample.

We also construct a bidder sample from the listed winners in the land auctions to investigate the economic profits of land acquisitions. We have shown in Table 2 that most of the Chinese developers that participate in Hong Kong land market are listed companies. Similarly, most developers in Hong Kong are publicly listed on the Hong Kong exchange (Haila, 2000). In total, 123 land parcels (out of 161) in the sample were won by 45 listed developers.[6] As property developers may jointly win a land auction, we finally have 146 observations in the winner-land sample.

We measure the economic profit of land acquisition through the stock market response to the land auction outcomes by an event study methodology (Ching and Fu, 2003; Ooi and Sirmans, 2004; Hui, Yu and Lam, 2010; Tse, Pretorius and Chau, 2011). The assumption is that the capital market is efficient and thus the expected profitability of real estate development after land acquisition is reflected immediately in the changes of the market value of the acquiring firms. The assumption is valid in Hong Kong land auctions as previous studies have shown that stock market efficiently reacts to the announcements of land sale outcomes (Ching and Fu, 2003; Hui, Yu and Lam, 2010; Tse, Pretorius and Chau, 2011). The economic profit of land acquisition is captured by cumulative abnormal return of the winner in a three-day event window [t, t+2] around the announcement date t. We calculate the abnormal stock return using both market adjusted model and market model: in the market adjusted model, abnormal return is calculated by subtract market return from stock return of a winner; and abnormal return in market model is stock return minus expected return from the CAPM model, in which stock beta is derived from daily stock returns and market returns in a estimation window [t-200, t-50].[7] We use Hang Seng index to compute the market return in Hong Kong and take one-month HIBOR (Hong Kong Interbank Offered Rate) as risk-free rate in the CAPM model.

Based on the cumulative abnormal returns, we firstly assess whether the cumulative abnormal returns of winning land auctions in the Chinese developers are positively significant. We

[6] The key Hong Kong developers include (the number of acquired parcels in parentheses): Sun Hung Kai Properties Limited (18), Henderson Land Development Company Limited (5), Cheung Kong (Holdings) Ltd (6), New World Development Company Limited (3), Wheelock Properties Limited (14), Sino Land Company Limited (12), K. Wah International Holdings Limited (7), Emperor International Holdings Limited (3), and Kerry Properties Limited (4).
[7] The results are quantitatively similar if we use alternative estimation windows to calculate stock betas.

then test whether the stock market gives higher valuations to the land acquisitions won by Chinese developers than those by local developers, using the regression model below.

$$CAR_{i,j} = \beta_0 + \beta_1 OFDI/OFDINEW_{i,j} + \beta_2 LNLDP_i + \beta_3 RERET_i + \beta_4 Z_j + \sum YEAR + \varepsilon \qquad (2)$$

The dependent variable is the cumulative abnormal return (*CAR*) to winner *j* that wins land parcel *i*. The key independent variable *OFDI* (or *OFDINEW*) is a dummy variable equal to 1 if the land parcel *i* is acquired by a developer *j* (or a new entrant) from China and 0 otherwise. The control variables include land price (*LNLDP*), residential property return (*RERET*) and firm-level variables (*Z*). The variables *Z* are the natural logarithm of market capitalization (*LNMV*), the natural logarithm of stock price (*LNP*), the stock returns in the past three months (*MOM*), the stock turnover in the past three months (*TURN*), return on assets (*ROA*), cash ratio (*CASH*), leverage ratio (*LEV*) and dividend yield (*DIV*) (Ching and Fu, 2003; Hui, Yu and Lam, 2010; Tse, Pretorius and Chau, 2011). Appendix 1 gives the detailed variable definitions.

5. Empirical results and discussions

5.1 Descriptive statistics

Table 3 reports the descriptive statistics of land auction variables for land sale sample and firm level variables for listed winner sample. Panel A shows that the average land price in 161 land parcels is 2,755 million HK$, indicating that land is quite expensive in Hong Kong. 18.63% (13.04%) of 161 land parcels are acquired by property developers (new entrants) from China. Average land area is 0.12 million square feet and average floor area ratio is 3.46. On average, the distance from the site to CBD is 14.12 km. Among the 161 parcels, the portions in the residential density zones R1, R2, R3 and R4 are 24.22%, 29.81%, 37.89% and 8.07%, respectively; 7.45% locate in Hong Kong Island region, 24.22% in Kowloon and 68.32% in New Territories. Average number of bidders in the land auctions is 11.04. 15% of the land parcels are jointly won by the developers. The mean annualized residential property return calculated from the Hong Kong residential real estate index is 9.23% in the 12 months prior to land auctions.

[Insert Table 3 here]

Panel B shows the statistics for the publicly traded winners in the land auctions. The cumulative abnormal returns in a three-day window to the listed winners are 0.54% and 0.52% from market adjusted model and market model. The average market capitalization of the listed winners is 100.76 billion HK$ and average stock price is 29.60. We also report the statistics for

the stock return in past three months, the average stock turnover in the past three months, ROA, cash ratio, leverage ratio and dividend yield.

