Tobin Tax Policy, Housing Speculation, and Property Market Dynamics

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Abstract

Hong Kong introduced a Tobin property tax—the Special Stamp Duty (SSD) Policy—in 2010, which substantially increased the selling costs of short-term property holders. This study examines the effectiveness of this Tobin property tax in curbing speculation and cooling down the market. We find that SSD effectively curtails short-term speculations and reduces flippers' (holding period less than 2 years) market presence, which fell from 23.2% in 2009 to 2.4% in 2011 and 0.9% in 2013. However, 1 year after implementing the tax, the housing price shows an upward trend of 12.64% and 15.76% in the primary and secondary markets, respectively, indicating a lack of a market cooling effect. We show that flippers strategically defer sales to circumvent SSD charges, resulting in the sharp bunching of urgent sales immediately after the lock-in period ends. Further, SSD effectively increases selling costs and prolongs potential sellers' holding periods, thereby significantly reducing liquidity and driving up prices in the secondary market. We also document an unintended externality on market dynamics: the unmet housing demand from the secondary market triggers a buying frenzy into the primary market, which increases the prices in both markets. Our findings have policy implications for the viability of Tobin taxes for regulating real estate markets.

Keywords: Tobin tax policy, stamp duty tax, property speculators, lock-in period, bunching effect
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1. Introduction

Financial transaction taxes, often referred to as Tobin taxes,[1] are widely used by regulators to penalize short-term financial round-trip transactions (Cai et al., 2021; Deng et al., 2018). However, despite their popularity in practice, evidence for their overall effectiveness remains inconclusive. On the one hand, some studies find that Tobin taxes reduce market volatility by curbing noise traders (e.g., Stiglitz, 1989; Summers & Summers, 1989). On the other hand, empirical evidence shows that Tobin taxes have the potential negative externality of reducing liquidity and disrupting market efficiency (Amihud & Mendelson, 1992; Deng et al., 2021; Subrahmanyam, 1998).

In this study, we focus on a Tobin tax policy, i.e., the Special Stamp Duty (SSD), in Hong Kong's overheated housing market. The SSD policy aims to curb short-term property speculations and cool down the market; short-term speculators (or flippers) are defined as traders who sell within 2 years of purchase (Bayer et al., 2020; Fu & Qian, 2014; Fu et al., 2015; Wong et al., 2018). Motivated by quick capital gains, flippers are often identified as the main culprits who drive up housing prices in Hong Kong, the world's least affordable housing market (SCMP, 2018). The presence of flippers was especially high (23.2%) in 2009, furthering prevalent speculations in the Hong Kong housing market.[2]

To tackle the rampant speculation and prevent further exuberance in the housing market, the Hong Kong government introduced the SSD on November 20, 2010 (SSD Phase 1), which stipulates that all residential properties with less than a 2-year holding period at the point of resale will be levied an SSD of 5–15%.[3] Two years later, on October 27, 2012, the government tightened the SSD by extending the tax exemption holding period to 3 years and increasing the tax rate to 20% (SSD

[1] Tobin (1978) proposed the tax more than 40 years ago to "throw some sand in the wheels of speculation," specifically for currency trading. The idea has been extended to many forms of financial transactions.
[2] Flipping sales, on average, account for 15.8% of all housing transactions in Hong Kong from 1992 to 2017, compared with 14.5% in Singapore (Tu and Zhang, 2019) and 4–17% in the Greater Los Angeles Area (Bayer et al., 2020).
[3] Note that this policy took effect immediately after announcement and delivered an unanticipated shock to the market. See the government press release for more details:https://www.info.gov.hk/gia/general/201011/19/P201011190294.htm. In addition, the stock price index of listed real estate firms in Hong Kong (Hang Seng Property Index [HSPI]) grew for several months before the policy was implemented and started to drop immediately after the policy was announced (Appendix Figure IB1). We also compare the HSPI with the market index (Hang Seng Index [HIS]) and find that HSPI experiences a larger drop than his, as the policy has a more adverse impact on the real estate sector. These results support our premise of the SSD policy having been unexpected by the market.

Phase 2). We expect the SSD to dampen short-term speculations by increasing the transaction costs for short-term resale transactions.

Despite the fact that property flippers are largely blamed by the media for driving up housing prices, there is no consensus in the literature on the impact of flippers on the housing market. Some studies find that flippers cause market mispricing in the U.S. housing market (Bayer et al., 2020; Chinco & Mayer, 2015), but others show that flippers have a positive effect on market liquidity and a mitigating effect on market volatility (Fu & Qian, 2014; Tu & Zhang, 2019). In addition, the field has not conclusively identified how a relatively small proportion of flippers can influence and interact with non-flippers in the housing market (Deng et al., 2019; Li et al., 2019). We also lack micro-level analyses of speculators' strategic responses to regulations (Bradley, 2018; Fu et al., 2015; Kopczuk & Munroe, 2015; Tam, 2018).

To fill this gap in the literature, we investigate whether and how exogenous Tobin tax policies can curb short-term property flipping and cool down housing prices. Specifically, we exploit the SSD Tobin tax policies as a quasi-natural experiment to examine flippers' roles in the housing market and their strategic responses to policies. As the SSD targets short-term speculative resales in the secondary market, we further examine the market dynamics between the primary and secondary market segments and the potential negative externality effect when housing demand flows from the secondary to the primary market.

