It is Not Easy Being a Flipper:

Return-Risk Trade-Off and Term Structure of Idiosyncratic Risk in the Housing Market

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Abstract

The idiosyncratic risk of capital gains in the housing market is large but declines with the holding period, implying that the excess capital gain returns of short-term flippers are obtained at the cost of bearing high idiosyncratic risk. Using the comprehensive housing transaction records in Hong Kong from 1993 to 2021, we find that although flippers obtained higher annualized returns than long-term buyers by 8.76 percentage points on average, the Sharpe ratio of flippers is lower than that of long-term buyers. The appraisal ratio of novice flippers is significantly lower than that of experienced long-term buyers and is merely comparable to that of novice long-term buyers. Only experienced flippers, who have at least 2 prior trading experiences and constitute less than 20% of the flippers, outperform long-term buyers in terms of risk-adjusted returns. Employing the unique urban and policy setting in Hong Kong, we also provide new empirical evidence that information quality and market liquidity explain the term structure of idiosyncratic risk.

Keywords: Idiosyncratic Risk, Term Structure of Risk, Flipper, Housing, Market Liquidity
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1. Introduction

The economic function of short-term investors (colloquially known as flippers) in the real estate market attracts substantial attention from the recent literature (e.g., Fu et al., 2016; Leung & Tse, 2017). A significant proportion of flippers attempt to profit from buying low and selling high in the housing market (Bayer et al., 2020), which improves the liquidity of the residential property that are difficult to be priced (Agarwal et al., 2023). The consensus is that these flippers play welfare-enhancing roles of arbitraging intermediaries in the housing market, but they are subject to considerable informational friction, liquidity constraints, and search and holding costs. While past literature highlights the excess return of flippers than other long-term buyers in the housing market, little is known about the risk associated with flipping activity. Understanding the return-risk trade-off faced by flippers is as important as understanding the economic function played by flippers, as flippers' function and performance must be evaluated together with the risk they take and share.

In this paper, we evaluate flippers' performance from the perspective of return-risk trade-off, and in particular we examine whether idiosyncratic risk plays an important role in such trade-off. The substantial risk of flipping is exemplified by the recent failure of Zillow's home-flipping business (Clark, 2021). We focus on idiosyncratic risk because Shleifer and Vishny (1997) and Pontiff (2006) identify idiosyncratic risk as the primary arbitrage holding cost. In the housing market, Giacoletti (2021) shows that accounting for annualized idiosyncratic risk substantially changes the assessment of the risk-return trade-off. Diversification of investment portfolio does not provide immunity to idiosyncratic risk when arbitrageurs explore market inefficiencies. Treynor and Black (1973) and Pontiff (2006) show that idiosyncratic risk will limit arbitrage with equal effectiveness in both concentrated and well-diversified portfolios. A large institution, like Zillow, may use advanced computer algorithms to identify thousands of attractive homes to flip but idiosyncratic risk will still play a crucial role in Zillow's return-risk trade-off. Correctly evaluating flippers' performance is also important for evidence-driven policy making. Most government attempts to regulate flipping only emphasize the high capital gains exploited by flippers. The risk involved in home-flipping has been largely ignored by not only the academic literature and the practitioners (including large institutions like Zillow), but also the policymakers.

Using the data of comprehensive secondhand housing transactions in Hong Kong between 1993 and 2021, we show that flippers bear substantial idiosyncratic risk compared to long-term buyers. Only the experienced flippers, constituting less than 20% of the flippers, can generate higher risk-adjusted returns that outperform the long-term buyers. In short, it is not easy being a flipper.

We first examine the term structure of risk in residential real estate capital gains. We find that the idiosyncratic risk of the annualized capital gain decreases with the holding period. If the holding period is extended by 1 year, the idiosyncratic risk decreases by 0.61 percentage points on average, equivalent to a 6.56% decrease from the average idiosyncratic risk level. The term structure of the idiosyncratic risk has a convex shape, with a sharp decrease in the idiosyncratic risk by around 1.86 percentage points after the first holding year. Flippers who resell the properties within 2 years after the purchases, undertake a substantially higher level of idiosyncratic risk than non-flippers by 8.65 percentage points. Novice flippers, who have fewer than 2 trading experiences in the local housing market, bear even a higher level of idiosyncratic risk than the experienced flippers by around 1.53 percentage points. These results are consistent with the findings and arguments in Giacoletti (2021) and Sagi (2021) that the annualized idiosyncratic risk in the real estate capital gains is not following a random walk. In addition, we also find consistent results with Eichholtz et al. (2021) that idiosyncratic risk constitutes a significant part of total risk in real estate capital gain and the annualized total risk is also a function of the holding period. Our finding suggests that the excess returns achieved by flippers should be examined in terms of the term structure of risk.

We further investigate the risk-adjusted performances of flippers in the Hong Kong housing market. Consistent with the findings in other housing markets (e.g., Bayer et al., 2020; Chi et al., 2021; Zhang et al., 2023), we find that on average, housing flippers achieve a higher total return than non-flippers in Hong Kong by 8.76 percentage points. Due to the information advantages accumulated in past trading experiences (Fan et al., 2023; Ling et al., 2018), experienced flippers achieve an even higher return than novice flippers by 6.23 percentage points. However, after taking the additional risk borne by flippers into consideration, we find that for home investments with positive capital gain returns, the Sharpe ratio of investments made by flippers is surprisingly lower than that of non-flippers by 0.0836. Although this difference is small (equal to around 2% of the average Sharpe ratios), this result indicates that flippers are not outperforming after we consider the risk-return trade-offs. The novice flippers perform worse in terms of Sharpe ratios than all the other types of home investors, including the novice non-flippers who have similar level of prior market trading experiences.

We also find similar patterns in the appraisal ratios of the home investors in Hong Kong. Among the home investors who have achieved positive abnormal returns, only the experienced flippers, who constitute less than 20% of the flippers and no more than 5% of all home buyers, outperform the long-term buyers in terms of the ratio of abnormal return to idiosyncratic risk. In contrast, the novice flippers do not show an extraordinary asset-picking ability, because their appraisal ratio is just merely comparable to that of novice long-term buyers and is significantly lower than that of the experienced long-term buyers. These findings are also aligned with the discussions on flippers' various trading strategies in Agarwal et al. (2023) and Bayer et al. (2020), as experienced flippers are more capable to arbitrage undervalued home investments in the market, while novice flippers may only earn the capital gains from fast market growth. Our findings reveal the underperformance of novice flippers who constitute more than 80% of the flippers.

We proceed to examine the mechanisms that shape the term structure of idiosyncratic risk in housing investments and result in the high risk taken by flippers. The first one is the quality of information available to evaluate the market price at the transaction time, as worse information quality will result in larger price dispersions and higher idiosyncratic risk. We hypothesis that the hold period is a proxy of the process of accumulative comparable market information on price movements from the purchase time to resale time. Using the number of highly comparable apartment sales in the same building (or housing complex) during the home period as the measurement of available comparable information at the transaction time (Li & Wan, 2021), we find supporting evidence that given the same hold period, apartment units with more comparable information will have a lower level of idiosyncratic risk. The number of comparable sales in the holding period can explain at least 62% of the variation in idiosyncratic risk with holding periods.

The second mechanism that we explore is market thinness, as properties with fewer potential buyers and/or sellers can result in larger price dispersion and higher idiosyncratic risk. We use the introduction of the Special Stamp Duty (SSD) policy by the Hong Kong government on November 20, 2010, as an identification for the changes in market thinness. This policy levies an additional stamp duty of 5-15% on home sales that are held for fewer than 2 years, which substantially increased the transaction costs of the flippers. Therefore, it largely suppressed the supply in the market, as mainly flippers defer their sales to avoid the additional tax (Agarwal et al., 2023; Chi et al., 2021). Meanwhile, it also impacts the demand, because flippers who still choose to resell within the lock-in period tend to transfer the costs to buyers and discourage potential buyers from accepting the deals (Zhang et al., 2023). We find that after the SSD policy takes effect, the idiosyncratic risk taken by flipper substantially increases, and the impact is larger for flippers who are subject to a higher level of stamp duty, which supports the mechanism of market thinness. While these two mechanisms are not mutually exclusive (i.e., properties with worse information quality are likely to be in a thinner market), they concurrently support the theoretical predictions in Pontiff (2006) and Sagi (2021) that market liquidity affects the level of idiosyncratic risk.

Last, we conduct robustness checks and additional cross-market analysis of our results. All our results survive if we use the standard deviations of returns in logarithmic form to measure the risk, like in Peng & Thibodeau (2017). We further use the resales of newly constructure apartment units to tease out the potential impact of unobserved renovations and capital improvements (Goetzmann & Spiegel, 1995). We further conduct subsample analyses of home investments purchased before the SSD policy took effect to address the potential policy impact on flippers' risk-adjusted performance, and our results remain robust. Finally, we compare the term structure of idiosyncratic risk in the Hong Kong housing market with the one in the California single-family residence market documented by Giacoletti (2021). The findings are consistent with the argument in Giacoletti (2021) that markets with worse information quality (i.e., California) have a steeper slope in the term structure than the market with better information quality (i.e., Hong Kong).

This study contributes to two strands of literature. First, it advances the literature on flipping activities in real estate markets. It is among the first to evaluate the performance and trading behaviors of flippers in terms of risk-return trade-offs. Given the high abnormal capital gain returns (LaCour-Little & Yang, 2021), short-term flipping transactions are popular in global housing markets (Bayer et al., 2020; Zhang at el., 2023). Recent studies argue that the only experienced flippers (i.e., with high trading volume), who act as middlemen in the market like dealers, help to improve market liquidity and reduce price volatility (Agarwal et al., 2023; Fu et al., 2016). In contrast, novice flippers (i.e., with low trading volume) are more likely to be speculators (Bayer et al., 2020), who amplify transaction volume and create momentum trading (DeFusco et al., 2022; Fu & Qian, 2015). While these past studies emphasize the importance of deterring the later type of speculative flipping transactions from the policy and regulation perspective (Chi et al., 2020), we provide new insights of discouraging flipping speculations from the perspective of making rational investment decisions. We emphasize that the speculative flipping transactions of novice flippers are not justified in terms of risk-return trade-off. Despite the high annualized capital returns, the novice flippers need to take higher level of risk due to the unique term structure of risk in the property market, and their risk-adjusted performance ratios are at best comparable to or worse than that of novice long-term investors. Therefore, our results bear important practical implications for the investors in housing markets.

Second, our study contributes to the growing literature on the term structure of idiosyncratic risk in real estate investment. Most previous real estate literature follows the standard framework in financial economics and assumes that idiosyncratic risk of real estate capital gain follow a random walk (e.g., Flavin & Yamashita, 2002; Landvoigt et al., 2015). In other words, the total idiosyncratic risk over the holding period is to scale with the holding period, and the annualized term of idiosyncratic risk is to be constant. Recent studies reject this hypothesis of a random walk. Sagi (2021) develops a theoretical model to show that there is a large component of total idiosyncratic risk in property prices that does not scale with holding periods, because this idiosyncratic component is driven by shocks (price dispersions) that only take place at the transaction time. Therefore, the annualized idiosyncratic risk become smaller with longer holding periods. The theoretical model predicts that information quality and market thinness affect the size of the idiosyncratic shock and shapes the term structure of annualized idiosyncratic risk, but there still lacks sufficient empirical evidence. One exception is Giacoletti (2021), which uses a cross-sectional measurement of the home atypicality and an approximation of credit supply at the Zip Code level to shows that: 1) the annualized idiosyncratic risk will be larger if inferring the market price of a house is more difficult (i.e., worse information quality); and 2) suppressed demand due to lower credit supplies result in a higher annualized idiosyncratic risk (i.e., a thinner market). We provide new supporting evidence for the theoretical explanations, exploiting the unique urban and policy setting in Hong Kong. Instead of using cross-sectional measurement of atypicality, we directly measure the availability of comparable transaction information at the reselling time, which supports the channel of information quality. Further, using the introduction of transaction tax that severely affects market liquidity of properties held by flippers (Agarwal et al., 2023; Zhang et al., 2023), we provide new supporting evidence for the channel of market thinness.

The remaining part of the paper is organized as follows. Section 2 introduces our measurements of idiosyncratic risk and the risk-adjusted performance of the home investors. Section 3 introduces our data and sample. Section 4 presents the empirical results on the term structure of idiosyncratic risk in the Hong Kong housing market, followed by the discussions on flippers' risk-adjusted performances in Section 5. Section 6 discusses the mechanisms for the term structure. Section 7 presents the results of robustness checks and additional analyses, and Section 8 concludes.

2. Measurement of Idiosyncratic Risk and Risk-adjusted Performance

The idiosyncratic component of house capital gain is the capital gain that is specific to each individual house resale, which is not explained by local market fluctuations and common physical characteristics across houses (e.g., Piazzesi et al. (2007)). Measuring this idiosyncratic component reliably is the focus of the literature on idiosyncratic risk of real estate investments. Compared to other mainstream financial products, measuring the idiosyncratic capital gain of real estate is particularly challenging due to the heterogeneous features of real estate assets and the low liquidity of real estate markets. Some literature defines idiosyncratic risk in housing market as the standard deviation of hedonic pricing errors (e.g., Peng & Thibodeau (2017), Peng & Zhang (2021), and Simlai (2018)). Giacoletti (2021) uses the local market index to compute the excess return over the market performance and then regresses the excess return on hedonic features to obtain residuals for idiosyncratic risk calculation. In the study, we adopt both methods from these two strands of literature, with certain modifications that suit the institutional setting in the Hong Kong housing market.

2.1. Idiosyncratic Risk using Method by Giacoletti (2021)

First, we follow the methodology in Giacoletti (2021) and use the matched property index returns during the holding period as the benchmarked market returns. We denote the corresponding abnormal return and idiosyncratic risk derived from this method as AR_G and $IdioRisk_G$, respectively. Specifically, for a home i purchased at time t and resold at time T, we denote its initial purchase price and the subsequent resale price as $P_{i,t}$ and $P_{i,T}$, respectively. During the holding period from t to T, the total market return (*TMR*) of all housing units comparable to unit *i* in Hong Kong is denoted as $TMR_{i,t,T}$. We obtain the total market returns using the local market indices of units in the same range of unit sizes, provided by the Rating and Valuation Department (RVD) of Hong Kong.[4] The RVD indices are derived using a hedonic approach based on the complete transactions in the market, with adjustments on property features over time (Chau at el., 2005), so they effectively capture the overall local market trends. If this home investment achieves the same capital gain appreciation as the overall market trend, the selling price should be equal to $P_{i,t} * (1 + TMR_{i,t,T})$. Accordingly, for this home investment, the total excess return (*TER*) beyond the market trend is written as below:

$$TER_{i,T} = \frac{P_{i,T} - P_{i,t} * (1 + TMR_{i,t,T})}{P_{i,t} * (1 + TMR_{i,t,T})}. \quad \text{--- (1)}$$

We transform the total excess capital gain returns into the logarithmic form and annualize it using the same rescaling method in Giacoletti (2021) and Sagi (2021). The total excess return in logarithmic form is scaled by $\sqrt{T - t}$, where $T - t$ equals the holding period in years. Accordingly, the annualized excess return beyond market trend in logarithmic form ($\log(ER_{i,T})$) is computed as:

$$\log(ER_{i,T}) = \frac{\log(1 + TER_{i,T})}{\sqrt{T - t}}. \qquad \text{--- (2)}$$

To further exclude the return components shared by common physical characteristics of the property, we follow Giacoletti (2021) and estimate the following regression equation:

$$\log(ER_{i,T}) = \beta X_{i,T} + \varphi_d + \omega_T + u_{i,T}, \qquad \text{--- (3)}$$

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[4] The Hong Kong RVD residential property price index is separated by class. The Class A index includes apartments with saleable areas under 40 m^2. The Class B index includes apartments with saleable areas between 40 m^2 and 69.9 m^2. The Class C index includes apartments with saleable areas between 70 m^2 and 99.9 m^2. The Class D index includes apartments with saleable areas between 100 m^2 and 159.9 m^2. The Class E index includes apartments with saleable areas above 160 m^2.

where $X_{i,T}$ is a set of information on physical property features, such as salable unit size, floor, building age, etc. φ_d and ω_T denotes the district and year-month fixed effects, respectively. The estimated residuals ($\hat{u}_{i,T}$) from Equation (3) represent the estimates of the idiosyncratic component of capital gains, namely the abnormal return in logarithmic form ($\log(AR_G)$):

$$\log(AR_{G,i,T}) = \hat{u}_{i,T}. \qquad \text{--- (4)}$$

Finally, we transform $\hat{u}_{i,T}$ from the logarithmic form back to the level, denoted the result as the level of abnormal return ($AR_{G,i,T}$):

$$AR_{G,i,T} = \exp(\hat{u}_{i,T}) - 1. \qquad \text{--- (5)}$$

The idiosyncratic risk of the capital gain return is computed as the standard deviation of the annualized abnormal returns ($AR_{G,i,T}$) among properties in the same district, purchased in the same year and month by investors at the same experience level ("experienced" or "novice"), and held for a similar period in length.[5] Investors are classified as experienced buyers if they have made at least two home purchases in Hong Kong before. Otherwise, they are considered novice buyers. For holding periods, we separate them into bins with incremental intervals of 6 months (i.e., 0-6 months, 7-12 months, etc.). Properties with holding periods in the same bins are deemed as having similar holding periods in length. With this approach, we obtain the level of idiosyncratic risk ($IdioRisk_G$). Notably, in some literature like Giacoletti (2021), the idiosyncratic risk is computed as the standard deviations of $\log(AR_{G,i,T})$, without transforming them back to the level. In this study, in order to achieve more interpretable regression coefficients, we follow the common practice in finance literature (e.g., Brown & Goetzmann, 1995) and use the standard deviations of abnormal returns in levels as our main results. We also use the standard deviations of $\log(AR_{G,i,T})$, denoted as $\log(IdioRisk_{G,i,T})$, in our additional robustness checks.