5.2 Chinese outward real estate investment and land price in Hong Kong market

We firstly explain whether (and why) Chinese developers may be willing to pay high price to acquire land in the Hong Kong market. Developers submit their bids in the land auctions based on their estimates of development cost and profit margins (Tse, Pretorius and Chau, 2011). The project-specific cost should be identical or similar to all the bidders. If developers expect the same profit margins from the land development, they should on average give similar bids in the auctions. In this case, land prices paid by Chinese developers or local developers should not be significantly different. Chinese developers could outbid local developers if they are willing to accept a lower (but still reasonable) profit margin. This could be true because the property market in Hong Kong is oligopolistic with limited land supply (Tang, Leung and Ng, 2018) and the profit margin from real estate development in Hong Kong is relatively high (Ching and Fu, 2003). In contrast, the profitability in China's real estate sector has been reduced since 2011 because of the state-led cooling measures implemented in China (BIS, 2019) and the aggressive competition in the property market (Cooper and Cowling, 2015).[8] Real estate development in Hong Kong is still profitable for Chinese developers even though they pay higher land cost than local developers in land acquisitions.

Table 4 provides the univariate tests of the differences in land price and the characteristics between the parcels purchased by Chinese developers and local developers. Panel A shows that the average land price paid by Chinese developers are significantly higher than the price paid by local developers. The land parcels acquired by Chinese developers have significantly a larger floor area ratio and are closer to CBD than those by local developers. These land parcels are also more likely to be located in large residential density zone R1 but less likely in low residential density zone R3, and more likely to be located in Kowloon region (a more developed area) and less likely in the New Territories (a less developed or rural area). The results indicate that Chinese developers choose to bid and win the land parcels with potentially high development values. Panel B shows

[8] Housing prices in China remain stable after the cooling measures (see the index in Figure 2). Cooper and Cowling (2015) show that the profitability of Chinese listed developers after 2010 did not grow as strongly as before and even declined after 2013. The unsold inventories had increased significantly after 2008 and maintained at a high level.

the differences between the 30 parcels won by Chinese developers and the matched 49 parcels won by local developers using the matching approach. After the matching by propensity score, the land parcel characteristics are indifferent between the two groups. We still observe that the average price of land parcels acquired by Chinese developers is significantly larger than the average price paid by local developers, given the close characteristics in two groups of land parcels.

[Insert Table 4 here]

Table 5 reports the results of regression analysis of the effect of Chinese outward real estate investment on Hong Kong land price using Equation (1). Panel A presents the results from the whole sample. Columns (1) and (2) gives the coefficient estimates from the models using *OFDI* as key dependent variable. Column (1) shows that the land prices of the parcels acquired by Chinese developers are significantly larger than those by local developers after controlling the land and auction characteristics. The coefficient on *OFDI* indicates that land price increases by 35.93% if the parcel is purchased by Chinese developers.[9] The results are similar in Column (2) if year dummies are included in the model, although the coefficient on OFDI becomes insignificant. Columns (3) shows that the new Chinese entrants to Hong Kong market pay significantly 44.72% more prices than other developers in the land acquisitions. The magnitude is even larger from Column (4) if the year fixed effect is controlled. The coefficients on control variables are consistent with the previous studies (Yang et al., 2015; Shen, Pretorius and Chau, 2018; Shen, Pretorius and Li, 2019). The land price is higher if the lot size is larger, the distance from site location to CBD is longer, and the parcel locates in higher residential density zones and in the Kowloon region. The land price also increases if the number of bidders is large in the auction, the parcel is jointly won and the property market in the past 12 months is hot.

[Insert Table 5 here]

Panel B gives the results from the matched sample. The results remain similar to the overall sample. Chinese developers pay higher prices in the land acquisitions than local developers even though the land parcels won by two groups have similar characteristics. The new entrants from China are more aggressive in the land auctions and outbid other developers. The results are consistent with some anecdotal evidence that outward real estate investments from China surge Hong Kong's land price and Chinese developers pay premium to compete with local developers

[9] The coefficient on *OFDI* in Column (1) is 0.3070. The increases in land price if the parcels are won by Chinese developers can be estimated as: exp (0.3010) - 1 = 35.93%. We calculate the price differences similarly in other models.

(Sito, Zhen and Ng, 2017). In sum, our findings indicate that Chinese outward real estate investments push up the land price in the host market.

5.3 Chinese outward real estate investment and economic profit

We further investigate the economic profit of the land acquisitions by Chinese developers. On the one hand, real estate projects in Hong Kong could provide higher return than those in China, leading to significantly abnormal returns to the developers. On the other hand, as new entrants without land bank in the market, Chinese developers do not have other means to acquire land parcels and may need to pay higher land prices in the land auctions to compete with local large developers (Shen, Pretorius and Li, 2019). This could increase the chance of "winner curse" (Tse, Pretorius and Chau, 2011) and cause negative market reactions to land acquisition outcomes. We investigate the economic profit of land acquisitions by event studies using the stock market reactions of the listed developers to the announcements of land auction outcomes.

[Insert Table 6 here]

Table 6 presents the cumulative abnormal returns of listed winners to land acquisition results. Panel A shows that in overall 146 events that listed developers won land auctions, the three-day cumulative abnormal returns around the announcement dates are 0.54% and 0.52% from market adjusted model (*CAR1*) and market model (*CAR2*) respectively, which are both significant at the 5% level. The results are consistent with previous studies (Ching and Fu, 2003; Tse, Pretorius and Chau, 2011) that land acquisitions in Hong Kong are positively associated with expected abnormal returns, probably due to the oligopolistic structure of the housing market (Tang, Leung and Ng, 2015). Surprisingly, the market responses to successful land acquisition from Chinese developers are as high as 1.21% (*CAR1*) and 1.05% (*CAR2*) and significant at the 5% level. The expected gain in the economic profit is also economically significant as 1.21% (1.05%) of market capitalization of Chinese developers is corresponding to the dollar amount around HK$1.28 (1.11) billion. The cumulative abnormal returns to the local winners are also positive. However, the returns are insignificant and the magnitudes are much smaller.