The empirical challenges faced by previous studies include a lack of detailed transaction records over long time periods, exogenous policy shocks, and difficulty in identifying property flippers in the housing market (Bayer et al., 2020; Tu & Zhang, 2019). In this study, we exploit a rich set of resale transactions in the Hong Kong housing market over a relatively long period, from 1992 to 2017, which enables us to overcome these difficulties.

We then apply several novel identification strategies in this unique institutional setting: 1) we use the SSD policy as an exogenous shock to the transaction costs to examine the effects of the Tobin tax on curbing speculations; 2) we exploit the sharp decline in the market presence of flippers to examine flippers' effects on housing market dynamics; 3) we use the SSD lock-in periods as clean cutoff dates to examine flippers' strategic responses in terms of holding periods and selling prices; 4) we examine the post-policy behaviors of home buyers with prior flipping experience (pre-policy

flippers) to address any potential selection bias; and 5) we conduct a counterfactual analysis of the market cooling effect by extrapolating price trend indices in the post-policy period based on average housing price growth rates in the pre-policy period.

Equipped with these identification strategies, we document the following key findings. First, we compare the investment performance of flippers relative to non-flippers and find that flippers obtain higher returns because they can buy low and sell high. Specifically, the annualized capital gain returns for flippers are 12.7% higher than for non-flippers, ceteris paribus; their purchase prices are 3.32% lower and their resale prices are 3.21% higher than those of non-flippers, implying that flippers may have expertise in discovering underpriced properties and selling at above-market prices. Using the SSD as an exogenous shock to flippers' demand, we show that flippers' annualized capital gain returns drop by about 9% after the introduction of SSD Phase 1; this diminished the flippers' returns by more than half, indicating that the SSD substantially disrupted flippers' speculative investment activities. These results remain robust when we address potential concerns about sample selection, confounding effects, and latent housing features.

Second, we examine whether the SSD can effectively curb speculation. We show that the market share of flipping sales drops dramatically after SSD implementation. Specifically, the percentage of flipping sales drops substantially, from 23.2% in 2009 to 2.4% in 2011 and 0.9% in 2013. Using a 5-year window around SSD, we find that the likelihood of flipping resales drops by 26.7% after SSD implementation, demonstrating the effectiveness of the policy in deterring short-term speculations. In addition, the average holding periods are significantly longer after SSD implementation. Before the SSD was introduced, 12.81% of the properties were resold within 1 year of their purchase dates and 20.99% were resold within 2 years of their purchase dates. After the introduction of SSD Phase 1, the corresponding percentages drop dramatically to 0.41% and 1.86%, respectively. For purchases made within the [-1, +1] year window around the introduction of SSD Phase 1, the average holding period increases by 68.7% (or 1.79 years) after policy implementation when we control for housing features and other fixed effects. These results indicate that the SSD is highly effective in reducing short-term flipping in the housing market.

Third, we investigate flippers' strategic responses to the Tobin tax policy by exploiting the SSD lock-in periods as clean policy cutoff dates. Given their tax-saving incentives, flippers may

strategically circumvent the SSD by extending their holding periods to slightly more than the lock-in periods. As expected, we observe a large and acute bunching effect immediately after the cutoff dates, implying that a sizeable proportion of flippers sell shortly after the lock-in periods end.[4] For example, after the introduction of SSD Phase 1, the share of urgent sales made within 1 (or 3) months after the lock-in period ends (i.e., [t+24 months, t+25 (or 27) months]) is 2.87 times (or 2.39 times) the corresponding share in the pre-policy period. Similarly, after the introduction of SSD Phase 2, the share of urgent sales made within 1 (or 3) months after the lock-in period ends is 5.89 times (or 5.28 times) the sales likelihood in the pre-policy period. In contrast, the likelihood of selling within the SSD lock-in periods drops substantially. The proportion of properties sold within 3 years of the purchase date is 28.1% in the pre-policy period and plummets to 2.26% after the introduction of SSD Phase 2.

One potential concern about the identification of flippers is selection bias, as only successful flips with a holding period of less than 2 years are captured by our method. Given that flippers can strategically extend their holding periods to circumvent the policy, they are mechanically deemed non-flippers in the post-policy period. To address this concern, we propose an alternative method by which to identify flippers based on their property transactions made prior to SSD implementation. We define flippers in the post-policy period as home buyers who made any flips (i.e., resold within 2 years) in the pre-policy period.

We examine the ex-post performance of all of the resales made by these pre-policy flippers and find that their annual returns fall by 9.16%, their purchase prices increase by 1.64%, and their resale prices drop by 1.58% after SSD implementation, which is consistent with earlier results that the SSD adversely affects the investment performance of flippers. Before the introduction of SSD Phase 1, the proportion of homes sold within 2 years by pre-policy flippers was 75.33%. This drops substantially to 1.03% after policy implementation, implying that the majority of the flippers now hold for over 2 years. Moreover, we find that pre-policy flippers are more likely to quit flipping and exit the housing market after SSD implementation, with their likelihood of making property

[4] Based on anecdotal evidence, it is possible that speculators may have entered informal forward contracts with potential buyers during the lock-in periods, allowing them to settle the properties immediately after the lock-in periods end.

purchases in the post-policy period falling by about 20% relative to the pre-policy period, lending further support to the effectiveness of the SSD in curbing flippers.