We further measure the total returns and total risk of the property investments to complete the investment performance evaluation. To be comparable with the annualized abnormal return in

[5] Giacoletti (2021) has implemented two approaches to measure the risk in the idiosyncratic component of capital gains. The first approach assumes a random walk in the idiosyncratic abnormal capital gain with a zero mean, so the squared idiosyncratic capital gain should be equal to the variance of idiosyncratic capital gain ($Var(\hat{u}_{i,T}) \approx E[\hat{u}_{i,T}^2]$). We relax this assumption due to the time-variance term structure of the idiosyncratic risk and follow the second approach in Giacoletti (2021) to measure the idiosyncratic risk as the standard deviation of $\hat{u}_{i,T}$ among a certain groups of property investments.

logarithmic form, the annualized total return in logarithmic form ($\log(TR_{i,T})$) is computed as the log of the total capital gain scaled by the same factor ($\sqrt{T-t}$) introduced by Giacoletti (2021) and Sagi (2021):

$$\log(TR_{i,T}) = \frac{\log(P_{i,T}/P_{i,t})}{\sqrt{T-t}}. \qquad \text{--- (6)}$$

Then, we transform it back to the level of the annualized total return ($TR_{i,T}$). The total risk ($TotalRisk_{i,T}$) is computed as the standard deviation of the annualized total return among comparable properties in the same district, purchased in the same year and month by same type of investors, and held for a similar period in length.

2.2. Idiosyncratic Risk using Method by Peng & Thibodeau (2017)

The second approach we take to measure the idiosyncratic risk follows the analysis in Peng & Thibodeau (2017), which is in the same spirit as a multifactor model that considers the market return and other hedonic property features as factors. To formally define the risk, we use the following log-linear model of annualized total capital gain returns that includes the market return and housing features as the explanatory variables at the right-hand side:

$$\log(TR_{i,T}) = \beta_1 \log(MR_{i,t,T}) + \beta_2 X_{i,T} + \varphi_d + \omega_T + v_{i,T}. \quad \text{--- (7)}$$

$\log(TR_{i,T})$ denotes the annualized total capital gain return in logarithmic form of property *i* sold at time *T*, as derived in Equation (4). $\log(MR_{i,t,T})$ is the annualized local market return in logarithmic form during the holding period from *t* to *T*, written as below:

$$\log(MR_{i,t,T}) = \frac{\log(1+TMR_{i,t,T})}{\sqrt{T-t}}. \qquad \text{--- (8)}$$

Same as in the first method, we use the RVD price index that matches the unit size of property *i* to calculate the total market return over the holding period ($TMR_{i,t,T}$). $X_{i,T}$ is the same set of physical property features as in Equation (3). φ_d and ω_T are the district and year-month fixed effects, respectively. $v_{i,T}$ is the component of the capital gain return that cannot be explained by the market return and common property features.

We define the imputed residuals of Equation (7), $\hat{v}_{i,T}$, as the abnormal return of this property investment in logarithmic form. To differentiate it from the abnormal return that we estimate in the first method, we denote this abnormal return derived from the method by Peng & Thibodeau (2017) as log (AR_{PT}). We transform it back to the level and use the result as the abnormal return (AR_{PT}).

Last, we calculate the standard deviations of AR_{PT} among all properties located in the same district, purchased in the same month and by the same type of investors, and held for a similar period in length. The standard deviations are called the idiosyncratic risk of the capital gain, denoted as $IdioRisk_{PT}$. Same as in the first method, we also calculate the standard deviations of log (AR_{PT}) as alternative measurements of idiosyncratic risk in the robustness checks, which are denoted $\log(IdioRisk_{PT})$.

2.3. Risk-adjusted Performance Evaluation

Based on the methods widely adopted in finance literature, we introduce two ratios to compare the risk-adjusted performance of flippers and other long-term investors in real estate markets. The first one is the Sharpe ratio, which measures the performance of an investment compared to a risk-free asset, after adjusting for the total risk of the investment (Sharpe, 1966). While this ratio was initially introduced for comparing mutual fund performance, it has also been adopted to measure the risk-adjusted performance of real estate assets (Fugazza et al., 2009; Lin & Liu, 2008; Shilling, 2003). This measurement seeks to characterize how well the return of a residential property that flippers (or non-flippers) choose to invest compensates for the total risk they take. In our context of residential property investment, we define the Sharpe ratio as:

$$SharpeRatio = \frac{TR_{i,T} - Rf_{t,T}}{TotalRisk_{i,T}}. \qquad \text{---(9)}$$

Specifically, $Rf_{t,T}$ denotes annualized total risk-free return during the holding period from t to T. The total risk-free return is calculated as the annualized commutative return of 1-month deposit rate in Hong Kong during the holding period.[6]

[6] We use the annualized cumulative return of monthly deposit rate to match with the variations in the holding periods of property investments. We confirm that all results remain robust if we use the medium and long-term deposit rates (e.g., 6 months, 1 year, 2 years, etc.) that are best matched with the holding periods.

The second risk-adjusted performance measurement we use is the appraisal ratio, defined as the abnormal return (Alpha) per unit of idiosyncratic risk (Brown & Goetzmann, 1995). This ratio is widely used to examine the skills of the investors in terms of selecting assets that provide outperforming risked-adjusted abnormal returns beyond the benchmarks (e.g., Cederburg et al., 2020; Li et al., 2011). In our context, the appraisal ratio represents whether flippers are more informed than non-flippers to identify property investment opportunities that provide risk-adjusted abnormal returns. We calculate the appraisal ratios using the abnormal returns and idiosyncratic risk derived from the methods by Giacoletti (2021) and Peng & Thibodeau (2017), respectively. The formulas are as follows:

$$AppraisalRatio_G = \frac{AR_G}{IdioRisk_G}, \qquad \text{---(10)}$$

$$AppraisalRatio_{PT} = \frac{AR_{PT}}{IdioRisk_{PT}}. \qquad \text{---(11)}$$

3. Data and Sample

The housing transaction data we use in the study are obtained from the EPRC Limited,[7] a data vendor that tracks the complete housing transactions lodged in the Hong Kong Land Registry. Our sample period is from 1993 to 2021. The EPRC property transaction data provides information on transaction details, such as the transaction date, price, buyers' names, and sellers' names. It also contains a comprehensive list of property features, such as the property address, building construction year, floor level, salable floor area (i.e., net unit size), and the property type (e.g., residential properties, industrial properties, offices, and retail properties).

We select our sample in the following steps. First, we only use the resales of residential properties that were initially purchased within our study period, enabling us to compute the capital gain returns during the holding periods. Second, we exclude resales with a holding period shorter than one month, which are unlikely to be normal transactions at arm's length. Third, we drop the home buyers who purchase multiple housing units in the same day. Further, we only use the transactions of private apartment units and dropped village houses, because the village houses are

[7] See: http://www.eprc.com.hk.

subject to special transaction restrictions in Hong Kong. Last, same as in Fan et al. (2023), we only use the housing investments made in the secondary markets for our main analysis, because we aim to measure the investment-picking skills of investors without the influence of developers' unobserved selling strategies, but we use the new sale transactions in our robustness checks presented in Section 7. Our final regression sample consists of 635,038 home resales.

Table 1 presents summary statistics of the variables used in our analysis. The average transaction price equals 2.9 million Hong Kong dollars (HKD). The average size of the apartment unit equals 533 square feet (sq. ft.). The average building age in the purchase year and the average floor of the unit equal 12.8 and 16.1, respectively. The annualized capital gain return and the associated total risk are 15.41% and 11.34% on average, respectively. Using the method by Giacoletti (2021), the average abnormal return and idiosyncratic risk are computed as 0.69% and 9.32%, respectively. If using the method by Peng & Thibodeau (2017), the average abnormal return equals 0.63% and the average idiosyncratic equals 9.27%. On average, home buyers hold the units for 5.3 years before resales. We define flippers as home buyers who hold the property for less than 2 years, and they constitute 24.7% of the home buyers in our sample. Panel B of Table 1 further compares the prices and property features of home purchases made by flippers and non-flippers. We find the flippers are more likely to invest in housing units with cheaper total prices and smaller unit areas than non-flippers. The target investment properties for flippers are likely to be older, on a lower floor and in a building with fewer total floors. They are also more likely to be in single-building estates and have fewer comparable units in the same building and estate.

[Insert Table 1 About Here]

Figure 1 plots the idiosyncratic risk of the housing capital gain returns as a function of holding periods. We calculate the average number of $IdioRisk_G$ and $IdioRisk_{PT}$ within bins of 6-month incremental holding periods (i.e., 0-6 months, 7-12 months, etc.), and plot the curves in Panel A and B, respectively. The term structure of idiosyncratic risk is decreasing in the holding period, with a steep decline for shorter holding periods and a slower decline as the holding period increases.

[Insert Figure 1 About Here]

We further classify the home investors based on their past trading experiences in the Hong Kong housing market. Buyers with at least 2 prior trading experiences are considered as experienced buyers, and the others are considered as novice buyers. Combined with the classification by holding periods, we find that on average, shares of experienced flippers, novice flippers, experienced non-flippers, and novice non-flippers are equal to 4.69%, 19.96%, 5.41%, and 69.94%, respectively. Figure 2 plots the changes in the shares of the four types of home buyers over years. It shows that the shares of the flippers in market largely decreased after the introduction of the SSD policy, because the policy substantially increased the transaction cost of flippers who still resell within the 2-year lock-in period.

[Insert Figure 2 About Here]

Last, we compare the idiosyncratic risk of capital gains taken by the four types of housing investors, with the density plots of their idiosyncratic risk shown in Figure 3. Using either the method in Giacoletti (2021) or the method in Peng & Thibodeau (2017), we find consistent patterns that flippers bear higher level of idiosyncratic risk than non-flippers, and novice buyers further take higher risk than experienced buyers within the subgroups of flippers or non-flippers.

[Insert Figure 3 About Here]

4. Term Structure of Risk in Capital Gain Return

4.1. Idiosyncratic Risk

We start with analyzing the term structure of idiosyncratic risk for the capital gain returns in the Hong Kong housing market. Specifically, we use the following empirical model in reduced form:

$$IdioRisk_{i,T} = \beta_1 \tau_{i,T} + \beta_2 \tau_{i,T}^2 + \beta_X X_{i,T} + \beta_{MR} MR_{i,t,T} + \varphi_d + \omega_T + \varepsilon_{i,T}. \text{ --- (12)}$$

$IdioRisk_{i,T}$ denotes the idiosyncratic risk of the capital gain for home sales of property i at time T. As discussed in Section 2, we use the different methodologies in Giacoletti (2021) and Peng &

Thibodeau (2017) to calculate this idiosyncratic component. The corresponding measurements, denoted as $IdioRisk_G$ and $IdioRisk_{PT}$, are used as the dependent variables in our empirical model, respectively. $IdioRisk_G$ and $IdioRisk_{PT}$ are winsorized at the 1% level. The explanatory variable, $\tau_{i,T}$, denotes the holding period (in years) of the home seller when property *i* is sold at time *T*. Therefore, the coefficient β_1 denotes the impact of holding period on the idiosyncratic risk in capital gain return, which is expected to be negative. Same as Giacoletti (2021), we also include the squared term of the holding period ($\tau_{i,T}^2$) to capture the convex form of the term structure, so its coefficient (β_2) is expected to be positive. $X_{i,T}$ is the same set of controls for the housing features as in Equation (3). $MR_{i,t,T}$ is the level of annualized local market return. φ_d denotes the district fixed effects and ω_T denotes the year-month fixed effects. $\varepsilon_{i,T}$ is the error term. We double cluster the standard errors by district and year-month.

Panel A of Table 2 reports the regression results of Equation (12), using the idiosyncratic risk measured by the method in Giacoletti (2021) as the dependent variable. In column (1), we use the holding period in years as the explanatory variable. The result indicates that if the holding period increases by 1 year, the idiosyncratic risk of the annualized capital gain decreases by 0.61 percentage points on average. This estimate is statistically significant at the 1% level. Since the average level of idiosyncratic risk computed with this method ($IdioRisk_G$) is 9.3%, this transfers to a 6.56% decrease of the idiosyncratic risk from the average level. The magnitude of this average effect is relatively small, because the impact of holding period on idiosyncratic risk becomes smaller and the term structure curve becomes flatter in later years (see Figure 1).

[Insert Table 2 About Here]

In column (2), we add the squared term of the holding years in the regression. The magnitude for the negative coefficient of the holding years becomes much larger (-0.0194), and the coefficient of the squared term is positive (0.008). Both estimates are statistically significant at the 1% level. This result confirms that the negative impact of holding period on idiosyncratic risk becomes smaller when the holding period is longer (i.e., the convexity of the term structure). Starting from the initial purchase time, the marginal impact of 1-year holding period on the idiosyncratic risk equals to around -1.86 percentage points (-0.0194+0.008), which translates to a 20% decrease from the average level of idiosyncratic risk (9.3%).

To compare the average idiosyncratic risk taken by the short-term holders (flippers) and the long-term holders (non-flippers), we use a dummy variable ($Flipper_{i,T}$) to replace the holding years ($\tau_{i,T}$) as the explanatory variable in Equation (12). It equals to 1 if the home seller holds the property for less than 2 years. Otherwise, it equals zero. The corresponding regression results are reported in column (3) of Table 2, Panel A. We find that flippers take a higher level of idiosyncratic risk than non-flippers by 8.65 percentage points, and the estimate is statistically significant at the 1% level.

We further separate flippers (and non-flippers) by their prior trading experiences in the Hong Kong housing market and compare the level of idiosyncratic risk they take in their housing investments. Specifically, we use a set of dummy variables in Equation (12) to denote the home sellers who are experienced flippers, novice flippers, and experienced non-flippers, respectively. The base group includes the novice non-flippers. The corresponding regression results are reported in column (4). As expected, we find that experienced investors tend to choose residential properties with lower idiosyncratic risk of capital gain. Investments of experienced non-flippers have lower idiosyncratic risk than that of novice non-flippers by 1.12 percentage points. The idiosyncratic risk taken by experienced and novice flippers are higher than those taken by novice non-flippers by 7.36 and 8.89 percentage points, respectively. The difference (1.53 percentage points) between the idiosyncratic risk taken by experienced and novice flippers is also statistically significant at the 1% level.