Panel B report the coefficient estimates from the regressions using Equation (2). Columns (1) and (2) show that the expected gains for Chinese developers from the real estate development after land acquisition are significantly larger than those for local developers. The cumulative abnormal returns of Chinese developers around the announcement dates of land auction outcomes

are 1.59% (CAR1) and 1.64% (CAR2), both significant at the 5% level, which are higher than those from local developers. Columns (3) and (4) indicate that the expected gains for the new entrants from China are also significantly larger than other developers. The results also show that the expected profit is lowered down if the winner pays too high prices to acquire the land parcels. The firm level variables are not significantly related to the abnormal returns except the variable of dividend yield, showing that the abnormal return is smaller for the winners with large dividend payments.

Overall, we find that Chinese developers are expected to gain significant economic profits from the outward real estate investment in Hong Kong markets. Even though they pay higher land prices than local developers in the land acquisitions, stock market still gives higher valuations to the investment decisions. The reason could be that Hong Kong housing market is oligopolistic and thus provides substantial profit margins to developers.[10] It is not surprising that Chinese developers can earn a large expected profit from the land development projects in Hong Kong because residential property price appreciation in Hong Kong is much higher than the one in China after 2010. Obtaining land parcels in Hong Kong can improve the overall profitability of Chinese developers. In contrast, local developers may not have such improvement in profitability. Even worse, the fierce competition from Chinese developers may erode the profit margins due to the rising land costs. This explains why the expected profit of the land acquisition by Chinese developers is significantly larger than that of local developers.

6. Conclusion

This study investigates the Chinese outward real estate investment in Hong Kong and assesses the impacts of the investments on Hong Kong land market as well as the profitability of the land acquisition. We find that the land purchases by Chinese developers has risen after 2011. Between 2011 and 2019, they acquired 13.04% of residential land parcels and paid 26.93% of land premiums in Hong Kong. These developers, especially the new entrants, pay significantly higher prices than local developers in the land acquisitions. We also observe that, the expected gains from land development of Chinese developers are positive and economically significant, and much

[10] Haila (2000) indicates that the richest families in Hong Kong accumulated their wealth in property business. Tang, Leung and Ng (2015) find that the top four local developers in Hong Kong account for more than 50% of housing market share.

larger than the gains local developers would normally have although the former may bear higher land costs. The results imply that outward real estate investment provides profitable opportunities to Chinese developers as the home market competition is severe and the state-led housing cooling measures reduce their profit margins. We expect that the trend of Chinese outward real estate investment will continue in the future and significantly impact the real estate markets in the host countries.

This paper fills the research gap in the scarce studies of the economic influence from China to other economies by outward real estate investment. In addition to the factors of cultural proximity and geographical proximity documented in the previous studies (e.g., Buckley et al., 2007), we show that the listing status in the host market and differentials between the property returns can also drive the outward real estate investments from China. Our paper is the first to investigate the impacts of China's outward real estate investment on the host market and the financial performance of investing companies. It gives clear evidence that outward investments from China could push up the land price in the host market and the market-seeking outward FDI could benefit the investing developers. By focusing on a specific industry, this study also makes contributions to the broad FDI literature as very few studies have explored whether (and why) outward investment affects investing companies. This study provides important implications policymakers that the impacts of investments from other markets should be considered when local housing policies are designed and implemented. Specific to Hong Kong, this could reflect the increasingly impacts of China's outward FDI on local housing market, which could pose a challenge to the government in order to stabilize housing price.

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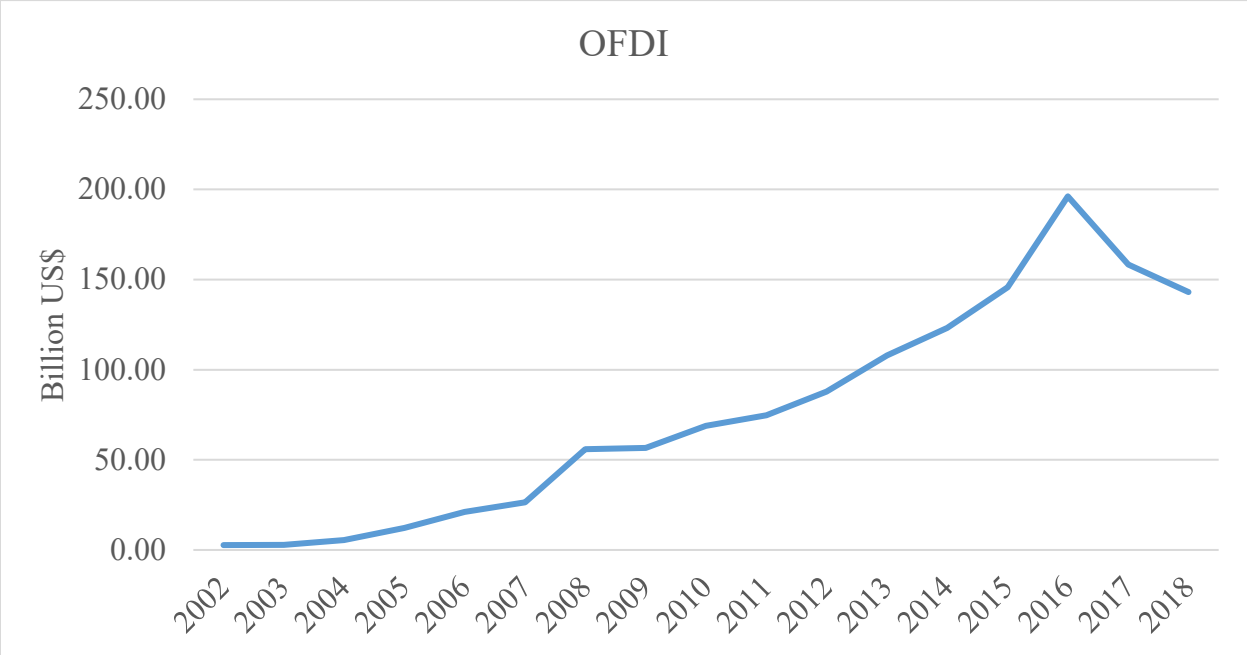
Appendix 1 Variable definitions