Fourth, we find that the Tobin tax policy SSD does not effectively cool down housing prices. The prices of primary and secondary transactions increase by 12.64% and 15.76%, respectively, 1 year after SSD implementation. This increase is even higher (37.96% and 26.6%, respectively) when we use a [-5, +5] year window. We further construct counterfactual price trends after policy implementation by extrapolating the housing price indices in the pre-policy period and find that the actual post-policy price movements do not significantly differ from the predicted counterfactuals in both the primary and secondary markets. This indicates that the SSD has little effect in cooling down the housing market.

We explain the policy's lack of market cooling effect from the perspective of negative externality in both the primary and secondary markets. We show that the transaction volume shrinks significantly in the secondary market, implying that the SSD dries up the liquidity in the secondary market, thereby reducing supply and increasing prices. As the secondary and primary markets are generally substitutive in nature (Soundararajan et al., 2018), the unmet housing demand from the secondary market triggers a buying frenzy into the primary market, where the supply is inelastic in both the short and medium terms, which pushes up prices in the primary market as well.

This study contributes to the literature on how Tobin tax policies curb speculations in the housing market and extends earlier studies on the impacts of these policies on housing and investments in general (Bradley, 2018; Cai et al., 2021; Deng et al. 2016; Fu et al., 2015; Kopczuk & Munroe, 2015). First, we show that Tobin taxes increase selling costs and are therefore effective in curbing flippers but not in cooling down markets. Our results suggest that curbing flippers alone cannot solve the housing unaffordability problem. On the contrary, it could dry up market liquidity and reduce supply in the secondary market, thereby increasing prices in the secondary market. Further, it triggers a buying frenzy into the primary market because of the spillover of unmet demand from the secondary market.

Second, our findings contribute to the understanding of the dynamic relationship between different segments of the housing market, offering unique insights into how imposing Tobin taxes in one market can have unintended consequences in other related markets (e.g., by pushing up prices).

Previous studies mainly focus on market segments of the equity market (Cai et al., 2021), the market segmentation between real estate and capital markets (Ambrose et al., 1992), or the dynamics of public and private real estate markets (Tuluca et al., 2000). For example, Cai et al. (2021) show that imposing Tobin taxes in the stock market triggers investors to shift their trading to the warrant market. Policy makers need to beware of the potential negative externalities when imposing such Tobin property taxes and must strive to strike a balance between the pros and cons with respect to social welfare. As Hong Kong is highly dependent on property-related taxes for government revenue, understanding the viability of SSD policies is especially important in this context.

Third, we contribute to the scant literature on the Hong Kong housing market from the perspective of short-term property speculators (Bayer et al., 2020; Chinco & Mayer, 2015; Fu & Qian, 2014; Tu & Zhang, 2019). Our findings shed light on the expertise of flippers in the housing market and the negative impact of the SSD on their investment performance. We also analyze the spillover effect of flipping sales in driving up housing prices in nearby neighborhoods and aggravating housing unaffordability (Gao et al., 2020), which is especially relevant given the extent of the housing problem in Hong Kong. Our empirical results complement the theoretic predictions made by Wong et al. (2018) and Leung and Tse (2017).

Fourth, the clean identification of flippers is a major challenge faced by previous studies on housing market speculations (Bayer et al., 2020). The literature only focuses on successful flippers and ignores their potential strategic responses to reduce the policy's impact (Fu et al., 2015). We improve this definition by identifying potential flippers based on their experiences prior to the policy shock. This identification strategy offers more convincing evidence of the impact of stamp duty policy on flippers' behaviors ex post and provides robustness checks for the main results.

Finally, this study contributes to the literature on strategic responses to government intervention policies (Best & Kleven, 2017; Dai et al., 2008; Tam, 2018). We document acute bunching effects around the lock-in period for each phase of the SSD policy, revealing that flippers tend to strategically extend the holding periods to slightly more than the lock-in periods to avoid extra taxes because of the SSD and urgently resell properties immediately after the lock-in periods end.

The rest of the paper is organized as follows. Section 2 introduces the institutional background and Section 3 describes the data and measures used. Section 4 presents the baseline results on flippers' returns and transaction prices. Sections 5 and 6 present the results on the effectiveness of the SSD in curbing speculation and cooling the market, respectively. Section 7 provides a discussion of the other strategic responses of flippers to the SSD policy. Section 8 offers some concluding remarks.

2. Institutional Background

Housing prices in Hong Kong have been rising continuously over the past few decades. Figure 1 plots Hong Kong's private domestic property price index from 1992 to 2018 based on data from Hong Kong's Rating and Valuation Department (RVD). Housing prices in Hong Kong reached a record high in 1997 prior to the 1997 Asian Financial Crisis. The local housing market then entered a recession until 2003. Since then, housing prices have regained growth momentum.

[------ PLACE FIGURE 1 ABOUT HERE ------]

Over the past decade, Hong Kong's residential property prices have risen by 242% (152.6% inflation-adjusted), with noticeable increases of 28.5% in 2009, 21% in 2010, and 25.7% in 2012. In 2018, the property price index reached 377.3, which is more than 6 times the index in 2003 (61.6). In contrast, real income has been virtually stagnant in Hong Kong for many years.[5] In 2019, Hong Kong topped the list of the world's most unaffordable cities for the eighth year in a row, with a median house price to median household income ratio of 20.8, which is much higher than the 5.1 benchmark ratio that demarcates "severely unaffordable".[6]

Although the lack of land supply is acknowledged as a major cause of the unaffordability of housing in Hong Kong, the speculations of property investors have also been identified as a key factor that drives up housing prices (SCMP, 2018). Property flipping constitutes a significant proportion of housing transactions in Hong Kong. Data on Hong Kong's property transactions from

[5] Data from the Census and Statistics Department of Hong Kong reveal that the real wage index for employees up to the supervisory level has only increased from 100 in September 1992 to 124.6 in September 2019. Source: https://www.censtatd.gov.hk/hkstat/sub/so210.jsp

[6] Source: 16th Annual Demographia International Housing Affordability Survey, obtained from http://www.demographia.com/db-dhi-index.htm

1992 to 2010 show that on average, approximately 18% of properties are sold within 2 years of purchase. If we focus only on the 1-year window before the enactment of the SSD policy in November 2010, then the proportion of flippers is especially high at 23.2%.