In Panel B of Table 2, we replicate the analysis using the idiosyncratic risk measures derived with method by Peng & Thibodeau (2017). Our results are consistent with the ones presented in Panel A. With a longer holding period by 1 year, the idiosyncratic risk of capital gain taken by the home buyer is estimated to decrease by 0.60 percentage points on average in this method (column (1)). The marginal impact of a 1-year holding period on the idiosyncratic risk of capital gain in new home purchases is estimated to be -1.84 percentage points (columns (2)). Compared to non-flippers, the idiosyncratic risk of capital gain taken by flippers is higher by 8.56 percentage points (column

(3)). The order of idiosyncratic risk level taken by the experienced and novice flippers/non-flippers is also consistent with the result obtained in Panel A, as shown in column (4).

In summary, our results confirm that in the Hong Kong housing market, the idiosyncratic risk component of individual house capital gains is a function of the holding periods and does not follow a random walk. This result further implies that although flippers are known to achieve higher abnormal annual returns than non-flippers in many global housing markets (Agarwal et al., 2023; Bayer et al., 2020; Fu et al., 2016), their excess returns may be achieved at the cost of bearing higher risk. Therefore, analyzing the risk-adjusted performance of flippers versus non-flippers is important for understanding the actual benefit and cost of being a flipper.

4.2. Total Risk

We complete our analysis on the term structure of risk in capital gain returns in the Hong Kong housing market by extending from idiosyncratic risk to total risk. Past literature documents that the component of idiosyncratic risk constitutes a major part of the total risk in real estate investments (e.g., Eichholtz et al. (2021)), especially during earlier years in the holding period. This is consistent with the stylized facts shown in our summary statistics (see Table 1), where the average total risk is 11.34% and the average idiosyncratic risk is 9.3%. Given the term structure of idiosyncratic risk and its dominating share in total risk, it is reasonable to expect that the total risk in capital gain returns will also decrease with the holding period.

To empirically test this hypothesis, we modify Equation (12) by using the total risk as the outcome variable, and the model is specified as follow:

$$TotalRisk_{i,T} = \beta_1 \tau_{i,T} + \beta_2 \tau_{i,T}^2 + \beta_X X_{i,T} + \beta_{MR} MR_{i,t,T} + \varphi_d + \omega_T + \varepsilon_{i,T}. \quad \text{--- (13)}$$

Specifically, $TotalRisk_{i,T}$ denotes the total risk of the capital gain for home sales of property i at time T. $TotalRisk_{i,T}$ is winsorized at the 1% level. Definitions of other variables are the same as in Equation (12). The standard errors are double clustered by district and year-month.

Table 3 reports the estimation results of Equation (13). As expected, we find that the total risk in capital gain returns taken by residential property investors decreases by 0.65 percentage points with a longer holding period of 1 year on average (column (1)). This translates to a 5.73% decrease from the average total risk level (11.34%) of capital gains in the Hong Kong housing market. The magnitude also implies that the decline in total risk with holding periods most originates from the changes in idiosyncratic risk. The term structure of the total risk also follows a convex form, as shown by the results in column (2). The total risk taken by flippers are higher those of non-flippers by 9.72 percentage points (column (3)), and the total risk taken by novice flippers are even higher than those taken by experienced flippers (column (4)). The patterns are closely tracking the ones we observed for idiosyncratic risk.

[Insert Table 3 About Here]

In summary, although flipping housing transactions may achieve high abnormal return, their risk-adjusted performance ratios can be low. Our empirical results on the term structure of total risk and idiosyncratic risk motivate our further analysis on flippers' Sharpe ratios and appraisal ratios in the next section.

5. Risk-adjusted Performance of Flippers

5.1. Total Return and Abnormal Return

In this section, we investigate the risk-adjusted performance of flippers. To be comparable with the past studies like Bayer et al. (2020) and Fu et al. (2016), we start with the analysis on the actual annualized returns. We hypothesize that flippers will achieve higher annualized capital gain returns than non-flippers, similar to the findings in these past empirical works in other housing markets. Further, we hypothesize the returns of experienced flippers will be even higher than those of the novice flippers. The reason is that experienced traders are expected to face lower market information asymmetry than novice traders (Fan et al., 2023). The real estate market is less efficient than the markets of other financial products in terms of price discovery due to its low liquidity, heterogeneity of properties, and high search cost (Gan, 2013; Wu & Deng, 2015). Experienced buyers are more likely to overcome market frictions and achieve higher returns, because they may have observed the market for longer periods and have better access to market information, such as closer connections to local property agents (Ling et al., 2018). In the same spirit, we expect experienced non-flippers to achieve higher returns than novice non-flippers.

We use a standard hedonic approach (Rosen, 1974) to compare the returns achieved by flippers and non-flippers. The empirical models are formulated as follow:

$$Return_{i,T} = \beta_1 Flipper_{i,T} + \beta_X X_{i,T} + \beta_{MR} MR_{i,t,T} + \varphi_d + \omega_T + \varepsilon_{i,T}, \quad \text{--- (14)}$$

$$Return_{i,T} = \beta_1 ExperiencedFlipper_{i,T} + \beta_2 NoviceFlipper_{i,T} + \beta_3 ExperiencedNonFlipper_{i,T} + \beta_X X_{i,T} + \beta_{MR} MR_{i,t,T} + \varphi_d + \omega_T + \varepsilon_{i,T}. \quad \text{--- (15)}$$

$Return_{i,T}$ denotes the annualized return of home sales for property *i* at time *T*. We use either the level of annualized total return or the level of annualized abnormal return as the outcome variables in separate regressions. $Return_{i,T}$ is winsorized at the 1% level. In Equation (14), $Flipper_{i,T}$ is a dummy variable equal to 1 if the home seller holds the property *i* for less than 2 years before reselling it at time *T*. Otherwise, $Flipper_{i,T}$ equals zero. Therefore, the coefficient β_1 represents the difference between the returns of flippers and non-flippers. In Equation (15), we further separate the home sellers into experienced flippers, novice flippers, experienced non-flippers, and novice non-flippers. We use a set of dummy variables to denote the first three groups of sellers and use novice non-flippers as the base group. $X_{i,T}$ represents the housing features. We also include the district fixed effects (φ_d) and year-month fixed effects (ω_T). Standard errors are double clustered district and year-month.

The corresponding regression results are reported in Table 4. In columns (1) and (2), we use the annualized total capital gain return as the outcome variable. The result in column (1) reveals that flippers achieve a higher total return than non-flippers by 8.76 percentage points[8] in Hong Kong between 1993 and 2021, and the estimate is statistically significant at the 1% level. Column (2) shows that novice flippers achieve higher returns than novice non-flippers by 7.53 percentage points. Experienced flippers achieve even higher returns than novice flippers by 6.23 percentage points, resulting in a total excess return of 13.76 percentage points than novice non-flippers. In contrast,

[8] This result is consistent with the excess total return (10.12 percentage points) of flippers in the Hong Kong housing market between 1992 and 2010, estimated by Agarwal et al. (2023).

experienced non-flippers only achieve a mild excess return than novice flippers by 0.66 percentage points. These estimates are also statistically significant at the 1% level.

[Insert Table 4 About Here]

In columns (3) and (4), we use the abnormal returns derived by the method in Giacoletti (2021) as the outcome variable. The results have the consistent patterns as those for the total returns. We find that flippers achieve a higher abnormal return than non-flippers by 7.89 percentage points. The abnormal returns of experienced flipper, novice flippers, and experienced non-flippers are higher than that of novice non-flippers by 12.36, 6.80, and 0.77 percentage points, respectively. In columns (5) and (6), we replicate the analyses using the abnormal returns derived by the method in Peng & Thibodeau (2017) as the outcome variable. The results are largely consistent with those reported in columns (3) and (4), indicating the robustness of our findings.

To conclude, our empirical findings are consistent with previous findings in other housing markets that flippers outperform non-flippers, if we only compare their annualized total or abnormal returns. Also, our results support our additional hypothesis that experienced home buyers achieve higher returns than novice home buyers.

5.2. Sharpe Ratio and Appraisal Ratio

While we find that flippers achieve higher annualized returns than non-flippers in the Hong Kong housing market, the term structure of the risk presented in Section 4 suggests that it is unclear whether flippers indeed overperform non-flippers in terms of risk-adjusted returns. In this section, we compare the Sharpe ratio and appraisal ratio between the housing investments made by flippers and non-flippers. When analyzing these performance ratios, we focus on cases with positive returns due to the following three reasons. First, some short-term buyers might be driven by occupation motive. They will emphasize the utility of housing and accept loss when resell properties. Second, factors such as high leverage and financial constraints may lead to losses. These factors deserve further analysis (see, e.g., Gan 2022) but are not the main topic of our paper. Third, almost all the government regulations regarding flipping emphasize flippers' capital gains but ignore the substantial risk borne by flippers. If we manage to show that the risk-adjusted returns are not phenomenal even for successful flippers, then our findings will have strong implications for policymakers.

Empirically, we modify Equations (14) and (15) as follows to conduct the regression analysis:

$$Ratio_{i,T} = \beta_1 Flipper_{i,T} + \beta_X X_{i,T} + \beta_{MR} MR_{i,t,T} + \varphi_d + \omega_T + \varepsilon_{i,T}, \quad \text{--- (16)}$$

$$Ratio_{i,T} = \beta_1 ExperienceFlipper_{i,T} + \beta_2 NoviceFlipper_{i,T} + \beta_3 ExperiencedNonFlipper_{i,T} + \beta_X X_{i,T} + \beta_{MR} MR_{i,t,T} + \varphi_d + \omega_T + \varepsilon_{i,T}. \quad \text{--- (17)}$$

Specifically, the outcome variable $Ratio_{i,T}$ denotes Sharpe ratio or appraisal ratio for the home sale of unit *I* at time *T*. $Ratio_{i,T}$ is winsorized at the 1% level. Definitions of other variables are same as in Equations (14) and (15). We include home sales with positive total returns in the regressions for Sharpe ratio and use home sales with positive abnormal returns in the regressions for appraisal ratio. Standard errors are double clustered by district and year-month, as in our other models.

Table 5 reports the corresponding estimation results. In column (1), the dependent variable is the Sharpe ratio of the investments. We find that on average, the Sharpe ratio of the housing investments made by flippers is lower than that of non-flippers by 0.0836, and this estimate is statistically significant at the 1% level. However, this difference is very small in comparison to the mean (3.759) and standard deviation (5.830) of Sharpe ratios for all housing investments with positive capital gains in the market[9], which means that flippers' investments do not severely underperform those of non-flippers in terms of Sharpe ratio. Nevertheless, unlike past studies that emphasize the substantial high total capital gain returns achieved by flippers, our study highlights the fact that those high total returns are at the cost of bearing higher total risk and there is no obvious premium in the Sharpe ratios for flippers.

[Insert Table 5 About Here]

In column (2), we further investigate the Sharpe ratios of investments made by the four groups of investors. We find that experienced non-flippers achieve the highest Sharpe ratio among the four

[9] In Internet Appendix Table 1, we report the summary statistics of Sharpe ratios and appraisal ratios of all home investments, including those with positive or negative returns. Among all housing investments, the mean and standard deviation of the Sharpe ratio equal 1.537 and 6.894, respectively.

types of investors, with a premium of 1.8622 over the base group (novice non-flippers). This translates to a higher Sharpe ratio by 49.5% and 81.5% from the mean (3.759) and median (2.285) Sharpe ratios of all housing investments with positive capital gains. The experienced flippers still outperform the novice-flippers and achieve a higher Sharpe ratio by 0.8893, equivalent to 23.7% of the average level, but their Sharpe ratios are significantly lower than those of experienced non-flippers by 0.9729 (i.e., 1.8622 – 0.8893). Novice flippers have the worst Sharpe ratio performance among the four groups, with a lower ratio than novice non-flippers by 0.1857.

In columns (3) and (4), we report the regression results on the appraisal ratio of the investors, computed using the method by Giacoletti (2021). The corresponding results computed using the method by Peng & Thibodeau (2017) are reported in columns (5) and (6). Unlike the results for the Sharpe ratio, we find that after teasing out the market trends and the return components shared by common housing features, the abnormal return per unit of idiosyncratic risk for flippers is still higher than that for non-flippers by 0.1058 (column (3)) or 0.0725 (column (5)) on average. This translates to an increase in the average appraisal ratios of 9.3% or 6.2%, dependent on the choice of methods to compute the abnormal returns.

However, the high appraisal ratio of flippers on average is mostly driven by the performance of experienced flippers, who achieve a higher ratio than the base group (novice non-flippers) by 0.4201 as derived by our first method (column (4)). This difference translates to a 36.8% increase from the average appraisal ratios. In contrast, the appraisal ratio of novice flippers is significantly lower than that of experienced non-flippers by 0.3059 (i.e., 0.3493 – 0.0434) and is only merely better than that of novice non-flippers by 0.0434 (column (4)). The difference between novice flippers and novice non-flippers is statistically significant but not economically prominent, as the magnitude only equals 3.8% of the average appraisal ratio. Also, if we use the method Peng & Thibodeau (2017), this performance difference between novice flippers and novice non-flippers further loses its statistical significance (column (6)).

In summary, these results indicate that only the experienced flippers, who have at least 2 prior trading experiences in the Hong Kong housing market and only constitute around 19% of the flipping trading numbers, can achieve higher appraisal ratios than all non-flippers. The appraisal ratio of novice flippers is just comparable to that of novice non-flippers and is severely worse than that of experienced long-term investors.

The difference of appraisal ratio performance between experienced and novice flippers can be explained by their distinct trading strategies that are documented in past studies (Agarwal at el., 2023; Bayer et al., 2020). Experienced flippers with higher past trading volume are more likely to act as the middlemen in the market, who have the skills and expertise to purchase the undervalued properties below market price and can resell them above market price. The appraisal ratio, which is commonly used to evaluate an investor's asset-picking ability, directly captures this fundamental trading expertise of experienced flippers. In contrast, the novice flippers with lower trading volume are mostly speculators who cannot purchase low and sell high but earn most of the returns from riding the fast market growth. Notably, using the method by Giacoletti (2021) or Peng & Thibodeau (2017), we have removed the market returns at the property-class level from the abnormal returns, so the remaining variations may come from the selection in smaller geographic scope (i.e., speculate in housing estates or districts with particularly fast price growth). The risk-adjusted return premium in this strategy, if any, will also be shared by other long-term investors in the same geographic areas, so the novice flippers do not necessarily have higher appraisal ratios than non-flippers.

6. Mechanisms for the Term Structure of Idiosyncratic Risk

6.1. Comparable Transaction Information

One of the key stylized facts documented in this study is that the idiosyncratic risk of annualized capital gain returns in the Hong Kong housing market has a term structure in a convex shape; that is, the idiosyncratic risk decreases with holding period and the decaying rate also decreases with holding period. This pattern of the apartment market in Hong Kong complements the findings in the U.S. single-family house market documented by Giacoletti (2021) and contradicts with the random walk hypothesis in previous real estate literature (e.g., Flavin & Yamashita, 2002; Landvoigt et al., 2015). Given the same housing unit, why does the annualized idiosyncratic risk in its capital gain decrease if the homeowner holds it for a longer period? Why do short-term buyers bear larger idiosyncratic risk than long-term buyers?

Past literature has proposed some theoretical explanations for the term structure of idiosyncratic risk, although there still lacks sufficient supporting empirical evidence. The first mechanism is the information quality available at transaction time. Unlike other financial products that experience independent idiosyncratic shocks over time, idiosyncratic shocks to property prices are only likely to occur at the transaction time and do not accumulate with longer holding periods. Accordingly, the annualized idiosyncratic risk becomes smaller with longer holding periods. The quality of information available at the transaction time for private valuation affects this *time-invariant* part of the total idiosyncratic risk in real estate capital gain. Sagi (2021) uses a structural model to demonstrate that market information friction generates price dispersions that are not scaled with holding periods. Giacoletti (2021) shows that the houses that are more atypical in the same ZIP codes will have a higher idiosyncratic risk in its capital gain.