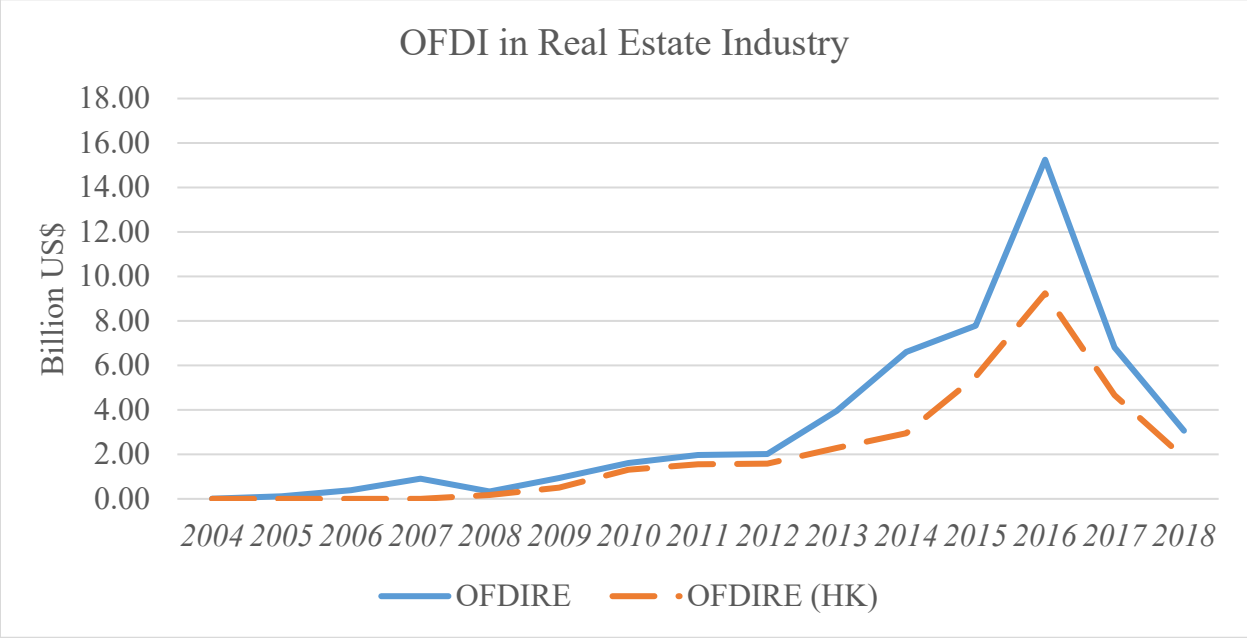
Variable	Definition
PRICE	Land price in million HK$ for a residential land parcel
LNPRICE	Natural logarithm of land price adjusted by the residential real estate index in Hong Kong
OFDI	Dummy variable equal to 1 if a winner is from China and 0 otherwise
OFDINEW	Dummy variable equal to 1 if a winner is a new entrant from China and 0 otherwise
AREA	Land area of a residential land parcel in million square foot
FAR	Floor area ratio of a residential land parcel
DISTANCE	The distance in km from site location of a land parcel to Hong Kong's CBD
R1	Dummy variable equal to 1 if a land parcel is located in a high residential density zone R1 and 0 otherwise
R2	Dummy variable equal to 1 if a land parcel is located in a medium residential density zone R2 and 0 otherwise
R3	Dummy variable equal to 1 if a land parcel is located in a low residential density zone R3 and 0 otherwise
R4	Dummy variable equal to 1 if a land parcel is located in a very low residential density zone R4 and 0 otherwise
HK	Dummy variable equal to 1 if a land parcel is located in Hong Kong Island and 0 otherwise
KL	Dummy variable equal to 1 if a land parcel is located in Kowloon and 0 otherwise
NT	Dummy variable equal to 1 if a land parcel is located in New Territories and 0 otherwise
BIDDER	The number of bidders in a land auction
LNBIDDER	Natural logarithm of the number of bidders
JOINT	Dummy variable equal to 1 if a land parcel is jointly won by developers and 0 otherwise
REIRET	Annualize return of residential real estate index in the past 12 months before land sale
CAR1	Cumulative abnormal return from market adjusted model for a listed winner after winning a land parcel
CAR2	Cumulative abnormal return from market model for a listed winner after winning a land parcel
MV	Market capitalization in billion HK$ of a listed winner at the end of the month prior to a land auction
LNMV	Natural logarithm of market capitalization
P	Stock price of a listed winner at the end of the month prior to a land auction
LNP	Natural logarithm of stock price
MOM	Stock return of a listed winner in the past three months prior to a land auction
TURN	Stock turnover of a listed winner in the past three months prior to a land auction
ROA	Return on assets of a listed winner in the fiscal year prior to a land auction
CASH	Cash ratio of a listed winner in the fiscal year prior to a land auction; cash holdings / total assets
LEV	Leverage ratio of a listed winner in the fiscal year prior to a land auction; total liabilities / total assets
DY	Dividend yield of a listed winner in the fiscal year prior to a land auction; dividend / stock price