To tackle the issue of rampant speculation in the housing market and to discourage flippers, the Hong Kong government introduced a series of stamp duty policies. On November 20, 2010, the Hong Kong government released the SSD Phase 1 policy, which stipulates that all properties purchased from then on will be levied an SSD of 15% if held for less than 6 months after purchase. If the properties are resold within 6–12 months of purchase, then an SSD of 10% will be levied; the SSD drops to 5% if the properties are resold within 1–2 years. The SSD is fully exempt if the unit has been held for over 2 years at the time of resale. Note that the government did not discuss this policy with the public beforehand; it was implemented immediately after announcement, delivering a sudden and unanticipated shock to the market.

[------ PLACE FIGURE 2 ABOUT HERE ------]

On October 27, 2012, the government further raised the SSD rates for all holding periods and extended the taxable period. The SSD rate was increased to 20% for resales made within 6 months of purchase and to 15% for those resold within 6–12 months of purchase. Any units resold within 1–3 years after purchase are subject to an SSD of 10%. Figure 2 illustrates the corresponding changes in SSD rates and taxable periods in 2010 and 2012.

The SSD policy in 2010 is the first stamp duty policy intervention introduced by the Hong Kong government during our study period that specifically targets flipping transactions.[7] It thus serves as a policy shock that can be used to investigate the effect of levying a Tobin tax on short-term flippers. Using this natural experiment, we examine the impact of the SSD Tobin tax on flippers' housing returns, market performance, and behaviors in response to the Tobin tax policy.

[7] In 2012, the Hong Kong government further introduced additional stamp duties for foreign buyers (Double Stamp Duty) and local buyers purchasing second units (Buyer's Stamp Duty) to further cool the market. However, unlike the SSD, which is levied based on the seller's holding period, these additional stamp duties are levied based on the buyer's residency status.

3. Data and Stylized Facts

3.1 Data and Summary Statistics

The housing transaction data used in this study are obtained from EPRC Ltd., a data vendor that tracks all transaction records in the Hong Kong Land Registry. Our data cover all primary and secondary housing transactions made in Hong Kong from 1992 to 2017. The data contain a comprehensive list of variables on housing characteristics and other specifics of the transactions, such as address, district, housing type (e.g., single building, block in an estate, or village house), building number, floor level, unit number, gross area size, number of rooms, building age, and lease term. The unit housing price per square foot (sq. ft.) is calculated by dividing the adjusted transaction price by the gross area size.[8] Both the transaction price and area size are trimmed at the top and bottom 1% levels to eliminate outliers. After excluding transaction records with missing information on housing features or transaction details, we have 1,556,528 transactions in our main sample.

Table 1 reports the summary statistics of the main variables used in this study. The variable definitions are provided in Appendix 1. Columns (1)–(3) of Table 1 summarize the full sample of transactions. The average home price is about 4.14 million HKD (approximately 0.53 million USD) and the average gross area size is about 707 sq. ft. On average, there are 2.1 bedrooms and 1.3 living rooms in a unit. The average floor level is 18.77.

[------ PLACE TABLE 1 ABOUT HERE ------]

In our baseline analysis, we follow Bayer et al. (2020) and Fu et al. (2015) and define flippers as buyers who sell a property within 2 years of the purchase date. This 2-year cutoff also aligns with the 2-year holding period cutoff defined in SSD Phase 1.[9] Columns (4)–(6) of Table 1 summarize the statistics for properties held for less than 2 years, whereas Columns (7)–(9) summarize the statistics for properties held for more than 2 years. Overall, 15.8% of the properties are resold within 2 years. Column (10), which reports the t-test results for the difference between flipping and non-flipping home purchases, shows that flippers are more likely to purchase cheaper and smaller units at lower floors than non-flippers.

[8] For each transaction, we adjust the housing price using monthly CPI to remove the effect from inflation, using October 2014 as the base.

[9] Results similar to our baseline estimations are obtained if we shorten the holding period to 1 year in our definition for flippers.

We calculate the total and annualized gross housing returns before tax for each repeat sale based on the purchase and resale prices and holding periods. We trim the returns at the top 5% and bottom 1% levels to remove outliers,[10] which leaves 812,958 repeat sales in our sample. The buyer's average holding period is 5.23 years. The total housing returns for flippers and non-flippers, as measured by the entire price appreciation or capital gain over the holding period, are 11.9% and 16.9%, respectively. This difference is statistically significant at the 1% level, indicating that non-flippers achieve higher total capital gains than flippers. However, if we take the holding period into account and examine the annualized returns, then flippers realize an annualized capital gain return of 16.3%, which is much higher than the 2% realized by non-flippers. This result implies that flippers potentially possess superior skills in identifying investment opportunities and in timing the market.