Instead of considering the cross-sectional atypicality as the static information quality, we hypothesize that the quality of market information available at transaction time can also be *time-variant*. More concretely, both the home buyers and sellers may be able to collect more transaction information of comparable properties over a longer holding period for valuation, so the price dispersions will reduce. The underlying assumption is that sellers and buyers will mainly use information of comparable transactions made *within* the holding period to infer the capital gain of the property since its initial purchase date. In other words, the holding period itself is a proxy for the accumulation of comparable information. Given a same holding period, properties with more comparable transactions within this holding period should have a lower level of idiosyncratic risk.

The high-density urban context of Hong Kong provides a unique institutional setting to test this hypothesis. Unlike the U.S. residential property market dominated by single-family houses, most of the residential properties in Hong Kong are apartment units in a certain estate (i.e., housing complex), and units in the same estate shares the same facility and very similar physical configurations. Therefore, the sales of other units in the same building (or the same estate) can be considered as comparable transactions of the unit (Li & Wan, 2021). Accordingly, we construct two variables, namely the total number of sales in the same building and in the same estate over the holding period, as the measurements for the accumulation of comparable information.[10]

We modify our Equation (12) as follow to empirically test our hypothesis of this mechanism:

$$IdioRisk_{i,T} = \gamma Comparable_{i,t,T} + \beta_1 \tau_{i,T} + \beta_2 \tau_{i,T}^2 + \beta_X X_{i,T} + \beta_{MR} MR_{i,t,T} + \varphi_d + \omega_T + \varepsilon_{i,T}.$$

--- (18)

$Comparable_{i,t,T}$ denotes the comparable transaction information for unit *i* accumulated from purchase time *t* to resale time *T*, which equals the total number of transactions in the same building (or estate) from *t* to *T* in the logarithmic form.[11] Its coefficient is expected to be negative, which will indicate the negative relationship between information quality and idiosyncratic risk. Definitions of other variables are the same as in Equation (12). In particular, the coefficient of holding period $\tau_{i,T}$ (β_1) in this model is expected to be smaller in magnitude than the one estimated in Equation (12) if the accumulation of comparable information can explain the term structure of time-variant idiosyncratic risk. The standard errors are double clustered by district and year-month.

We report the corresponding estimation results in Table 6. In Panel A, the dependent variable is the idiosyncratic risk of the annualized capital gain computed by the method in Giacoletti (2021). The log-form number of sales in the same building is used as the measurement of comparable information in columns (1) and (2). We find that among the home sales with the same length of holding periods, if the number of sales in the same building during the holding period increases by 10% (equivalent to around 9.2 transactions), the idiosyncratic risk will decrease by 0.249 percentage points (column (1)). This estimate is statistically significant at the 1% level. Further, after adding this measurement of comparable information in the model, the coefficient of holding period decreases from -0.0061 (in Panel A of Table 2) to -0.0023, implying that the accumulation of comparable transaction information in the same building can explain from around 62.3% of the time-dependent variations in idiosyncratic risk.[12] We also find consistent patterns after we include the squared term of the holding periods in the model, as reported in column (2).

[10] Some of the estates in Hong Kong may only have one building (i.e., the single-building estate), and the two measures will be equal in this case.

[11] We use log(sale number + 1) to account for the cases with zero sales during the holding period.

[12] This percentage is computed as (0.0061 – 0.0023) / 0.0061.

[Insert Table 6 About Here]

In columns (3) and (4), we use the log-form number of sales in the same estate as the measurement of comparable information. We expect its explanatory power to be lower than that of the sales in the same building because sales in the same building are likely to convey more comparable information than sales in the same estate but different buildings. As expected, we find that a 10% increase (equivalent to around 64.1 transactions) in the number of sales in the same estate over the holding period will result in a lower idiosyncratic risk of capital gain by 0.175 percentage points (column (1)). The number of sales in the same estate can explain for around 29.5% of the time-varying idiosyncratic risk, as the coefficient of the holding period changes to -0.0043. All these estimates are statistically significant at the 1% level.

Finally, we replicate the analyses using the idiosyncratic risk of the annualized capital gain computed by the method in Peng & Thibodeau (2017) as the outcome variable. The corresponding results are reported in Panel B of Table 6. We find consistent results in terms of both the magnitude of the effect and the level of statistical significance.

To conclude, our results provide supporting evidence for the mechanism of comparable information in determining the idiosyncratic risk of real estate capital gain. It advances the knowledge in previous literature by showing that information quality is not just static as the cross-sectional atypicality to neighborhoods but can be improved by accumulating information on comparable transactions during the holding period and thus shapes the term structure of the idiosyncratic risk profile.

6.2. Market Thinness

The second mechanism we propose relates to the market thinness that is associated with the length of the holding period. Idiosyncratic risk of housing capital gain returns should be larger when the market is thinner and the set of active buyers matching with each individual seller is smaller (Giacoletti, 2021). Due to the high heterogeneity in real estate assets, it is hypothesized that properties sold after different holding periods face different levels of idiosyncratic risk due to the selection by property investors. For example, Bayer at el. (2020) documents that experienced short-term flippers in the housing market act as middlemen who exploit the high price inefficiency of certain properties to make profits. They can be considered as arbitrageurs like in Pontiff (2006), who face high idiosyncratic risk due to the investors' selection into the illiquid market segments. Our summary statistics presented in Panel B of Table 1 also reveals that compared to non-flippers, flippers tend to choose smaller units in older buildings with fewer numbers of units in the same building or estate, consistent with the argument that the properties selected by flippers are likely in a thinner market segment.[13]

To examine the mechanism of market liquidity in determining the high idiosyncratic risk taken by short-term home investors, we use the introduction of the SSD policy in Hong Kong as the identification strategy. To tackle the rampant short-term speculations in the housing market, the Hong Kong government introduced the SSD on November 20, 2010, which levies an additional transaction tax equal to 5–15% of the total price for all residential properties resold within a 2-year holding period if the properties are purchased after November 20, 2010. The government suddenly announced this policy change just 1 day before the policy took effect (i.e., on November 19, 2010), which surprised the market. This policy was further tightened on October 27, 2012, with the lock-in period extended to 3 years and the tax rate increased to 10–20%. Appendix 2 reveals the changes of SSD rates due to the introduction of the policies.

Our identification strategy assumes that the SSD policy provides a huge shock to the liquidity of the market segments that attract flippers. There are two potential reasons for this liquidity shock. First, as documented in Agarwal et al. (2023), a significant proportion of short-term speculators will defer the resales after the lock-in period ends, so the supply in these property segments is largely frozen. Second, some short-term speculators will still choose to resell within the lock-in period, but they will increase the listing prices and try to pass the additional stamp duty cost to the potential buyers (Zhang et al., 2023). This discourages the potential buyers from accepting the deal and freezes the market liquidity from the demand side.

Accordingly, it is hypothesized that after the introduction of the SSD, properties sold within the 2-year lock-in period will have a higher level of idiosyncratic risk in capital gain than that in the

[13] In Internet Appendix Table IA2, we further test the correlation between housing features and holding periods using regressions. We confirm that older properties with smaller sizes and on lower floor are more likely to be held for fewer years.

period before the SSD was introduced. Further, as Zhang et al. (2023) find that the lock-in effect on lowering transaction probability is stronger when the SSD tax rate is higher, we expect the increases in idiosyncratic risk are more prominent for properties held in 1 year (with the SSD rate of 10-15%) than those held between 1 to 2 years (with the SSD rate of 5%). In Figure 4, we plot the term structure of idiosyncratic risk in home investments purchased in the [-2, +2] years window around the introduction of the SSD, which shows the consistent patterns as we hypothesize. The line with square markers shows the term structure for home purchases made before the SSD took effect, while the line with diamond markers shows that after the SSD took effect. The idiosyncratic risks of capital gains in flipping transactions increase after the SSD took effect, but there is no obvious change for the resales held for more than 2 years.

[Insert Figure 4 About Here]

We further adopt the following empirical model to formally test this hypothesis:

$$IdioRisk_{i,T} = \beta_1 Hold1Y_{i,T} + \beta_2 Hold1t2Y_{i,T} + \beta_3 Hold1Y_{i,T} \times SSD_{i,t} + \beta_4 Hold1t2_{i,T} \times SSD_{i,t} + \beta_X X_{i,T} + \beta_{MR} MR_{i,t,T} + \varphi_d + \omega_T + \varepsilon_{i,T}. \quad \text{--- (19)}$$

Specifically, the outcome variable is the idiosyncratic risk of capital gain for the home sale of unit *i* at selling time *T*. $Hold1Y_{i,T}$ and $Hold1t2Y_{i,T}$ are dummy variables denotes the home sales that have holding periods within 1 year and between 1 and 2 years, respectively. $SSD_{i,t}$ is a dummy variable denoting if the initial purchase date of the home sale is after the SSD policy took effect (i.e., on or after November 20, 2010). We interact $SSD_{i,t}$ with $Hold1Y_{i,T}$ and $Hold1t2Y_{i,T}$, and the coefficients of the interaction terms (β_3 and β_4) represent the changes in idiosyncratic risk for home resales in 1 years and 1-2 years due to the introduction of the SSD, respectively. The single term of $SSD_{i,t}$ is omitted in the model, as we have controlled for the time fixed effects (ω_T). Definitions of the other variables are the same as in our baseline Equation (12). Following Agarwal et al. (2023), we only include the home sales with initial purchase dates falling in the [-1, +1] year (or the [-2, +2] years) window around the SSD effective date in the regressions to remove the potential impacts of other confounding policies. The standard errors are double clustered by district and year-month.

The regression results are reported in Table 7. In columns (1) and (2), the outcome variables are the idiosyncratic risk measured by the method in Giacoletti (2021). Column (1) reports the result for home purchases made in the [-1, +1] year window around the SSD effective date, whereas column (2) reports the result for purchases made in the [-2, +2] years window. Consistent with our expectation, we find that after the introduction of the SSD, making resales within 1 year will incur a higher level of idiosyncratic risk in capital gain by 10.91 to 17.39 percentage points. If the flippers resell the property after 1 to 2 years after, the idiosyncratic risk in capital gain they take will increase by 1.43 to 2.43 percentage points due to the frozen market liquidity of the SSD policy. We also use the idiosyncratic risk measured by the method in Peng & Thibodeau (2017), with the results reported in columns (3) and (4). The findings remain robust, in comparison to those reported in columns (1) and (2).

[Insert Table 7 About Here]

In summary, using the unique SSD policy shock as the identification of market liquidity changes, we provide evidence that the market liquidity is one mechanism resulting in the higher idiosyncratic risk taken by flippers than that of non-flippers.

7. Robustness and Additional Analyses

In this section, we conduct a battery of robustness checks for our results. First, to remove the potential skewness of risk in levels, some past literature (e.g., Peng & Thibodeau, 2017) use the standard deviations of the abnormal returns in logarithmic forms (i.e., $u_{i,T}$ in Equation (3) or $v_{i,T}$ in Equation (7)) as the idiosyncratic risk, instead of using the standard deviations of the abnormal return in levels. We use the levels of the risk in our main tests in to achieve more interpretable magnitudes of regression coefficients, but we conducted robustness checks using these alternative measurements of risk in logarithmic forms. Specifically, we denote the annualized total risk in logarithmic forms as *log(TotalRisk)*. The annualized idiosyncratic risk in logarithmic forms computed by the method in Giacoletti (2021) and the method in Peng & Thibodeau (2017) are denoted as *log*($IdioRisk_G$) log ($IdioRisk_{PT}$). We replicate all our regression analyses on the term structures and mechanisms using these alternative measurements. The results are reported in Internet Appendix Tables IA3 to IA7, and all our findings remain robust.

Second, some past literature argues that idiosyncratic risk does not follow a random walk for short-term investors, because there are unobserved non-stochastic components like the upgrade and renovation expenses (e.g., Goetzmann & Spiegel, 1995). Giacoletti (2021) dispels this channel by controlling the renovation expenses and capital improvements. This information is not available in the EPRC data, but we use the subsample of first-hand property sales as a robustness check for the term structures, because most new apartment units sold in Hong Kong are fully furnished and it is unlikely that short-term investors spend additional costs on capital improvements in the new sales (Agarwal et al., 2023). The corresponding regression results are reported in Internet Appendix Table IA8. We find consistent patterns in the new sale market that the annualized idiosyncratic risk decreases with longer holding periods and the term structure has a convex form. It indicates that the term structure of idiosyncratic risk of the capital gains in the Hong Kong housing market is unlikely driven by additional capital investments of short-term investors, lending support to the robustness of our conclusion.

Third, the SSD policy not only influences the market liquidity and idiosyncratic risk taken by flippers, but also impacts the returns realized by flippers (Agarwal et al., 2023). Therefore, our main results on the risk-adjusted performance of flippers, which were estimated using the full sample in our study period, could potentially be biased by the policy effect. Accordingly, we conduct a robustness check using the subsample of home sales that were initially purchased before the introduction of the SSD policy. The corresponding results are reported in Internet Appendix Table IA9, and the patterns are generally consistent with those we find in the full sample.

Finally, we conduct an additional cross-market analysis by comparing the term structure of idiosyncratic risk in the Hong Kong residential property market with that in the single-family housing market of California documented by Giacoletti (2021). Due to the high-density urban context with similar units in the same building/estate, the apartment units in Hong Kong are expected to have better information quality for private valuations (Li & Wan, 2021) than the much more heterogeneous single-family houses in California, and Hong Kong residential property market is more liquid than the single-family housing market in California. As the slope of term structure of idiosyncratic risk can be treated a proxy of housing market illiquidity (Giacoletti, 2021), we hypothesize that the term structure of idiosyncratic risk of single-family houses in California will have a steeper slope than that in Hong Kong. To test this hypothesis, we use the EPRC data to replicate Table 4 in Giacoletti (2021), following the same empirical specification in it.[14] The results are reported in Internet Appendix Table IA10. The coefficient of holding years equal to -0.0009 in the Hong Kong housing market, which is smaller in magnitude compared to the one reported in the single-family housing market of California (-0.0017). This pattern is consistent after adding the squared term of holding years in the regression, with a coefficient of -0.0038 for the holding year in Hong Kong and -0.0051 in California. Therefore, this cross-market analysis results provide additional support to the argument that market liquidity shapes the term structure of annualized idiosyncratic risk in the real estate market.

8. Conclusion

When analyzing flipping activity and designing regulations to restrict speculative flippers, we should consider not only the capital gains achieved in the flipping transactions but also the risk borne and shared by them. This study is among the first to evaluate flippers' performance from the perspective of risk-return trade-off, with emphasis on the term structure of idiosyncratic risk.

We show that flippers do generate higher capital gain returns, but they do not have superior risk-adjusted performance compared to long-term buyers, as flippers bear much higher idiosyncratic risk. Instead, only experienced flippers (constituting less than 20% of flippers) can generate good risk-adjusted performance. Using the unique urban and policy setting in Hong Kong, we further show that low information quality and market thinness contribute to the high idiosyncratic risk in the housing market. Our study highlights the importance of considering idiosyncratic risk in the functioning of the housing market.

Flippers bear substantial risk when they play welfare-enhancing roles of arbitraging intermediaries in the housing market. Ignoring the risk involved in home-flipping could significantly bias the investment decision of flippers, undermine institutional investors' risk management system,

[14] Unlike our empirical models that use the level of idiosyncratic risk as the outcome variable, the main objective of Giacoletti (2021) is to test the hypothesis of a random walk, so it uses the squared idiosyncratic capital gain ($\hat{u}_{i,T}^2$) as the outcome variable, which should be equal to the variance of idiosyncratic capital gain ($Var(\hat{u}_{i,T}) \approx E[\hat{u}_{i,T}^2]$) if the assumption of a random walk holds. To be comparable with the estimates, we follow the same empirical strategy in this additional test.

and lead to ineffective and inefficient government policies. Our study delivers a strong message: It is not easy being a flipper as the risk involved is very high. Do not ignore risk, especially the term structure of idiosyncratic risk.