Figure 1 Chinese outward FDI and real estate investment

Panel A: overall Chinese outward FDI by year

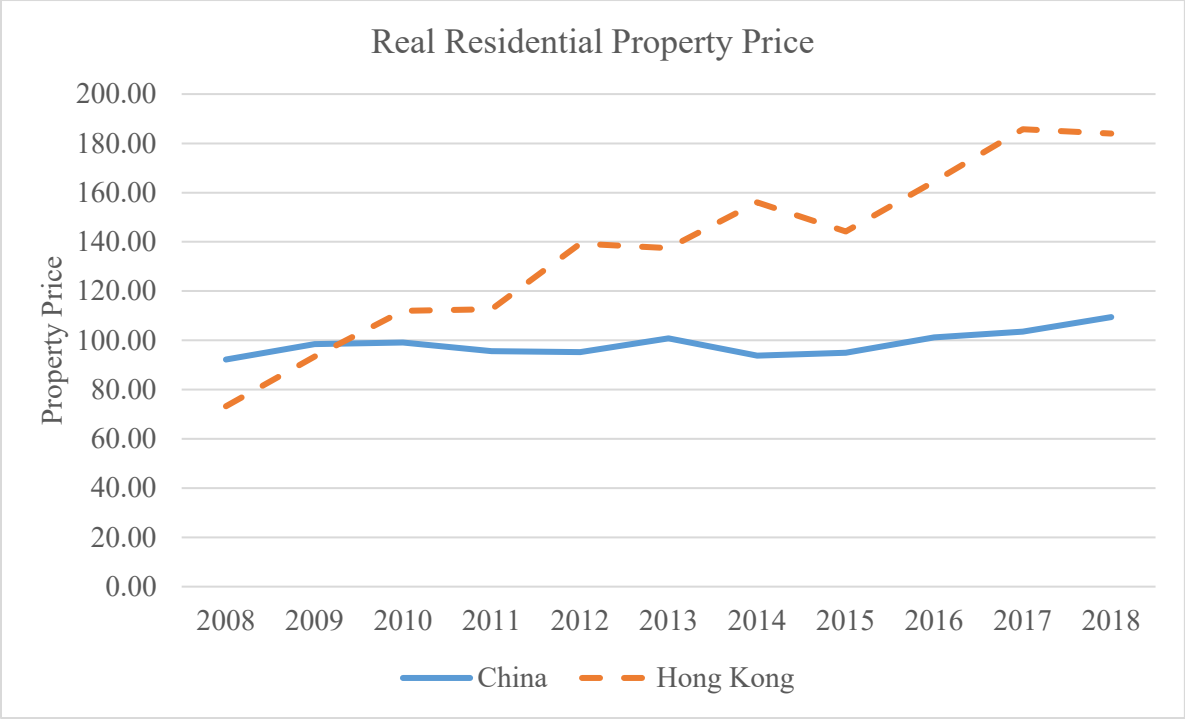


Panel B: Chinese outward FDI in real estate industry by year



Reference: Statistical Bulletin of China's Outward Foreign Direct Investment, Ministry of Commerce and China Statistics Bureau

Figure 2 Real residential property prices for China and Hong Kong



Reference: Bank for International Settlements, Index 2010=100 for both China and Hong Kong

Table 1 Residual land sold in Hong Kong market by year

Panel A: the number of residual land parcels

Year	Total number	Won by Chinese firms	Percent	Won by Chinese new entrants	Percent
2011	17	1	5.88%	0	0.00%
2012	20	2	10.00%	1	5.00%
2013	27	3	11.11%	1	3.70%
2014	28	3	10.71%	3	10.71%
2015	16	2	12.50%	2	12.50%
2016	23	5	21.74%	4	17.39%
2017	10	7	70.00%	7	70.00%
2018	11	2	18.18%	1	9.09%
2019	9	5	55.56%	2	22.22%
Total	161	30	18.63%	21	13.04%

Panel B: the land premium (billion $)

Year	Overall land premium (HK$ billion)	Overall land premium (US$ billion)	Paid by Chinese firms (HK$ billion)	Paid by Chinese firms (US$ billion)	Percent
2011	30.73	3.95	0.58	0.07	1.88%
2012	34.24	4.41	3.24	0.42	9.46%
2013	48.12	6.20	5.04	0.65	10.48%
2014	35.80	4.62	5.28	0.68	14.75%
2015	25.03	3.23	5.55	0.72	22.18%
2016	72.21	9.31	21.69	2.80	30.04%
2017	59.56	7.65	43.89	5.64	73.69%
2018	70.61	9.01	11.33	1.45	16.05%
2019	67.29	8.59	22.86	2.92	33.98%
Total	443.59	56.97	119.47	15.35	26.93%

Note: this table reports the statistics of residential land parcels sold by the Hong Kong government between 2001 and 2019 August. Chinese firms refer to the property developers from China. Chinese new entrants are those Chinese developers that had never joined Hong Kong property development market before 2011. Reference: Land Sale Records and Press Releases, Lands Department, Hong Kong.