3.2 Stylized Facts on Flippers' Presence in the Housing Market

Panel A of Figure 3 plots the percentage of flipping deals in all housing transactions by purchase year. Before the SSD went into effect, the share of flipping sales was approximately 18%. The share was especially low at 4.7% in 2001 during the market downturn following the Asian Financial Crisis in 1997, and it increased to around 23% during the market boom in 2004.

[------ PLACE FIGURE 3 ABOUT HERE ------]

The presence of flippers in the Hong Kong housing market is relatively greater than in other metropolises with globally attractive housing markets. For example, the percentage of flippers ranges from 4% to 17% between 1991 and 2007 (Bayer et al., 2020) in the Greater Los Angeles Area. In Singapore, the percentage of flippers in the housing market is on average 14.46% between 2006 and 2010 (Tu & Zhang, 2019). In our context of the Hong Kong housing market, flipping sales (with a holding period of less than 2 years from the purchase date) account for 15.8% of all housing transactions between 1992 and 2017.[11]

[10] We trim the return at the bottom 1% and top 5% levels to better alleviate the impact of outliers, as the potential entry errors in transaction prices tend to result in a long right tail in the distribution of returns (Appendix Figure IB2). Similar filtering processes are applied in studies such as Wong et al. (2018). All of our results are robust if we trim the returns at both the top and bottom 1% (or 5%) levels instead.

[11] Note that most of the flippers who resell the properties within 2 years are local buyers. Flipping sales by mainland Chinese or other foreigners account for only approximately 2% of all flipping sales.

Our data reveal that introduction of the SSD in 2010 significantly deterred flipping sales. After the introduction of SSD, the percentage of flipping sales plummeted to 1–2% until the end of 2017, which indicates the effectiveness of the policy in curbing flipping activities.[12] Appendix Table IA1, Panel A shows the univariate test results on the difference in the percentage of flippers before and after SSD implementation. The results show that after enactment of the SSD, the proportion of flippers who hold their properties for less than 2 years drops by 17.3 percentage points and the proportion of flippers who hold for less than 1 year drops by 10.1 percentage points.

We further check whether flippers have a more active presence in the secondary or primary market by examining the percentage of flipping transactions by market segment. Figure 3, Panel B plots the percentage of flipping sales in the primary and secondary housing markets during the sample period of 1992–2017. We find that the percentages in the two market segments are quite comparable, which indicates that flippers do not concentrate in either market and that housing speculation is a relevant concern for both market segments. Consistent with the pattern in the general market, the significant drop in the flippers' market share after SSD implementation is observed in both the primary and secondary markets. Appendix Table IA1, Panels B and C show the univariate test results on the change in the percentage of flipping sales after SSD implementation in the primary and secondary markets, respectively.

The presence of property flippers is, in general, evenly distributed across regions. Figure 3, Panel C plots the proportion of flipping transactions in the three major regions of Hong Kong (i.e., Hong Kong Island, Kowloon, and the New Territories) by purchase year from 1992 to 2017. Figure 4 shows the average proportion of flipping transactions in the 18 planning districts during the study period. Both the level of and change in flippers' percentage by year are similar across the regions, although Kowloon seems to have slightly more flippers from 2000 to 2009 than other regions. We observe that the SSD also causes a significant drop in the percentage of flipping sales in all three regions.

[12] After implementation of the SSD Phase 1 in November 2010, buyers who resell during the SSD lock-in period are designated as "successful" flippers. To analyze the "unsuccessful" flippers who resell immediately after the lock-in period ends, we also plot the by-year percentage of buyers who resell within 2.5 or 3.5 years in Appendix Figure IB3. In 2011 and 2012, when the lock-in period was 2 years, around 7.5% of buyers resold within 2.5 years. Similarly, in 2013 and 2014, when the lock-in period was 3 years, the percentage of buyers who resold within 3.5 years was 7–7.5%. This level is also consistent with the low percentage of flippers in the market during 1997–2003.

[------ PLACE FIGURE 4 ABOUT HERE ------]

3.3 Flippers' Holding Period Distribution

Given that the applicable tax rates under the SSD policies hinge on the holding periods of the property, we examine the flippers' responses to SSD in terms of holding period by comparing their holding period distributions in the pre- and post-policy periods. We expect flippers to extend their holding periods to slightly more than the lock-in periods after SSD implementation to reduce tax expenses. We also expect flippers to extend their holding periods differently based on the different tax exemption periods under the two phases of the SSD policy.

As expected, we find that property investors defer selling until the property is exempt from the SSD. Figure 5 plots the distribution of the subsequent holding periods in years for units purchased before and after the two effective dates of the two phases of the SSD policy. Panel A shows the histogram of holding periods for resold homes initially purchased before November 20, 2010, at which time the SSD was not imposed. We observe a considerably high number of sales with holding periods of 1–2 years, which implies that the popularity of flipping activities in the pre-policy period was high.

[------ PLACE FIGURE 5 ABOUT HERE ------]

Panel B shows the transactions made between November 20, 2010 and October 26, 2012, when properties were exempt from the SSD only if they were held for at least 2 years. A sizeable proportion of flippers defer their sales until the end of the SSD lock-in period. Over 5% of the properties purchased during this period are sold within the first month of becoming exempt from the SSD. Panel C shows homes purchased after the effective date of October 27, 2012, when Phase 2 of the SSD was implemented and the lock-in period was extended to 3 years. We again observe a similar pattern of large-scale sales bunching immediately after the tax exemption period, with over 10% of homes sold in the first month after the 3-year lock-in period.