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Appendix 1: Variable Definitions

Variable	Definition
Price	The transaction price before tax, in million Hong Kong dollars (HKD).
log (Price)	The transaction price before tax in logarithmic form.
TotalReturn	The annualized total capital gain return before tax.
log (TotalReturn)	The annualized total capital gain return before tax in logarithmic form.
$Abnormal\ Return_G$	The annualized abnormal capital gain return (alpha) before tax, measured by the method in Giacoletti (2021).
$log\ (Abnormal\ Return_G)$	The annualized abnormal capital gain return (alpha) before tax in logarithmic form, measured by the method in Giacoletti (2021).
$Abnormal\ Return_{PT}$	The annualized abnormal capital gain return (alpha) before tax, measured by the method in Peng & Thibodeau (2017).
$log\ (Abnormal\ Return_{PT})$	The annualized abnormal capital gain return (alpha) before tax in logarithmic form, measured by the method in Peng & Thibodeau (2017).
TotalRisk	The total risk in the annualized total capital gain return before tax.
$log\ (TotalRisk_{PT})$	The total risk in the annualized total capital gain return before tax in logarithmic form.
$IdioRisk_G$	The idiosyncratic component of the risk in the annualized total capital gain return before tax, measured by the method in Giacoletti (2021). It is computed as the standard deviations of $Abnormal\ Return_G$ among comparable properties in the same district, purchased in the same year and month by same type of investors, and held for a similar period in length.
$log\ (IdioRisk_G)$	The idiosyncratic component of the risk in the annualized total capital gain return before tax in logarithmic form, measured by the method in Giacoletti (2021). It is computed as the standard deviations of *log* ($Abnormal\ Return_G$) among comparable properties in the same district, purchased in the same year and month by same type of investors, and held for a similar period in length.
$IdioRisk_{PT}$	The idiosyncratic component of the risk in the annualized total capital gain return before tax, measured by the method in Peng & Thibodeau (2017).
$log\ (IdioRisk_{PT})$	The idiosyncratic component of the risk in the annualized total capital gain return before tax in logarithmic form, measured by the method in Peng & Thibodeau (2017). It is computed as the standard deviations of *log* ($Abnormal\ Return_{PT}$) among comparable properties in the same district, purchased in the same year and month by same type of investors, and held for a similar period

	in length.
Sharpe Ratio	The ratio of *TotalReturn* minus the annualized risk-free return to *TotalRisk*.
Appraisal Ratio$_G$	The ratio of *Abnormal Return*$_G$ to *IdioRisk*$_G$.
Appraisal Ratio$_{PT}$	The ratio of *Abnormal Return*$_{PT}$ to *IdioRisk*$_{PT}$.
Holding Year	The holding period of the housing investment in years.
Flipper	Home buyers who hold the property for less than 2 years.
Experienced Flipper	Home buyers who hold the property for less than 2 years and has at least 2 past home purchase experiences in Hong Kong before the time of purchase.
Novice Flipper	Home buyers who hold the property for less than 2 years and has fewer than 2 past home purchase experiences in Hong Kong before the time of purchase.
Experienced Non-flipper	Home buyers who hold the property for more than 2 years and has at least 2 past home purchase experiences in Hong Kong before the time of purchase.
Novice Non-flipper	Home buyers who hold the property for more than 2 years and has fewer than 2 past home purchase experiences in Hong Kong before the time of purchase.
Sales in Building	Number of other home sales in the same building during the holding period.
Sales in Estate	Number of other home sales in the same estate (i.e., building complex) during the holding period.
Net Unit Size	Net sellable area of the unit in square feet.
Building Age	Age of the building at purchase time.
Unit Floor	The floor level of the unit.
Total Floor	Total number of floors in the building.
Single-building Estate	A dummy variable indicating the estates that consist of one single building block only.
Total Units in Building	Total number of apartment units in the building.
Total Units in Estate	Total number of apartment units in the estate.

Appendix 2: Special Stamp Duty Tax Rate in Hong Kong

This figure plots the special stamp duty rates for home sellers with respect to their initial purchase time and their holding periods under the SSD policy. The blue line indicates the SSD rate for homes purchased between 20 November 2010 and 26 October 2012. The orange line indicates the SSD rate for units purchased after 27 October 2012.

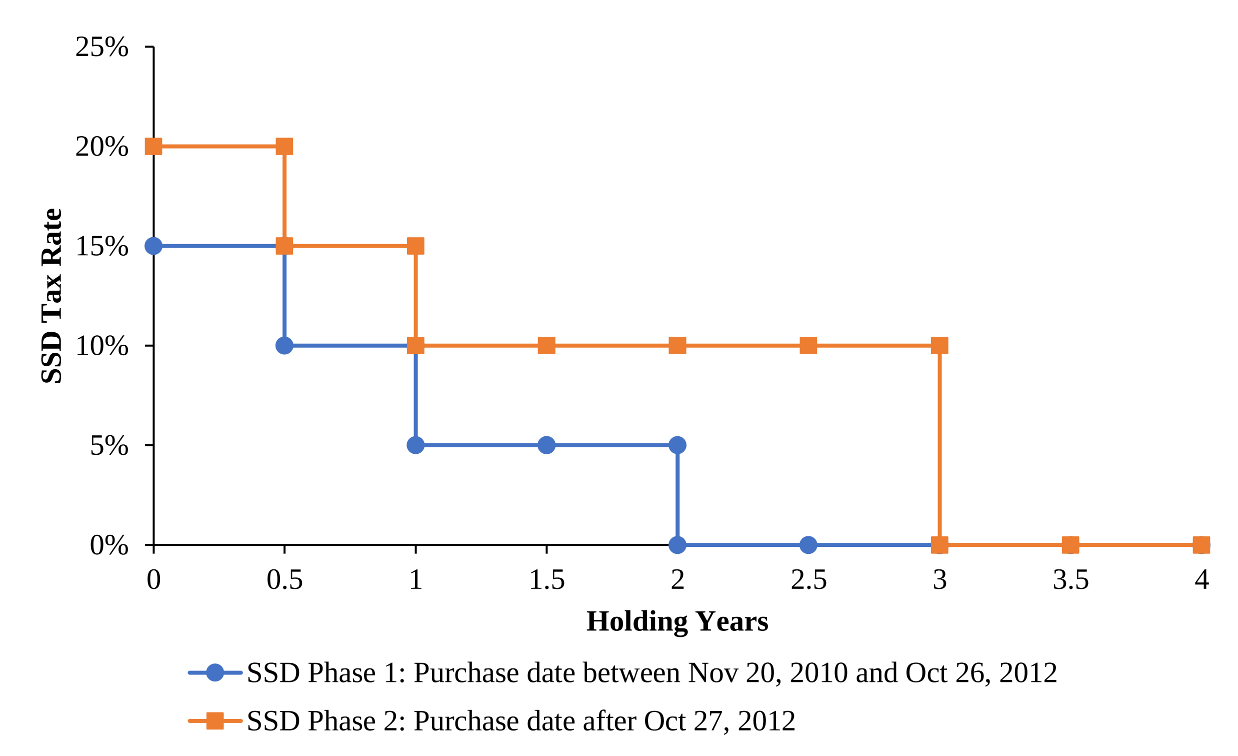
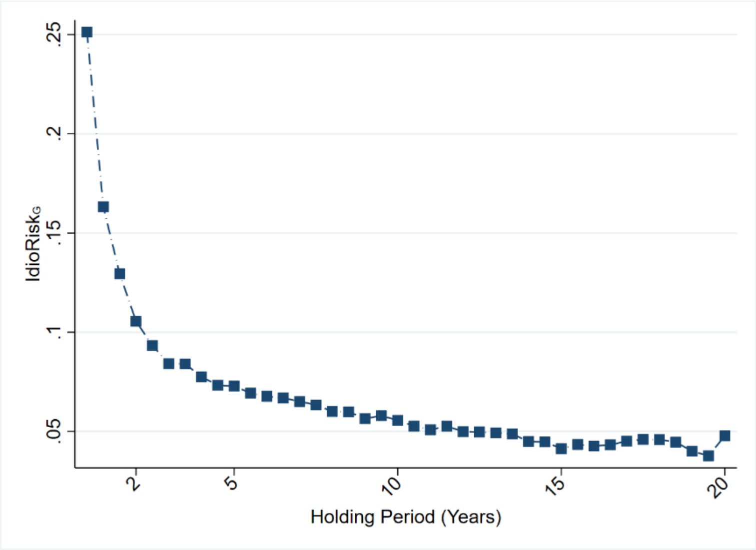


Figure 1: Idiosyncratic Risk of Capital Gain Returns and Holding Periods in the Residential Property Market

This figure plots the relationship between the idiosyncratic risk of annualized capital gain return and holding period (in years) in the Hong Kong residential property market. In Panel A, the idiosyncratic risk for the annualized capital gain return is estimated using the method by Giacoletti (2021). In Panel B, the idiosyncratic risk for the annualized capital gain return is estimated using the method by Peng & Thibodeau (2017).

Panel A. Idiosyncratic Risk Measured by Method in Giacoletti (2021)



Panel B. Idiosyncratic Risk Measured by Method in Peng & Thibodeau (2017)

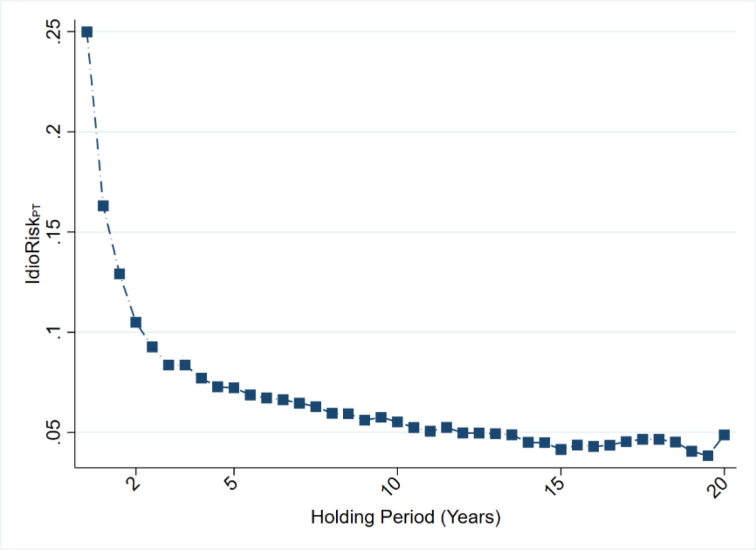


Figure 2: Shares of Buyer Types in the Residential Property Market

This figure plots the share of buyers by holding period and prior market transaction experience in the Hong Kong residential property market. *Flippers* are home buyers who hold the property for less than two years before resales, and *non-flippers* are the other home buyers who hold the property for at least 2 years before resales. *Experienced Flippers* (or *Experienced Non-flippers*) are flippers (or non-flippers) who have made at least two housing transactions in Hong Kong before. *Novice Flippers* (or *Novice Non-flippers*) are flippers (or non-flippers) who have made fewer than two housing transactions before. *SSD* refers to the Special Stamp Duty policy, which was introduced on 20 November 2010.

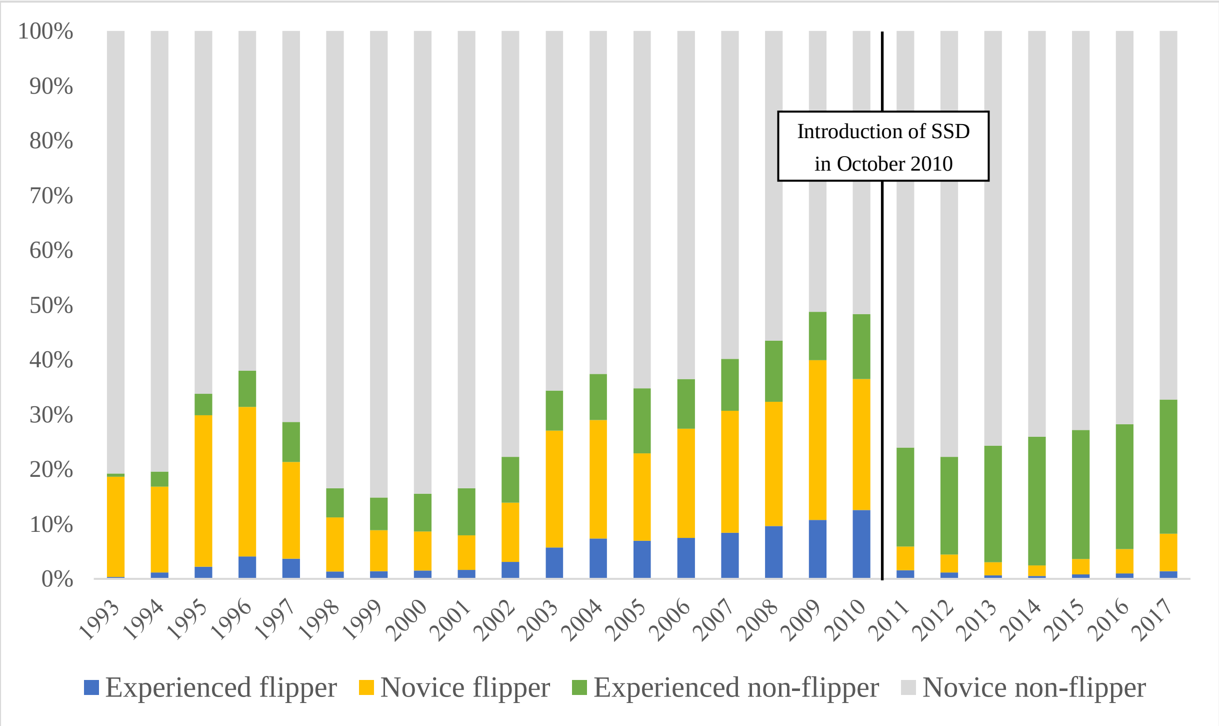
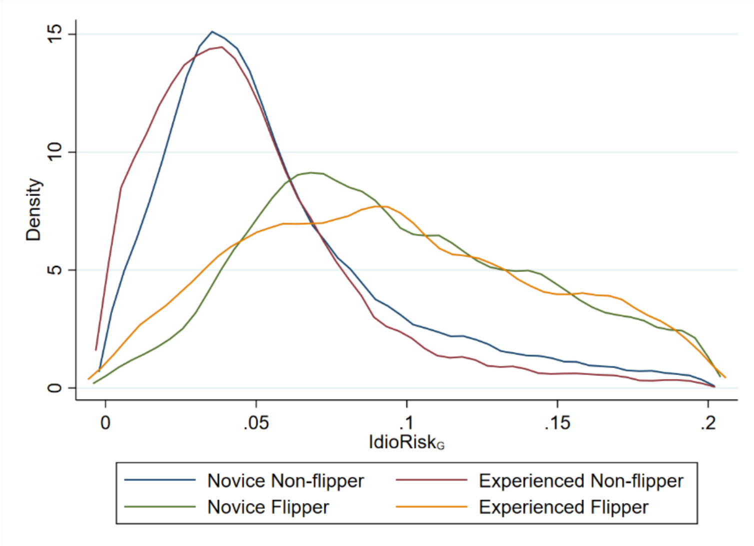


Figure 3: Distributions of Idiosyncratic Risk in Capital Gain Returns by Buyer Types

This figure plots the kernel-density distributions of the idiosyncratic risk in capital gain returns by buyer types in the Hong Kong residential property market. *Flippers* are home buyers who hold the property for less than two years before resales, and *non-flippers* are the other home buyers who hold the property for at least 2 years before resales. *Experienced Flippers* (or *Experienced Non-flippers*) are flippers (or non-flippers) who have made at least two housing transactions in Hong Kong before. *Novice Flippers* (or *Novice Non-flippers*) are flippers (or non-flippers) who have made fewer than two housing transactions before. In Panel A, the idiosyncratic risk for the annualized capital gain return is estimated using the method by Giacoletti (2021). In Panel B, the idiosyncratic risk for the annualized capital gain return is estimated using the method by Peng & Thibodeau (2017). Values over 0.2 on the x-axis are excluded in the plot.