Table 2 Winners and participants from China in the Hong Kong land market

Panel A: the characteristics of Chinese winners

	Winners from China	Wins	Stated-owned	Listed	List Code	Joint with local
1	China Overseas Land & Investment Limited	9	Y	Y	688.HK	Y*
2	HNA Group Co., Ltd.	4	N	N	---	N
3	Poly Property Group Co., Limited	4	Y	Y	119.HK	N
4	Agile Property Holdings Limited	3	N	Y	3383.HK	N
5	Vanke Property (Hong Kong) Company Limited	2	N	Y	2202.HK	N
6	KWG Property Holding Limited	2	N	Y	1813.HK	N
7	China City Construction (International) Co., Limited	1	Y	N	---	Y
8	China Resources Land Limited	1	Y	Y	1109.HK	N
9	China Metallurgical Group Corporation	1	Y	N	---	N
10	Logan Property Holdings Company Limited	1	N	Y	3380.HK	N
11	Longfor Properties Co. Ltd	1	N	Y	960.HK	N
12	Minmetals Land Limited	1	Y	Y	230.HK	N
13	Shenzhen Investment Limited	1	Y	Y	604.HK	Y
14	Shimao Property Holdings Limited	1	N	Y	813.HK	Y
15	Sino-Ocean Group Holding Ltd	1	Y	Y	3377.HK	N
	Total	30#				

Panel B: the characteristics of Chinese participants

	Participants from China	N of bids	N of bids (lose)	N of bids (win)	State-owned	Listed	List Code
1	China Overseas Land & Investment Limited	37	28	9	Y	Y	688.HK
2	Vanke Property (Hong Kong) Company Limited	24	22	2	N	Y	2202.HK
3	Poly Property Group Co., Limited	14	10	4	Y	Y	119.HK
4	Shimao Property Holdings Limited	12	11	1	N	Y	813.HK
5	KWG Property Holding Limited	11	9	2	N	Y	1813.HK
6	China Resources Land Limited	10	9	1	Y	Y	1109.HK
7	Logan Property Holdings Company Limited	9	8	1	N	Y	3380.HK
8	Agile Property Holdings Limited (Chairman)	7	4	3	N	Y	3383.HK
9	China Merchants Properties Development Limited	6	6	0	Y	Y	144.HK
10	HNA Group Co., Ltd.	5	1	4	N	N	---
11	China Metallurgical Group Corporation	4	3	1	Y	N	---
12	Minmetals Land Limited	4	3	1	Y	Y	230.HK
13	Longfor Properties Co. Ltd	3	2	1	N	Y	960.HK
14	Country Garden Holdings Company Limited	2	2	0	N	Y	2007.HK
15	Sino-Ocean Land (Hong Kong) Limited	2	1	1	Y	Y	3377.HK
16	China City Construction (International) Co., Limited	2	1	1	Y	N	---
17	Shenzhen Investment Limited	2	1	1	Y	Y	604.HK
18	China Evergrande Group	1	1	0	N	Y	3333.HK
29	C C Land Holdings Limited	1	1	0	N	Y	1224.HK
30	China Aoyuan Property Group Limited	1	1	0	N	Y	3883.HK
	Total	157	124	33			

Note: this table provides the characteristics of Chinese winners and participants in Hong Kong land auctions, including the number of land parcels won by each winner, the number of bids submitted by major participants, whether the developers are state-owned, listing status and listing code. Panel A gives the information of Chinese winners, totally 15 companies. Among 30 parcels acquired by Chinese developers, six of them are jointly won with local developers. Panel B provides the characteristics of participants from China. Reference: Land Sale Records and Press Releases, Lands Department, Hong Kong.

3 parcels are jointly won by two Chinese developers. The joint winners are KWG Property Holding Limited and Logan Property Holdings Company, KWG Property Holding Limited and Longfor Properties Co. Ltd., and Poly Property Group Co., Limited and China Resources Land Limited.

* 3 of 9 parcels won by China Overseas Land & Investment Limited are joint developed with local developer.