To obtain more details on strategic holding period extension immediately after the tax exemption periods, we tabulate the distribution of the holding periods of resale transactions before and after implementation of the SSD in Table 3, Panel A. For home purchases made in the 1-year

window before SSD Phase 1 implementation (November 20, 2010), we find that 12.81% of the properties are resold within 1 year and 20.99% are resold within 2 years. After SSD Phase 1 (November 20, 2010 to October 27, 2012), the percentages of resales made within 1 year and between 1–2 years drop dramatically to 0.41% and 1.86%, respectively. These results consistently show, as do those discussed in Section 3.2, that there is a substantial decrease in flipping sales after introduction of the SSD.

[------ PLACE TABLE 3 ABOUT HERE ------]

Next, we examine resales made after the tax exemption periods following the implementation of the two phases of SSD. We find that 5.76% of the properties purchased during SSD Phase 1 are sold within 6 months of completing the 2-year lock-in period and 3.51% are sold within 6 months to 1 year of completing the lock-in period. In contrast, for homes purchased within 1 year of SSD Phase 2 implementation, the resales made within 1, 1–2, and 2–3 years constitute only 0.35%, 0.61%, and 1.31% of the sample, respectively. The percentage of resales made in 3–3.5 years surges to 6% after the SSD lock-in period is extended to 3 years. These patterns offer evidence that property sellers strategically extend their holding periods to immediately after the applicable lock-in periods end after the two phases of SSD are implemented to enjoy tax exemptions.

4. Impact of the SSD on Flippers' Returns and Transaction Prices

4.1 Flippers' Housing Returns

The findings of several studies have furthered the debate on the impacts of flippers on the housing market (Bayer et al., 2020; Chinco & Mayer, 2015; Fu & Qian, 2014; Tu & Zhang, 2019). Although some studies document that flippers only provide market liquidity without distorting the market pricing, others argue that flippers obtain abnormal housing returns and cause market mispricing. In this section, we examine whether flippers realize higher housing returns than non-flippers and investigate the impact of the SSD on flippers' returns and prices. We use the following empirical specification:

$$Return_{it} = \beta_1 Flip_{it}^{S} + \beta_2 Flip_{it}^{S} * SSD_{i,t_p} + X_{it}'\lambda + \gamma M_t + \varphi_i + \omega_t + \varepsilon_{it}. \quad \text{---(1)}$$

For unit i transacted at time t, $Flip_{it}^{s}$ is a dummy variable that denotes whether the seller holds the unit for less than 2 years. $Return_{it}$ is the annualized gross housing return at the time of resale t before paying relevant taxes. We interact $Flip_{it}^{s}$ with a dummy variable SSD_{i,t_p}, which denotes whether the date of purchase (T_p) is after November 20, 2010 (i.e., affected by SSD Phase 1).[13] The coefficient β_1 thus represents the premium of the annual return that flippers realize compared with non-flippers before the implementation of the SSD. The coefficient of the interaction term (β_2) denotes the impact of the SSD on the flippers' housing returns. X_{it} is a set of variables that control for the physical features of unit i at time t, such as area size, number of rooms, log of remaining lease years, log of building age, floor level, and building type. In addition, we control for the monthly prime lending rates of home mortgages (M_t). φ_i is the district fixed effect and ω_t represents the year times quarter fixed effects. ε_{it} denotes the error term. Standard errors are clustered at the district level.

Column (1) in Table 2 reports the estimation result of the flippers' housing returns, obtained using Equation (1). Our regression sample includes all of the repeat sales for which we can identify the buyers' holding periods and annualized housing returns for the period 1992–2017. The result reveals that before the implementation of the SSD, flippers realize a 12.72% higher annual return than non-flippers when selling their properties. After SSD implementation in 2010, the flippers' annualized returns decrease by 8.81%. These two estimates are statistically significant at the 1% level. Nevertheless, flippers realize a higher annualized capital gain return of 3.91% (= 12.72% – 8.81%) than non-flippers after SSD implementation.

[------ PLACE TABLE 2 ABOUT HERE ------]

4.2 Flippers' Purchase and Resale Prices

Several possible reasons underlie the excess housing returns of flipping transactions, such as better trading expertise and abilities to identify undervalued properties (Bayer et al., 2020; Tu & Zhang, 2019). The excess housing returns of flippers may be the result of either a lower purchase

[13] The SSD policy levies additional taxes based on the purchase time of a resold unit. For instance, a flipping transaction purchased in 2009 and resold in 2011 is not subject to SSD Phase 1. The dummy variable $SSD_{i,t-1}$ is excluded from the model, as we control for time fixed effects.

price or a higher resale price. To investigate whether flippers buy at lower prices and/or sell at higher prices and to determine whether the SSD impacts flippers' purchase and resale prices, we use the following empirical specifications:

$$log(Price_{it}) = \beta_1 Flip_{it}^{b} + \beta_2 Flip_{it}^{b} * SSD_{i,t_p} + X_{it}'\lambda + \gamma M_t + \varphi_i + \omega_t + \varepsilon_{it}, \text{ --- (2)}$$

$$log(Price_{it}) = \beta_1 Flip_{it}^{s} + \beta_2 Flip_{it}^{s} * SSD_{i,t_p} + X_{it}'\lambda + \gamma M_t + \varphi_i + \omega_t + \varepsilon_{it}, \text{ --- (3)}$$

where $\log(Price_{it})$ is the natural logarithm of the transaction price for unit i at time t. In Equation (2), $Flip_{it}^{b}$ denotes whether this transaction involves a flipper buyer who will resell the unit after holding it for less than 2 years. Similarly, in Equation (3), $Flip_{it}^{s}$ denotes whether the seller has held the property for less than 2 years. The coefficient β_1 represents the difference in purchase (resale) price between a flipper and a non-flipper, whereas coefficient β_2 represents the impact of the SSD on a flippers' purchase (resale) price. X_{it} is the same set of variables that control for the unit's physical features as in Equation (1). φ_i denotes the district fixed effect and ω_t represents the year times quarter fixed effects. ε_{it} is the error term. Standard errors are clustered at the district level.