Panel A: Idiosyncratic Risk Measured by Method in Giacoletti (2021)



Panel B: Idiosyncratic Risk Measured by Method in Peng & Thibodeau (2017)

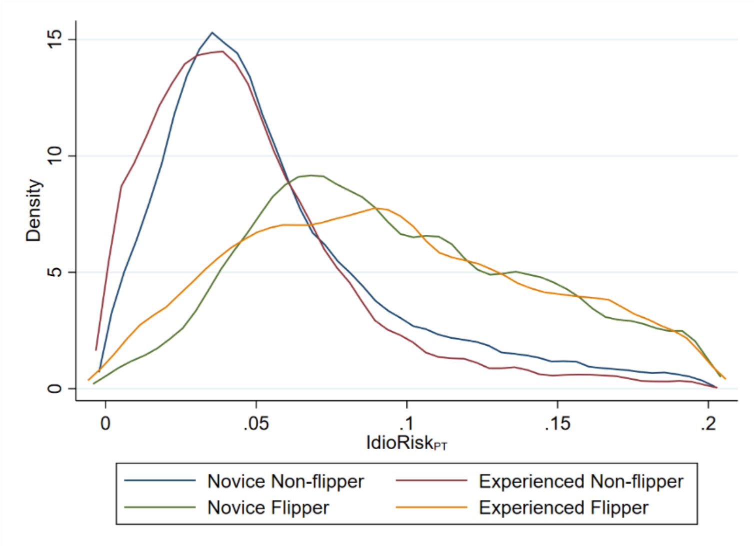
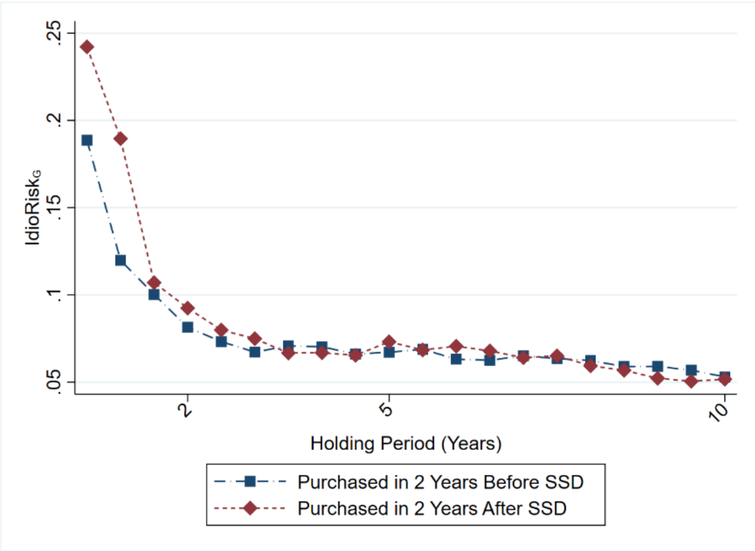


Figure 4: Term Structure of Idiosyncratic Risk Before and After the Introduction of Special Stamp Duty

This figure plots the term structure idiosyncratic risk of annualized capital gain return for home purchases made before and after the introduction of the SSD policy. In Panel A, the idiosyncratic risk for the annualized capital gain return is estimated using the method by Giacoletti (2021). In Panel B, the idiosyncratic risk for the annualized capital gain return is estimated using the method by Peng & Thibodeau (2017).

Panel A: Idiosyncratic Risk Measured by Method in Giacoletti (2021)



Panel B: Idiosyncratic Risk Measured by Method in Peng & Thibodeau (2017)

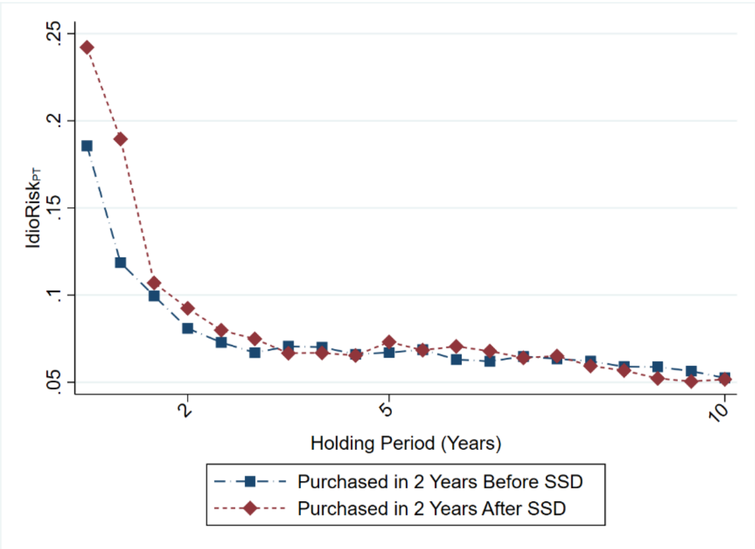


Table 1: Summary Statistics

This table presents the summary statistics of the key variables. Panel A provides the summary statistics of the variables used in regression analysis. Panel B presents the univariate test on physical features for homes purchased by flippers and non-flippers. Flippers refer to the homeowners who hold the property for less than two years before resales. Non-flippers are homeowners who hold the property for more than two years before sales. ***, **, * indicate 1%, 5%, and 10% significance, respectively.

Panel A. Summary of Variables Used in Regressions

	(1)	(2)	(3)	(4)	(5)	(6)
Variable	N	Mean	Std. Dev.	P25	P50	p75
Price	635,038	2.9084	2.9832	1.4200	2.1500	3.4200
log (Price)	635,038	0.8112	0.6792	0.3507	0.7655	1.2296
Net Unit Size	635,038	532.7763	234.4225	387	486	611
Building Age	635,038	12.8158	10.1693	4	11	19
Unit Floor	635,038	16.0780	11.6895	7	14	23
log (TotalReturn)	635,038	0.1218	0.2107	0.0028	0.1477	0.2609
log (Abnormal $Return_G$)	635,038	0.0002	0.1132	-0.0541	-0.0056	0.0444
log (Abnormal $Return_{PT}$)	635,038	-0.0002	0.1129	-0.0544	-0.0056	0.0438
log (TotalRisk)	635,038	0.0936	0.0932	0.0393	0.0654	0.1128
log ($IdioRisk_G$)	635,038	0.0884	0.0929	0.0352	0.0584	0.1057
log ($IdioRisk_{PT}$)	635,038	0.0880	0.0929	0.0349	0.0580	0.1052
TotalReturn	635,038	0.1541	0.2348	0.0028	0.1592	0.2981
Abnormal $Return_G$	635,038	0.0069	0.1210	-0.0527	-0.0056	0.0454
Abnormal $Return_{PT}$	635,038	0.0063	0.1204	-0.0530	-0.0056	0.0447
TotalRisk	635,038	0.1134	0.1352	0.0424	0.0739	0.1305
$IdioRisk_G$	635,038	0.0932	0.1156	0.0347	0.0578	0.1053
$IdioRisk_{PT}$	635,038	0.0927	0.1154	0.0344	0.0573	0.1048
Sharpe Ratio	477,333	3.7594	5.8302	0.9676	2.2850	4.2910
Appraisal $Ratio_G$	297,078	1.1433	1.1569	0.3330	0.8110	1.5539
Appraisal $Ratio_{PT}$	297,190	1.1670	1.2105	0.3358	0.8190	1.5683
Holding Year	635,038	5.2976	4.4468	2.0247	3.9644	7.6411
Flipper	635,038	0.2465	0.4310	0	0	0
Experienced Flipper	635,038	0.0469	0.2114	0	0	0
Novice Flipper	635,038	0.1996	0.3997	0	0	0
Experienced Non-flipper	635,038	0.0541	0.2263	0	0	0
Novice Non-flipper	635,038	0.6994	0.4585	0	1	1
Sales in Building	635,038	91.8887	102.7554	23	58	123
log (Sales in Building)	635,038	3.9268	1.2360	3.1781	4.0775	4.8203
Sales in Estate	635,038	640.8417	1023.1623	54	233	784
log (Sales in Estate)	635,038	5.2577	1.8156	4.0073	5.4553	6.6657

Panel B. Univariate Test on Physical Features of Units Purchased by Flippers and Non-flippers

	(1)	(2)	(3)	(4)	(5)	(6)
	Flippers (N=156,535)		Non-flippers (N=478,503)		t-test	
Variable	Mean	Std. Dev.	Mean	Std. Dev.	Diff in Mean	Std. Err.
Price	2.6343	2.8792	2.9981	3.0111	-0.3639***	0.0087
log (Price)	0.6891	0.6900	0.8512	0.6708	-0.1621***	0.0020
Net Unit Size	518.7952	246.9796	537.3500	229.9819	-18.5548***	0.6822
Building Age	14.6292	10.8473	12.2226	9.8654	2.4065***	0.0295
Unit Floor	14.9823	11.3115	16.4365	11.7885	-1.4542***	0.0340
Total Floor	29.1778	13.0507	30.8875	13.2327	-1.7097***	0.0384
Single-building Estate	0.3715	0.4832	0.2990	0.4578	0.0726***	0.0014
Total Units in Building	222.1265	136.4563	234.5024	135.8994	-12.3759***	0.3961
Total Units in Estate	1564.6530	1984.5643	1762.0130	2059.3442	-197.3606***	5.9433
Sales in Building	31.6317	47.1516	111.6009	108.2086	-79.9691***	0.2819
Sales in Estate	195.0397	332.7060	786.6791	1125.5362	-591.6394***	2.8852

Table 2: Term Structure of Idiosyncratic Risk for the Annualized Capital Gain Return in the Residential Property Market

This table presents the relationship between the idiosyncratic risk of annualized capital gain return and holding period (in years). In Panel A, the dependent variable $IdioRisk_G$ is the level of the idiosyncratic risk for the annualized capital gain return in the Hong Kong residential property market, estimated using the method by Giacoletti (2021). In Panel B, the dependent variable $IdioRisk_{PT}$ is the level of the idiosyncratic risk for the annualized capital gain return in the Hong Kong residential property market, estimated using the method by Peng & Thibodeau (2017). *Holding Year* is the property owner's holding period in years. *Flipper* is a dummy variable denoting whether the owner is a flipper (i.e., hold the property for less than two years). *Experienced Flipper* is a dummy denoting whether the owner is an experienced flipper that has made at least two housing transactions before. *Novice Flipper* is a dummy variable denoting whether the owner is a novice flipper that has made fewer than two housing transactions before. *Experienced Non-flipper* is a dummy variable denoting whether the owner is an experienced non-flipper (i.e., hold the property for more than two years) that has made at least two housing transactions before. Robust standard errors are reported in parentheses and are clustered by district and year-month. ***, **, * indicate 1%, 5%, and 10% significance, respectively.

Panel A. Idiosyncratic Risk Measured by Method in Giacoletti (2021)

	(1)	(2)	(3)	(4)
Dependent Variable:	$IdioRisk_G$	$IdioRisk_G$	$IdioRisk_G$	$IdioRisk_G$
Holding Year	-0.0061***	-0.0194***		
	(0.0001)	(0.0003)		
Holding Year^2		0.0008***		
		(0.0000)		
Flipper			0.0865***	
			(0.0011)	
Experienced Flipper				0.0736***
				(0.0015)
Novice Flipper				0.0889***
				(0.0013)
Experienced Non-flipper				-0.0112***
				(0.0005)
Constant	0.0857***	0.1151***	0.0192***	0.0213***
	(0.0032)	(0.0032)	(0.0030)	(0.0030)
Base Group	N/A	N/A	Non-flipper	Novice Non-flipper
Property Features	YES	YES	YES	YES
Year-month FE	YES	YES	YES	YES
District FE	YES	YES	YES	YES
Observations	635,038	635,038	635,038	635,038
R-squared	0.1359	0.1699	0.1775	0.1786

Panel B. Idiosyncratic Risk Measured by Method in Peng & Thibodeau (2017)

	(1)	(2)	(3)	(4)
Dependent Variable:	$IdioRisk_{PT}$	$IdioRisk_{PT}$	$IdioRisk_{PT}$	$IdioRisk_{PT}$
Holding Year	-0.0060***	-0.0192***		
	(0.0001)	(0.0003)		
Holding Year^2		0.0008***		
		(0.0000)		
Flipper			0.0856***	
			(0.0011)	
Experienced Flipper				0.0723***
				(0.0015)
Novice Flipper				0.0882***
				(0.0013)
Experienced Non-flipper				-0.0112***
				(0.0005)
Constant	0.0846***	0.1137***	0.0192***	0.0214***
	(0.0032)	(0.0032)	(0.0030)	(0.0030)
Base Group	N/A	N/A	Non-flipper	Novice Non-flipper
Property Features	YES	YES	YES	YES
Year-month FE	YES	YES	YES	YES
District FE	YES	YES	YES	YES
Observations	635,038	635,038	635,038	635,038
R-squared	0.1364	0.1699	0.1778	0.1790

Table 3: Term Structure of Total Risk for the Annualized Capital Gain Return in the Residential Property Market

This table presents the relationship between the total risk of annualized capital gain return and holding period (in years). The dependent variable *TotalRisk* is the level of the total risk for the annualized capital gain return in the Hong Kong residential property market. *Holding Year* is the property owner's holding period in years. *Flipper* is a dummy variable denoting whether the owner is a flipper (i.e., hold the property for less than two years). *Experienced Flipper* is a dummy denoting whether the owner is an experienced flipper that has made at least two housing transactions before. *Novice Flipper* is a dummy variable denoting whether the owner is a novice flipper that has made fewer than two housing transactions before. *Experienced Non-flipper* is a dummy variable denoting whether the owner is an experienced non-flipper (i.e., hold the property for more than two years) that has made at least two housing transactions before. Robust standard errors are reported in parentheses and are clustered by district and year-month. ***, **, * indicate 1%, 5%, and 10% significance, respectively.