Table 3 Summary statistics

Panel A: variables related to land auction

Variable	Obs.	Mean	Std. Dev.	Min	Max
PRICE	161	2755.22	3792.86	15.01	25161
LNPRICE	161	19.87	1.48	15.78	22.63
OFDI	161	18.63%	0.39	0	1
OFDINEW	161	13.04%	0.34	0	1
AREA	161	0.12	0.13	0.00	0.81
FAR	161	3.46	2.39	0.2	9
DISTANCE	161	14.12	7.18	0.65	30.03
R1	161	0.24	0.43	0	1
R2	161	0.30	0.46	0	1
R3	161	0.38	0.49	0	1
R4	161	0.08	0.27	0	1
HK	161	0.07	0.26	0	1
KL	161	0.24	0.43	0	1
NT	161	0.68	0.47	0	1
BIDDER	161	11.04	5.86	2	30
LNBIDDER	161	2.26	0.56	0.69	3.40
JOINT	161	0.15	0.36	0	1
REIRET	161	0.09	0.10	-0.10	0.26

Panel B: variables related to land auction events and winner firms

Variable	Obs.	Mean	Std. Dev.	Min	Max
CAR1	146	0.54%	0.03	-0.06	0.11
CAR2	146	0.52%	0.03	-0.06	0.11
LNP	146	2.43	1.66	-2.81	4.88
MOM	146	0.04	0.14	-0.45	0.50
TURN	146	0.03	0.04	0.00	0.24
LNMV	146	10.36	1.81	6.31	12.82
ROA	146	0.06	0.04	0.00	0.19
CASH	146	0.11	0.08	0.02	0.51
LEV	146	0.21	0.10	0	0.44
DY	146	0.04	0.02	0	0.10

Table 4 Univariate tests of land price and characteristics between Chinese and local developers

Panel A: the whole sample

Variables	China (N=30)	Local (N=131)	Diff.	t-statistics
LNLDP	20.78	19.67	1.11	(3.86)***
AREA	0.12	0.12	0.00	(0.01)
FAR	4.41	3.24	1.17	(2.45)**
DISTANCE	10.43	14.97	-4.54	(-3.21)***
R1	0.47	0.19	0.28	(3.27)***
R2	0.27	0.31	-0.04	(0.42)
R3	0.17	0.43	-0.26	(-2.70)***
R4	0.10	0.08	0.02	(0.43)
HK	0.07	0.08	-0.01	(0.18)
KL	0.60	0.16	0.44	(5.50)***
NT	0.33	0.76	-0.43	(-4.86)***

Panel B: the matched sample

Variables	China (N=30)	Local (N=49)	Diff.	t-statistics
LNLDP	20.78	20.00	0.78	(2.45)**
AREA	0.12	0.12	-0.01	(-0.21)
FAR	4.41	3.51	0.90	(1.51)
DISTANCE	10.43	12.67	-2.24	(1.31)
R1	0.47	0.29	0.18	(1.63)
R2	0.27	0.24	0.02	(0.21)
R3	0.17	0.33	-0.16	(1.57)
R4	0.10	0.14	-0.04	(0.55)
HK	0.07	0.08	-0.01	(0.24)
KL	0.60	0.43	0.17	(1.48)
NT	0.33	0.49	-0.16	(1.36)

Note: this table reports the differences of land price and characteristics between the parcels won by Chinese developers and local developers. Panel A gives the results from overall sample. Panel B presents the comparisons from matched sample. The *t-statistics* are reported in parentheses. ***, **, * represent the statistical significance at 10%, 5% and 1% level, respectively.

Table 5 Chinese outward real estate investment and land price in Hong Kong

Panel A: the whole sample

	(1)	(2)	(3)	(4)
OFDI	0.3070	0.3048		
	(2.00)**	(1.58)		
OFDINEW			0.3696	0.4708
			(2.70)***	(2.56)**
AREA	7.0068	6.9882	7.0169	6.9947
	(7.23)***	(7.57)***	(7.24)***	(7.63)***
FAR	-0.0159	0.0158	-0.0183	0.0109
	(-0.19)	(0.18)	(-0.22)	(0.12)
DISTANCE	-0.0572	-0.0502	-0.0578	-0.0503
	(-3.09)***	(-2.55)**	(-3.13)***	(-2.57)**
R1	1.3911	1.3739	1.4194	1.4532
	(2.61)***	(2.27)**	(2.67)***	(2.37)**
R2	1.4490	1.4374	1.4767	1.5164
	(3.78)***	(3.22)***	(3.87)***	(3.37)***
R3	0.4719	0.5657	0.4810	0.6144
	(2.04)**	(1.96)*	(2.11)**	(2.15)**
HK	0.3191	0.4434	0.3353	0.4617
	(0.69)	(0.95)	(0.73)	(1.00)
KL	0.5508	0.4958	0.5829	0.5114
	(1.97)*	(1.53)	(2.18)**	(1.67)*
LNBIDDER	0.3618	0.3896	0.3377	0.3796
	(2.26)**	(1.95)*	(2.08)**	(1.91)*
JOINT	0.5560	0.5895	0.5667	0.5945
	(3.70)***	(3.80)***	(3.67)***	(3.79)***
REIRET	1.7547	1.4518	1.7392	1.3237
	(2.47)**	(0.92)	(2.45)**	(0.84)
Constant	17.6838	17.5228	17.7345	17.5424
	(30.96)***	(28.37)***	(30.94)***	(28.34)***
Year dummies	No	Yes	No	Yes
N	161	161	161	161
R-squared	0.679	0.699	0.680	0.703