The corresponding estimation results of Equations (2) and (3) are reported in Columns (2) and (3) of Table 2, respectively. We find that before SSD implementation, flippers' purchase prices are 3.32% lower (Column (2)) and their resale prices are 3.21% higher (Column (3)) than those of non-flippers. Both of these estimates are statistically significant at the 1% level. After SSD implementation, the flippers' purchase prices increase by 2.04% (Column (2)) and the estimate is statistically significant at the 10% level. The result in Column (3) indicates that the SSD also significantly reduces flippers' resale prices by 1.86% (statistically significant at the 5% level). These results imply that flippers in Hong Kong potentially possess expertise in discovering underpriced properties and selling at above-market prices, but their price advantages largely diminish after implementation of the SSD.

4.3 Spillover Effect on Non-Flipping Transaction Prices

To investigate whether flippers contribute to the soaring housing prices, we also examine the potential spillover effect of flipping transactions in the period prior to SSD implementation on subsequent non-flipping transaction prices in the housing market. Following the empirical strategy of

Campbell et al. (2011), we focus on nearby neighborhoods (building) and examine the spillover effect on other homes sold in the same building within 1 month of each flipping transaction.

We report a detailed analysis of the spillover effect in Internet Appendix C. In brief, we find that if the 1-month lagged share of flipping transactions in one building increases by one percentage point, then the price of subsequent non-flipping transactions made in the same building increases by 0.2–1%. To address endogeneity concerns, we use the initial introduction of the SSD on November 20, 2010 at the city level as the instrumental variable (IV) for the number of flippers at the building level. Our findings reveal the mechanism by which a small proportion of flippers in the neighborhood can significantly impact the entire housing market (Deng et al., 2019).

4.4 Robustness Analysis

4.4.1 Alternative Definition Using Pre-Policy Flippers

The definition of flippers based on the within-2-years holding period might suffer from potential selection bias, as only successful flips with holding periods of below two years are captured. As many flippers strategically delay selling until after the lock-in period ends, they are excluded from identification in the post-policy period.

To address this concern, we use a new identification strategy for all potential flippers in the post-policy period. Specifically, we identify homebuyers who have ever made any flipping transactions (i.e., held properties for less than 2 years) in the pre-policy period (i.e., before SSD Phase 1 was introduced on November 20, 2010) and designate them as pre-policy flippers. The assumption is that homebuyers with prior flipping experience are more likely to be experienced flippers.

We then reexamine the impact of the SSD on the performance of flippers using this alternative identification strategy by replacing the key explanatory variables $Flip_{it}^{b}$ (or $Flip_{it}^{s}$) in Equations (1)–(3) with $PreFlip_{it}^{b}$ (or $PreFlip_{it}^{s}$), which denote pre-policy flippers in buying (or selling) transactions. Note that we investigate the performance of all transactions made by pre-policy flippers and not only flips that are performed within 2 years. Table 2, Panel B reports the corresponding estimation results, which show that pre-policy flippers realize 10.12% higher annual

returns than the other homebuyers before SSD Phase 1, but that their housing returns decrease by 9.16% afterward (Column (1)). The purchase prices of the pre-policy flippers increase by 1.64% (Column (2)) and their sales prices decrease by 1.58% (Column (3)) following SSD implementation. These findings are qualitatively consistent with the result obtained using the conventional flipper definition, shown in Table 2, Panel A. This further confirms that the SSD significantly reduces flippers' housing returns and hence discourages short-term housing speculations.

4.4.2 Alternative Sampling

We also conduct a battery of other robustness analyses of flippers' returns and prices. First, as our sample ends in 2017, non-flippers who hold properties for longer periods may be right-censored and may not feature in the repeat sales pairs in the post-policy period. We address this issue by restricting the resale sample to be within 5 years of both the pre- and post-policy periods. Second, we alleviate concerns regarding the potential confounding effects of other government policies in the Hong Kong housing market by using a shorter sampling window of [-2, +2] years or [-1, +1] years surrounding SSD policy implementation. In addition, we test the robustness of our findings by defining flipping sales as transactions with holding periods of less than 1 year, instead of less than 2 years. All of these test results remain robust, as reported in Internet Appendix D.

4.4.3 Mechanism of the Superior Housing Performance of Flippers

We examine the potential mechanism by which flippers earn higher returns. Previous studies suggest three potential mechanisms: 1) market information advantage, 2) property quality improvement through renovation and upgrades, and 3) purchases of underpriced foreclosure properties (Bayer et al., 2020; Fu et al., 2015). We show that flippers gain an information advantage from their market experiences, which is a key facilitator of their superior housing returns. We find that flippers who have flipped more times (and thus have more market knowledge) earn higher annual returns by purchasing properties at cheaper prices. The corresponding analysis results are reported in Internet Appendix E.