	(1)	(2)	(3)	(4)
Dependent Variable:	TotalRisk	TotalRisk	TotalRisk	TotalRisk
Holding Year	-0.0065***	-0.0215***		
	(0.0001)	(0.0003)		
Holding Year^2		0.0009***		
		(0.0000)		
Flipper			0.0972***	
			(0.0014)	
Experienced Flipper				0.0820***
				(0.0018)
Novice Flipper				0.1002***
				(0.0015)
Experienced Non-flipper				-0.0132***
				(0.0006)
Constant	0.0690***	0.1020***	-0.0021	0.0005
	(0.0039)	(0.0039)	(0.0035)	(0.0035)
Base Group	N/A	N/A	Non-flipper	Novice Non-flipper
Property Features	YES	YES	YES	YES
Year-month FE	YES	YES	YES	YES
District FE	YES	YES	YES	YES
Observations	635,038	635,038	635,038	635,038
R-squared	0.1480	0.1795	0.1899	0.1910

Table 4: Flippers' Total and Abnormal Capital Gain Returns in the Residential Property Market

This table presents the regression results on flippers' total and abnormal annualized capital gain returns. In columns (1) and (2), the dependent variable *TotalReturn* is the level of the annualized total capital gain return. In columns (3) and (4), the dependent variable $AbnormalReturn_G$ is the level of the annualized abnormal capital gain return, estimated using the method by Giacoletti (2021). In columns (5) and (6), the dependent variable $AbnormalReturn_{PT}$ is the level of the annualized abnormal capital gain return, estimated using the method by Peng & Thibodeau (2017). *Flipper* is a dummy variable denoting whether the owner is a flipper (i.e., hold the property for less than two years). *Experienced Flipper* is a dummy denoting whether the owner is an experienced flipper that has made at least two housing transactions before. *Novice Flipper* is a dummy variable denoting whether the owner is a novice flipper that has made fewer than two housing transactions before. *Experienced Non-flipper* is a dummy variable denoting whether the owner is an experienced non-flipper (i.e., hold the property for more than two years) that has made at least two housing transactions before. Robust standard errors are reported in parentheses and are clustered by district and year-month. ***, **, * indicate 1%, 5%, and 10% significance, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:	TotalReturn	TotalReturn	$AbnormalReturn_G$	$AbnormalReturn_G$	$AbnormalReturn_{PT}$	$AbnormalReturn_{PT}$
Flipper	0.0876***		0.0789***		0.0739***	
	(0.0014)		(0.0011)		(0.0011)	
Experienced Flipper		0.1376***		0.1236***		0.1165***
		(0.0022)		(0.0019)		(0.0019)
Novice Flipper		0.0753***		0.0680***		0.0635***
		(0.0013)		(0.0011)		(0.0011)
Experienced Non-flipper		0.0066***		0.0077***		0.0060***
		(0.0007)		(0.0006)		(0.0006)
Constant	-0.0563***	-0.0607***	-0.0452***	-0.0493***	-0.0457***	-0.0494***
	(0.0050)	(0.0050)	(0.0042)	(0.0042)	(0.0042)	(0.0042)
Base Group	Non-flipper	Novice Non-flipper	Non-flipper	Novice Non-flipper	Non-flipper	Novice Non-flipper
Property Features	YES	YES	YES	YES	YES	YES
Year-month FE	YES	YES	YES	YES	YES	YES
District FE	YES	YES	YES	YES	YES	YES
Observations	635,038	635,038	635,038	635,038	635,038	635,038
R-squared	0.6615	0.6641	0.1031	0.1110	0.1014	0.1086

Table 5: Flippers' Risk-adjusted Returns in the Residential Property Market

This table presents the regression results on flippers' risk-adjusted annualized capital gain returns. In columns (1) and (2), the dependent variable is the Sharpe ratio of the housing investment. In columns (3) and (4), the dependent variable is the appraisal ratio (i.e., the ratio of abnormal return to idiosyncratic risk) of the owner, calculated using the method by Giacoletti (2021). In columns (5) and (6), the dependent variable is the appraisal ratio of the owner, calculated using the method by Peng & Thibodeau (2017). Only residential property investments with positive Sharpe ratios are included in columns (1) and (2), and only the residential property investments with positive appraisal ratios are included in columns (3) to (6). *Flipper* is a dummy variable denoting whether the owner is a flipper (i.e., hold the property for less than two years). *Experienced Flipper* is a dummy denoting whether the owner is an experienced flipper that has made at least two housing transactions before. *Novice Flipper* is a dummy variable denoting whether the owner is a novice flipper that has made fewer than two housing transactions before. *Experienced Non-flipper* is a dummy variable denoting whether the owner is an experienced non-flipper (i.e., hold the property for more than two years) that has made at least two housing transactions before. Robust standard errors are reported in parentheses and are clustered by district and year-month. ***, **, * indicate 1%, 5%, and 10% significance, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Total Return > 0		Abnormal Return$_G$ > 0		Abnormal Return$_{PT}$ > 0	
Dependent Variable:	Sharpe Ratio	Sharpe Ratio	Appraisal Ratio$_G$	Appraisal Ratio$_G$	Appraisal Ratio$_{PT}$	Appraisal Ratio$_{PT}$
Flipper	-0.0836***		0.1058***		0.0725***	
	(0.0246)		(0.0073)		(0.0076)	
Experienced Flipper		0.8893***		0.4201***		0.3902***
		(0.0380)		(0.0119)		(0.0124)
Novice Flipper		-0.1857***		0.0434***		0.0072
		(0.0260)		(0.0075)		(0.0079)
Experienced Non-flipper		1.8622***		0.3493***		0.3309***
		(0.0528)		(0.0131)		(0.0138)
Constant	1.9923***	1.5790***	1.0341***	0.9599***	1.0858***	1.0148***
	(0.1727)	(0.1723)	(0.0466)	(0.0465)	(0.0492)	(0.0490)
Base Group	Non-flipper	Novice Non-flipper	Non-flipper	Novice Non-flipper	Non-flipper	Novice Non-flipper
Property Features	YES	YES	YES	YES	YES	YES
Year-month FE	YES	YES	YES	YES	YES	YES
District FE	YES	YES	YES	YES	YES	YES
Observations	477,333	477,333	297,078	297,078	297,190	297,190
R-squared	0.1954	0.2022	0.0457	0.0553	0.0442	0.0526

Table 6: Impact of Comparable Sales on the Term Structure of Idiosyncratic Risk

This table presents the regression results on the impact of comparable sales during holding periods on the term structure of idiosyncratic risk. In Panel A, the dependent variable $IdioRisk_G$ is the level of the idiosyncratic risk for the annualized capital gain return in the Hong Kong residential property market, estimated using the method by Giacoletti (2021). In Panel B, the dependent variable $IdioRisk_{PT}$ is the level of the idiosyncratic risk for the annualized capital gain return in the Hong Kong residential property market, estimated using the method by Peng & Thibodeau (2017). *log(Sales in Building)* is the logarithmic form of the number of other home sales in the same building during the holding period. *log(Sales in Building)* is the logarithmic form of the number of other home sales in the same estate (i.e., housing complex) during the holding period. *Holding Year* is the property owner's holding period in years. Robust standard errors are reported in parentheses and are clustered by district and year-month. ***, **, * indicate 1%, 5%, and 10% significance, respectively.

Panel A. Idiosyncratic Risk Measured by Method in Giacoletti (2021)

	(1)	(2)	(3)	(4)
Dependent Variable:	$IdioRisk_G$	$IdioRisk_G$	$IdioRisk_G$	$IdioRisk_G$
Holding Year	-0.0023***	-0.0137***	-0.0043***	-0.0166***
	(0.0001)	(0.0002)	(0.0001)	(0.0002)
Holding $Year^2$		0.0006***		0.0007***
		(0.0000)		(0.0000)
log (Sales in Building)	-0.0249***	-0.0175***		
	(0.0004)	(0.0004)		
log (Sales in Estate)			-0.0131***	-0.0089***
			(0.0002)	(0.0002)
Constant	0.2279***	0.2085***	0.1263***	0.1390***
	(0.0043)	(0.0041)	(0.0033)	(0.0033)
Year-month FE	YES	YES	YES	YES
District FE	YES	YES	YES	YES
Observations	635,038	635,038	635,038	635,038
R-squared	0.1650	0.1825	0.1524	0.1770

Panel B. Idiosyncratic Risk Measured by Method in Peng & Thibodeau (2017)

	(1)	(2)	(3)	(4)
Dependent Variable:	$IdioRisk_{PT}$	$IdioRisk_{PT}$	$IdioRisk_{PT}$	$IdioRisk_{PT}$
Holding Year	-0.0023***	-0.0135***	-0.0043***	-0.0164***
	(0.0001)	(0.0002)	(0.0001)	(0.0002)
Holding Year^2		0.0006***		0.0007***
		(0.0000)		(0.0000)
log (Sales in Building)	-0.0247***	-0.0174***		
	(0.0004)	(0.0004)		
log (Sales in Estate)			-0.0130***	-0.0088***
			(0.0002)	(0.0002)
Constant	0.2256***	0.2064***	0.1248***	0.1375***
	(0.0043)	(0.0041)	(0.0033)	(0.0033)
Year-month FE	YES	YES	YES	YES
District FE	YES	YES	YES	YES
Observations	635,038	635,038	635,038	635,038
R-squared	0.1651	0.1824	0.1527	0.1769

Table 7: Impact of Market Liquidity on the Term Structure of Idiosyncratic Risk

This table presents the regression results on the impact of market liquidity on the term structure of idiosyncratic risk, using the introducing of the Special Stamp Duty (SSD) on 20 November 2010 as the shock. In columns (1) and (2), the dependent variable $IdioRisk_G$ is the level of the idiosyncratic risk for the annualized capital gain return in the Hong Kong residential property market, estimated using the method by Giacoletti (2021). In columns (3) and (4), the dependent variable $IdioRisk_{PT}$ is the level of the idiosyncratic risk for the annualized capital gain return in the Hong Kong residential property market, estimated using the method by Peng & Thibodeau (2017). *Hold<1Yr* is a dummy variable indicating home purchases that are held for less than 1 year before resales. *Hold1-2Yr* is a dummy variable indicating home purchases that are held for 1 to 2 years before resales. *SSD* is a dummy variable denoting home purchases made after the introduction of the SSD on 20 November 2010. columns (1) and (3) include the home purchases made within the [-1, +1] year around 20 November 2010. columns (2) and (4) include the home purchases made within the [-2, +2] years around 20 November 2010. Robust standard errors are reported in parentheses and are clustered by district and year-month. ***, **, * indicate 1%, 5%, and 10% significance, respectively.

	(1) [-1, +1] year $IdioRisk_G$	(2) [-2, +2] years $IdioRisk_G$	(3) [-1, +1] year $IdioRisk_{PT}$	(4) [-2, +2] years $IdioRisk_{PT}$
Hold<1Yr	0.0595***	0.0588***	0.0589***	0.0581***
	(0.0063)	(0.0048)	(0.0062)	(0.0048)
Hold1-2Yr	0.0016	0.0096***	0.0018	0.0098***
	(0.0049)	(0.0035)	(0.0049)	(0.0035)
SSD * Hold<1Yr	0.1739***	0.1091***	0.1732***	0.1094***
	(0.0568)	(0.0373)	(0.0565)	(0.0371)
SSD * Hold1-2Yr	0.0243***	0.0143**	0.0241***	0.0142**
	(0.0088)	(0.0069)	(0.0087)	(0.0069)
Constant	0.1620***	0.1574***	0.1585***	0.1538***
	(0.0228)	(0.0149)	(0.0227)	(0.0148)
Base Group	Non-flipper	Non-flipper	Non-flipper	Non-flipper
Year-month FE	YES	YES	YES	YES
District FE	YES	YES	YES	YES
Observations	54,740	101,810	54,740	101,810
R-squared	0.1514	0.1437	0.1477	0.1396

Internet Appendix A. Supplementary Tables

Table IA1: Additional Summary Statistics

This table reports the summary statistics of the risk-adjusted performance measures of the full sample.

	(1) N	(2) Mean	(3) Std. Dev.	(4) P25	(5) P50	(6) p75
Sharpe Ratio	635,038	1.5367	6.8936	-0.5122	1.3966	3.4512
Appraisal Ratio_{G}	635,038	-0.2445	1.9730	-1.0514	-0.0812	0.7337
Appraisal Ratio_{PT}	635,038	-0.2211	1.9595	-1.0472	-0.0805	0.7408

Table IA2. Correlation between Holding Periods and Housing Features

This table reports the correlation between the housing features and the holding periods in the Hong Kong housing market. Robust standard errors are reported in parentheses and are clustered by district and year-month. ***, **, * indicate 1%, 5%, and 10% significance, respectively.

Dependent Variable:	(1) Holding Years	(2) Holding Years	(3) Holding Years
Net Unit Size	0.7156***		
	(0.0257)		
Building Age at Purchase Time		-0.0272***	
		(0.0009)	
Unit Floor			0.0081***
			(0.0006)
Constant	0.8573***	5.6464***	5.1675***
	(0.1596)	(0.0148)	(0.0136)
Year-month FE	YES	YES	YES
District FE	YES	YES	YES
Observations	635,038	635,038	635,038
R-squared	0.1096	0.1092	0.1073

Table IA3: Term Structure of Idiosyncratic Risk for the Annualized Capital Gain Return in the Residential Property Market – Robustness Check Using the Risk in Logarithmic Form

This table presents robustness check results on the relationship between the idiosyncratic risk of annualized capital gain return and holding period (in years). In Panel A, the dependent variable $log(IdioRisk_G)$ is the logarithmic form of the idiosyncratic risk for the annualized capital gain return in the Hong Kong residential property market, estimated using the method by Giacoletti (2021). In Panel B, the dependent variable $log(IdioRisk_{PT})$ is the logarithmic form of the idiosyncratic risk for the annualized capital gain return in the Hong Kong residential property market, estimated using the method by Peng & Thibodeau (2017). *Holding Year* is the property owner's holding period in years. *Flipper* is a dummy variable denoting whether the owner is a flipper (i.e., hold the property for less than two years). *Experienced Flipper* is a dummy denoting whether the owner is an experienced flipper that has made at least two housing transactions before. *Novice Flipper* is a dummy variable denoting whether the owner is a novice flipper that has made fewer than two housing transactions before. *Experienced Non-flipper* is a dummy variable denoting whether the owner is an experienced non-flipper (i.e., hold the property for more than two years) that has made at least two housing transactions before. Robust standard errors are reported in parentheses and are clustered by district and year-month. ***, **, * indicate 1%, 5%, and 10% significance, respectively.

Panel A. Idiosyncratic Risk Measured by Method in Giacoletti (2021)

	(1)	(2)	(3)	(4)
Dependent Variable:	log ($IdioRisk_G$)	log ($IdioRisk_G$)	log ($IdioRisk_G$)	log ($IdioRisk_G$)
Holding Year	-0.0050***	-0.0147***		
	(0.0001)	(0.0002)		
Holding $Year^2$		0.0006***		
		(0.0000)		
Flipper			0.0653***	
			(0.0007)	
Experienced Flipper				0.0499***
				(0.0010)
Novice Flipper				0.0683***
				(0.0008)
Experienced Non-flipper				-0.0126***
				(0.0004)
Constant	0.0755***	0.0972***	0.0215***	0.0239***
	(0.0026)	(0.0026)	(0.0024)	(0.0024)
Base Group	N/A	N/A	Non-flipper	Novice Non-flipper
Year-month FE	YES	YES	YES	YES
District FE	YES	YES	YES	YES
Observations	635,038	635,038	635,038	635,038
R-squared	0.1397	0.1679	0.1716	0.1739

Panel B. Idiosyncratic Risk Measured by Method in Peng & Thibodeau (2017)

Dependent Variable:	(1) log ($IdioRisk_{PT}$)	(2) log ($IdioRisk_{PT}$)	(3) log ($IdioRisk_{PT}$)	(4) log ($IdioRisk_{PT}$)
Holding Year	-0.0049***	-0.0147***		
	(0.0001)	(0.0002)		
Holding Year^2		0.0006***		
		(0.0000)		
Flipper			0.0651***	
			(0.0007)	
Experienced Flipper				0.0496***
				(0.0010)
Novice Flipper				0.0681***
				(0.0008)
Experienced Non-flipper				-0.0126***
				(0.0004)
Constant	0.0756***	0.0973***	0.0218***	0.0243***
	(0.0026)	(0.0026)	(0.0024)	(0.0024)
Base Group	N/A	N/A	Non-flipper	Novice Non-flipper
Year-month FE	YES	YES	YES	YES
District FE	YES	YES	YES	YES
Observations	635,038	635,038	635,038	635,038
R-squared	0.1395	0.1677	0.1712	0.1736

Table IA4: Term Structure of Total Risk for the Annualized Capital Gain Return in the Residential Property Market – Robustness Check Using the Risk in Logarithmic Form

This table presents robustness check results on the relationship between the total risk of annualized capital gain return and holding period (in years). The dependent variable *log(TotalRisk)* is the logarithmic form of the total risk for the annualized capital gain return in the Hong Kong residential property market. *Holding Year* is the property owner's holding period in years. *Flipper* is a dummy variable denoting whether the owner is a flipper (i.e., hold the property for less than two years). *Experienced Flipper* is a dummy denoting whether the owner is an experienced flipper that has made at least two housing transactions before. *Novice Flipper* is a dummy variable denoting whether the owner is a novice flipper that has made fewer than two housing transactions before. *Experienced Non-flipper* is a dummy variable denoting whether the owner is an experienced non-flipper (i.e., hold the property for more than two years) that has made at least two housing transactions before. Robust standard errors are reported in parentheses and are clustered by district and year-month. ***, **, * indicate 1%, 5%, and 10% significance, respectively.