Panel B: the matched sample

	(1)	(2)	(3)	(4)
OFDI	0.2814	0.2511		
	(1.72)*	(1.39)		
OFDINEW			0.4081	0.4300
			(2.82)***	(2.69)***
AREA	5.5000	5.2399	5.4949	5.2702
	(4.73)***	(4.26)***	(4.79)***	(4.31)***
FAR	-0.1484	-0.1288	-0.1527	-0.1475
	(-1.35)	(-1.17)	(-1.41)	(-1.34)
DISTANCE	-0.0799	-0.0702	-0.0833	-0.0726
	(-2.44)**	(-1.69)*	(-2.60)**	(-1.78)*
R1	2.0384	1.7687	2.0548	1.9030
	(2.81)***	(2.26)**	(2.97)***	(2.49)**
R2	1.7838	1.5802	1.8206	1.6905
	(3.14)***	(2.40)**	(3.33)***	(2.61)**
R3	0.7898	0.6622	0.7985	0.7300
	(2.43)**	(1.45)	(2.52)**	(1.63)
HK	-0.4126	-0.2518	-0.3842	-0.2295
	(-0.66)	(-0.42)	(-0.61)	(-0.39)
KL	0.3367	0.4754	0.3506	0.5016
	(0.66)	(0.68)	(0.71)	(0.75)
LNBIDDER	0.0179	-0.0949	-0.0581	-0.1403
	(0.11)	(-0.51)	(-0.36)	(-0.74)
JOINT	0.5855	0.6146	0.5886	0.6314
	(3.55)***	(2.73)***	(3.68)***	(2.85)***
REIRET	-0.2326	0.3331	-0.2521	0.3170
	(-0.23)	(0.14)	(-0.25)	(0.13)
Constant	19.4003	19.1320	19.6055	19.2576
	(22.33)***	(18.12)***	(23.43)***	(18.45)***
Year dummies	No	Yes	No	Yes
N	79	79	79	79
R-squared	0.740	0.771	0.746	0.777

Note: This table presents the results of Eq. (1) that estimates the impacts of Chinese outward real estate investment on land prices in Hong Kong market. The dependent variable is the natural logarithm of land price deflated by residential property return. The key independent variable *OFDI* (or *OFDINEW*) is a dummy variable equal to 1 if the land parcel is acquired by a developer (or a new entrant) from China and 0 otherwise. The detailed variable definitions are in Appendix 1. Panel A reports the results from overall sample. Panel B presents the coefficient estimates from matched sample. The *t-statistics* adjusted by robust standard error are reported in parentheses. ***, **, * represent the statistical significance at 10%, 5% and 1% level, respectively.

Table 6 Chinese outward real estate investment and economic profit

Panel A: cumulative abnormal returns of winning land auction

Variable	All (N=146)	China (N=26)	Local (N=120)
CAR1	0.54%	1.21%	0.39%
t-statistics	(2.35)**	(2.25)**	(1.56)
CAR2	0.52%	1.05%	0.41%
t-statistics	(2.29)**	(2.09)**	(1.60)

Panel B: market response to Chinese and local winners

	(1)	(2)	(3)	(4)
	CAR1	CAR2	CAR1	CAR2
OFDI	0.0159	0.0164		
	(2.18)**	(2.28)**		
OFDINEW			0.0180	0.0152
			(2.06)**	(1.74)*
LNLDP	-0.0042	-0.0047	-0.0044	-0.0049
	(-1.95)*	(-2.11)**	(-2.02)**	(-2.16)**
LNP	0.0026	0.0019	0.0017	0.0012
	(0.63)	(0.47)	(0.43)	(0.29)
MOM	0.0134	0.0134	0.0186	0.0172
	(0.50)	(0.53)	(0.69)	(0.67)
TURN	0.0265	-0.0104	0.0183	-0.0086
	(0.33)	(-0.13)	(0.23)	(-0.10)
LNMV	-0.0028	-0.0031	-0.0006	-0.0010
	(-0.76)	(-0.83)	(-0.18)	(-0.29)
ROA	0.0112	-0.0025	0.0393	0.0224
	(0.14)	(-0.03)	(0.46)	(0.28)
CASH	-0.0284	-0.0317	-0.0172	-0.0194
	(-0.74)	(-0.82)	(-0.47)	(-0.54)
LEV	0.0185	0.0093	0.0380	0.0306
	(0.54)	(0.28)	(1.21)	(1.03)
DY	-0.3852	-0.4444	-0.3447	-0.4038
	(-2.21)**	(-2.48)**	(-2.02)**	(-2.28)**
REIRET	0.1628	-0.3624	0.0738	-0.4287
	(0.26)	(-0.57)	(0.12)	(-0.67)
Constant	0.1125	0.1468	0.0919	0.1255
	(2.07)**	(2.66)***	(1.78)*	(2.38)**
Year dummies	Yes	Yes	Yes	Yes
N	146	146	146	146
R-squared	0.176	0.179	0.168	0.164

Note: this table reports the cumulative abnormal returns for listed winners. CAR1 (CAR2) is the cumulative abnormal return in a three-day event window around the announcement date of land auction outcome from market adjusted model (market model). Panel A gives the cumulative abnormal returns for overall listed developers, Chinese developers and local developers. The *t-statistics* are reported in parentheses. Panel B presents the results of Eq. (2). The key independent variable *OFDI* (or *OFDINEW*) is a dummy variable equal to 1 if the land parcel is acquired by a developer (or a new entrant) from China and 0 otherwise. The detailed variable definitions are in Appendix 1. The *t-statistics* adjusted by robust standard error are reported in parentheses. ***, **, * represent the statistical significance at 10%, 5% and 1% level, respectively.