	(1)	(2)	(3)	(4)
Dependent Variable:	log (TotalRisk)	log (TotalRisk)	log (TotalRisk)	log (TotalRisk)
Holding Year	-0.0046***	-0.0144***		
	(0.0001)	(0.0002)		
Holding Year^2		0.0006***		
		(0.0000)		
Flipper			0.0639***	
			(0.0007)	
Experienced Flipper				0.0479***
				(0.0011)
Novice Flipper				0.0671***
				(0.0008)
Experienced Non-flipper				-0.0132***
				(0.0005)
Constant	0.0678***	0.0894***	0.0170***	0.0196***
	(0.0027)	(0.0026)	(0.0025)	(0.0025)
Base Group	N/A	N/A	Non-flipper	Novice Non-flipper
Year-month FE	YES	YES	YES	YES
District FE	YES	YES	YES	YES
Observations	635,038	635,038	635,038	635,038
R-squared	0.1334	0.1612	0.1666	0.1691

Table IA5: Flippers' Total and Abnormal Capital Gain Returns in the Residential Property Market – Robustness Check Using the Return in Logarithmic Form

This table presents the robustness check results on flippers' total and abnormal annualized capital gain returns. In columns (1) and (2), the dependent variable *log(TotalReturn)* is the logarithmic form of the annualized total capital gain return. In columns (3) and (4), the dependent variable *log*($AbnormalReturn_G$) is the logarithmic form of the annualized abnormal capital gain return, estimated using the method by Giacoletti (2021). In columns (5) and (6), the dependent variable *log*($AbnormalReturn_{PT}$) is the logarithmic form of the annualized abnormal capital gain return, estimated using the method by Peng & Thibodeau (2017). *Flipper* is a dummy variable denoting whether the owner is a flipper (i.e., hold the property for less than two years). *Experienced Flipper* is a dummy denoting whether the owner is an experienced flipper that has made at least two housing transactions before. *Novice Flipper* is a dummy variable denoting whether the owner is a novice flipper that has made fewer than two housing transactions before. *Experienced Non-flipper* is a dummy variable denoting whether the owner is an experienced non-flipper (i.e., hold the property for more than two years) that has made at least two housing transactions before. Robust standard errors are reported in parentheses and are clustered by district and year-month. ***, **, * indicate 1%, 5%, and 10% significance, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:	log(TotalReturn)	log(TotalReturn)	log($AbnormalReturn_G$)	log($AbnormalReturn_G$)	log($AbnormalReturn_{PT}$)	log($AbnormalReturn_{PT}$)
Flipper	0.0703***		0.0705***		0.0660***	
	(0.0011)		(0.0011)		(0.0011)	
Experienced Flipper		0.1114***		0.1118***		0.1055***
		(0.0017)		(0.0016)		(0.0017)
Novice Flipper		0.0602***		0.0605***		0.0564***
		(0.0011)		(0.0010)		(0.0010)
Experienced Non-flipper		0.0056***		0.0085***		0.0066***
		(0.0006)		(0.0006)		(0.0005)
Constant	-0.0360***	-0.0395***	-0.0439***	-0.0478***	-0.0431***	-0.0466***
	(0.0041)	(0.0041)	(0.0040)	(0.0040)	(0.0040)	(0.0040)
Base Group	Non-flipper	Novice Non-flipper	Non-flipper	Novice Non-flipper	Non-flipper	Novice Non-flipper
Property Features	YES	YES	YES	YES	YES	YES
Year-month FE	YES	YES	YES	YES	YES	YES
District FE	YES	YES	YES	YES	YES	YES
Observations	635,038	635,038	635,038	635,038	635,038	635,038

R-squared	0.7071	0.7093	0.0916	0.0994	0.0913	0.0984

Table IA6: Impact of Comparable Sales on the Term Structure of Idiosyncratic Risk – Robustness Check Using the Risk in Logarithmic Form

This table presents the robustness check results on the impact of comparable sales during holding periods on the term structure of idiosyncratic risk. In Panel A, the dependent variable *log(IdioRisk*$_G$*)* is the logarithmic form of the idiosyncratic risk for the annualized capital gain return in the Hong Kong residential property market, estimated using the method by Giacoletti (2021). In Panel B, the dependent variable *log(IdioRisk*$_{PT}$*)* is the logarithmic form of the idiosyncratic risk for the annualized capital gain return in the Hong Kong residential property market, estimated using the method by Peng & Thibodeau (2017). *log(Sales in Building)* is the logarithmic form of the number of other home sales in the same building during the holding period. *log(Sales in Building)* is the logarithmic form of the number of other home sales in the same estate (i.e., housing complex) during the holding period. *Holding Year* is the property owner's holding period in years. Robust standard errors are reported in parentheses and are clustered by district and year-month. ***, **, * indicate 1%, 5%, and 10% significance, respectively.

Panel A. Idiosyncratic Risk Measured by Method in Giacoletti (2021)

	(1)	(2)	(3)	(4)
Dependent Variable:	log (IdioRisk$_G$)	log (IdioRisk$_G$)	log (IdioRisk$_G$)	log (IdioRisk$_G$)
Holding Year	-0.0023***	-0.0108***	-0.0037***	-0.0128***
	(0.0001)	(0.0002)	(0.0001)	(0.0002)
Holding Year^2		0.0004***		0.0005***
		(0.0000)		(0.0000)
log (Sales in Building)	-0.0174***	-0.0119***		
	(0.0003)	(0.0002)		
log (Sales in Estate)			-0.0093***	-0.0062***
			(0.0001)	(0.0001)
Constant	0.1756***	0.1610***	0.1046***	0.1140***
	(0.0032)	(0.0030)	(0.0027)	(0.0026)
Year-month FE	YES	YES	YES	YES
District FE	YES	YES	YES	YES
Observations	635,038	635,038	635,038	635,038
R-squared	0.1618	0.1770	0.1526	0.1732

Panel B. Idiosyncratic Risk Measured by Method in Peng & Thibodeau (2017)

	(1)	(2)	(3)	(4)
Dependent Variable:	log ($IdioRisk_{PT}$)	log ($IdioRisk_{PT}$)	log ($IdioRisk_{PT}$)	log ($IdioRisk_{PT}$)
Holding Year	-0.0023***	-0.0108***	-0.0037***	-0.0128***
	(0.0001)	(0.0002)	(0.0001)	(0.0002)
Holding $Year^2$		0.0004***		0.0005***
		(0.0000)		(0.0000)
log (Sales in Building)	-0.0174***	-0.0119***		
	(0.0003)	(0.0002)		
log (Sales in Estate)			-0.0093***	-0.0061***
			(0.0001)	(0.0001)
Constant	0.1755***	0.1609***	0.1047***	0.1141***
	(0.0032)	(0.0030)	(0.0027)	(0.0026)
Year-month FE	YES	YES	YES	YES
District FE	YES	YES	YES	YES
Observations	635,038	635,038	635,038	635,038
R-squared	0.1615	0.1766	0.1523	0.1729

Table IA7: Impact of Market Liquidity on the Term Structure of Idiosyncratic Risk – Robustness Check Using the Risk in Logarithmic Form

This table presents the robustness check results on the impact of market liquidity on the term structure of idiosyncratic risk, using the introducing of the Special Stamp Duty (SSD) on 20 November 2010 as the shock. In columns (1) and (2), the dependent variable *log(IdioRisk$_G$)* is the logarithmic form of the idiosyncratic risk for the annualized capital gain return in the Hong Kong residential property market, estimated using the method by Giacoletti (2021). In columns (3) and (4), the dependent variable *log(IdioRisk$_{PT}$)* is the logarithmic form of the idiosyncratic risk for the annualized capital gain return in the Hong Kong residential property market, estimated using the method by Peng & Thibodeau (2017). *Hold<1Yr* is a dummy variable indicating home purchases that are held for less than 1 year before resales. *Hold1-2Yr* is a dummy variable indicating home purchases that are held for 1 to 2 years before resales. *SSD* is a dummy variable denoting home purchases made after the introduction of the SSD on 20 November 2010. columns (1) and (3) include the home purchases made within the [-1, +1] year around 20 November 2010. columns (2) and (4) include the home purchases made within the [-2, +2] years around 20 November 2010. Robust standard errors are reported in parentheses and are clustered by district and year-month. ***, **, * indicate 1%, 5%, and 10% significance, respectively.

	(1) [-1, +1] year log (IdioRisk$_G$)	(2) [-2, +2] years log (IdioRisk$_G$)	(3) [-1, +1] year log (IdioRisk$_{PT}$)	(4) [-2, +2] years log (IdioRisk$_{PT}$)
Hold<1Yr	0.0422***	0.0448***	0.0422***	0.0449***
	(0.0042)	(0.0035)	(0.0042)	(0.0035)
Hold1-2Yr	0.0016	0.0073***	0.0018	0.0075***
	(0.0039)	(0.0027)	(0.0039)	(0.0027)
SSD * Hold<1Yr	0.1599***	0.0966***	0.1605***	0.0974***
	(0.0437)	(0.0292)	(0.0436)	(0.0291)
SSD * Hold1-2Yr	0.0162**	0.0112*	0.0161**	0.0112*
	(0.0070)	(0.0059)	(0.0069)	(0.0059)
Constant	0.1264***	0.1309***	0.1267***	0.1310***
	(0.0199)	(0.0134)	(0.0199)	(0.0134)
Base Group	Non-flipper	Non-flipper	Non-flipper	Non-flipper
Year-month FE	YES	YES	YES	YES
District FE	YES	YES	YES	YES
Observations	54,740	101,810	54,740	101,810
R-squared	0.1211	0.1192	0.1204	0.1186

Table IA8: Term Structure of Idiosyncratic Risk for the Annualized Capital Gain Return in the Residential Property Market – Robustness Checks using New Sale Units

This table presents robustness check results on the relationship between the idiosyncratic risk of annualized capital gain return and holding period (in years). The sample includes only the firsthand new sales in the Hong Kong housing market. In columns (1) and (2), the dependent variable $IdioRisk_G$ is the level of the idiosyncratic risk for the annualized capital gain return, estimated using the method by Giacoletti (2021). In columns (3) and (4), the dependent variable $IdioRisk_{PT}$ is the level of the idiosyncratic risk for the annualized capital gain return, estimated using the method by Peng & Thibodeau (2017). *Holding Year* is the property owner's holding period in years. Robust standard errors are reported in parentheses and are clustered by district and year-month. ***, **, * indicate 1%, 5%, and 10% significance, respectively.

	(1)	(2)	(1)	(2)
Dependent Variable:	$IdioRisk_G$	$IdioRisk_G$	$IdioRisk_{PT}$	$IdioRisk_{PT}$
Holding Year	-0.0032***	-0.0094***	-0.0031***	-0.0092***
	(0.0001)	(0.0007)	(0.0001)	(0.0007)
Holding Year^2		0.0003***		0.0003***
		(0.0000)		(0.0000)
Constant	0.0147*	0.0413***	0.0147*	0.0408***
	(0.0088)	(0.0096)	(0.0086)	(0.0094)
Property Features	YES	YES	YES	YES
Year-month FE	YES	YES	YES	YES
District FE	YES	YES	YES	YES
Observations	137,588	137,588	137,588	137,588
R-squared	0.2952	0.3047	0.2890	0.2985

Table IA9: Flippers' Risk-adjusted Returns in the Residential Property Market – Robustness Checks Using Home Purchases before the Introduction of the SSD Policy

This table presents the robustness check results on flippers' risk-adjusted annualized capital gain returns. The sample includes only the home investments that were initially purchased before the SSD policy took effect (i.e., before November 20, 2010). In columns (1) and (2), the dependent variable is the Sharpe ratio of the housing investment. In columns (3) and (4), the dependent variable is the appraisal ratio (i.e., the ratio of abnormal return to idiosyncratic risk) of the owner, calculated using the method by Giacoletti (2021). In columns (5) and (6), the dependent variable is the appraisal ratio of the owner, calculated using the method by Peng & Thibodeau (2017). Only residential property investments with positive Sharpe ratios are included in columns (1) and (2), and only the residential property investments with positive appraisal ratios are included in columns (3) to (6). *Flipper* is a dummy variable denoting whether the owner is a flipper (i.e., hold the property for less than two years). *Experienced Flipper* is a dummy denoting whether the owner is an experienced flipper that has made at least two housing transactions before. *Novice Flipper* is a dummy variable denoting whether the owner is a novice flipper that has made fewer than two housing transactions before. *Experienced Non-flipper* is a dummy variable denoting whether the owner is an experienced non-flipper (i.e., hold the property for more than two years) that has made at least two housing transactions before. Robust standard errors are reported in parentheses and are clustered by district and year-month. ***, **, * indicate 1%, 5%, and 10% significance, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Total Return > 0		Abnormal Return$_G$ > 0		Abnormal Return$_{PT}$ > 0	
Dependent Variable:	Sharpe Ratio	Sharpe Ratio	Appraisal Ratio$_G$	Appraisal Ratio$_G$	Appraisal Ratio$_{PT}$	Appraisal Ratio$_{PT}$
Flipper	-0.1080***		0.0912***		0.0629***	
	(0.0237)		(0.0074)		(0.0078)	
Experienced Flipper		0.8184***		0.4002***		0.3721***
		(0.0374)		(0.0121)		(0.0127)
Novice Flipper		-0.2023***		0.0290***		-0.0005
		(0.0247)		(0.0076)		(0.0080)
Experienced Non-flipper		1.9196***		0.3355***		0.3277***
		(0.0678)		(0.0177)		(0.0188)
Constant	1.4586***	1.1499***	1.0396***	0.9755***	1.0811***	1.0187***
	(0.1777)	(0.1772)	(0.0494)	(0.0493)	(0.0524)	(0.0522)
Base Group	Non-flipper	Novice Non-flipper	Non-flipper	Novice Non-flipper	Non-flipper	Novice Non-flipper
Property Features	YES	YES	YES	YES	YES	YES
Year-month FE	YES	YES	YES	YES	YES	YES
District FE	YES	YES	YES	YES	YES	YES
Observations	402,798	402,798	251,793	251,793	251,814	251,814
R-squared	0.2116	0.2176	0.0469	0.0556	0.0462	0.0539

Table IA10: Cross-market Comparison on the Term Structure of Idiosyncratic Risk in the Housing Markets of Hong Kong and California

This table reports the cross-market comparison results on the term structure of idiosyncratic risk in the housing markets of Hong Kong and California. The outcome variable is the squared idiosyncratic capital gains (residuals $\hat{u}_{i,T}^2$ in Equation (3)). columns (1) and (2) include the EPRC data of resale housing transactions in Hong Kong between 1993 and 2021. Results in columns (3) and (4) are obtained from columns (2) and (3) of Table 4 in Giacoletti (2021), with uses all resales in California taking place over the period from April 1996 through December 2018. The location fixed effects are at the district level in columns (1) and (2) and are at the Zip Code level in columns (3) and (4). Robust standard errors are reported in parentheses and are double clustered by year-month and district (or Zip Code). ***, **, * indicate 1%, 5%, and 10% significance, respectively.

	(1)	(2)	(3)	(4)
	Hong Kong	Hong Kong	California	California
Dependent Variable:	$\hat{u}_{i,T}^2$	$\hat{u}_{i,T}^2$	$\hat{u}_{i,T}^2$	$\hat{u}_{i,T}^2$
Holding Year	-0.0009***	-0.0038***	-0.0017***	-0.0051***
	(0.0000)	(0.0001)	(0.0001)	(0.0003)
Holding Year^2		0.0002***		0.0003***
		(0.0000)		(1.62E-05)
Property Features	YES	YES	YES	YES
Year-month FE	YES	YES	YES	YES
District FE	YES	YES	N/A	N/A
Zip Code FE	N/A	N/A	YES	YES
Observations	635,038	635,038	1,258,169	1,258,169
R-squared	0.054	0.065	0.099	0.108