To rule out the other two mechanisms, we first show that flippers obtain better returns than other market participants on properties purchased directly from the primary market. Given that new homes are already in a good condition and do not require much quality improvement, this result corroborates evidence that flippers' excess returns in Hong Kong housing market are not likely to be driven by renovation or quality upgrades. Second, we argue that foreclosures are relatively rare[14] in Hong Kong and comprise a very small proportion of the overall booming housing market compared to the high proportion of flippers in the market. Therefore, we believe that purchasing foreclosed properties is not likely to be the main driving force of flippers' higher returns.

5. Effectiveness of the SSD in Curbing Flippers and Flippers' Strategic Responses

5.1 Regression Analysis of Urgent Sales Bunching after SSD Lock-In Periods

As property features and other market variables can affect the holding period of a unit, we conduct multivariate regression analysis on the impact of the SSD on property investors' holding periods. Specifically, we estimate the impact of the SSD on the holding periods of resale transactions made in the market by applying the following model:

$$log(Holding\ Period_{it}) = \beta_1 SSD_{i,t_p} + \beta_2 Flip_{it}^{b} + \beta_3 Flip_{it}^{b} * SSD_{i,t_p} + X_{it}'\lambda + \gamma M_t + \varphi_i + \varepsilon_{it}, \quad \text{--- (4)}$$

where SSD_{i,t_p} denotes whether the home purchase of buyer i at time t_p is subject to SSD Phase 1. $Flip_{it}^{b}$ is a dummy variable that equals 1 if the buyer holds the property for less than 2 years at the time of resale (t). The dependent variable is the logarithm of the number of holding days at the time of resale. The other control variables are the same as in Equations (1)–(3), but the time fixed effects are omitted to obtain reliable estimates of β_1. Standard errors are clustered at the district level. To address the issue of transactions held for long periods not appearing in later years of the sample, we

[14] Although we do not have detailed data on foreclosures, we expect the number to be much less than the number of flippers in the market. For example, the number of foreclosed properties is estimated to be below 100 for the year 2021 based on the article "Hong Kong sees rising interest in property auctions, as housing market outlook improves" in the *South China Morning Post*. Source: https://www.scmp.com/business/article/3138905/hong-kong-sees-rising-interest-property-auctions-housing-market-outlook.

only include transactions made within the [-1, +1] year window around the initiation of SSD Phase 1 (November 20, 2010).

[------ PLACE TABLE 4 ABOUT HERE ------]

Table 4, Panel A reports the estimation result of Equation (4). We find that on average, the holding periods of the transactions made in the housing market increase by 68.7% after SSD implementation. As the average holding period in the market in the 1-year window before SSD Phase 1 is 2.61 years, this translates to an increase of 1.79 years in the holding period. Column (2) shows that the holding periods of the flipping transactions increase by 54.5% following SSD implementation, which is equivalent to an increase of 0.48 years in the holding periods of successful flippers. Interestingly, we find that the holding periods of the identified non-flipping transactions decrease by 5% after SSD implementation. This aligns with our previous observation of many flippers simply deferring their resales until after the lock-in period ends so that the average holding periods for units held for more than 2 years decrease after the policy shock. All of these estimates are statistically significant at the 1% level.

We also estimate the effect of the SSD on the share of flipping home purchases in the market. The following Probit model is employed. Our sample includes all of the market transactions made in the pre- and post-policy periods:

$$Flip_{it}^{b} = \beta_1 SSD_{i,t_p} + X_{it}'\lambda + \gamma M_t + \varphi_i + \varepsilon_{it}. \quad \text{--- (5)}$$

We use $Flip_{it}^{b}$ as the dependent variable, which is a dummy variable that denotes all of the home purchases made by flippers. The definitions of the other variables remain the same as in Equation (4). We estimate the marginal effect at the means. The coefficient β_1 denotes the impact of the SSD on the probability of home purchases made by flippers in the market.

The estimation results of Equation (5) are reported in Table 4, Panel B. In Columns (1)–(4), we only include the full sample and samples within the [-5, +5], [-2, +2], or [-1, +1] year windows of SSD implementation, respectively. We find that when controlling for the housing features and other fixed effects, the share of flipping home purchases in the Hong Kong residential property market reduces from 21.95 to 31.08 percentage points following the implementation of the SSD, estimated

using these different sampling windows. All of these estimates are statistically significant at the 1% level. These results further support the effectiveness of the SSD policy in curbing speculations.

5.2 Pre-Policy Flippers' Holding Period Extension

It is possible that many flippers who originally intend to resell within 2–3 years could simply defer their sales until the SSD lock-in period ends. It remains unclear whether the overall speculative activities in the market are still effectively curtailed by the SSD if we account for these deferred flipping transactions. To obtain clean inferences of the SSD's impact on housing speculations, we employ an alternative identification strategy and examine the trading activities of pre-policy flippers in the post-policy period, as discussed in Section 4.4.

In Figure 6, we plot the percentage of purchases made by pre-policy flippers in each year. , The difference between the dotted (all resales) and dashed lines (flipping resales with holding period less than 2 years) denotes the non-flipping purchases made by the pre-policy flippers before the introduction of the SSD, which shows that the majority of homes bought by pre-policy flippers are resold within 2 years. After the implementation of SSD Phase 1, pre-policy flippers still account for 8–10% of the purchases in the market, but most are non-speculative in nature. For example, within 1 year of SSD Phase 1 initiation, approximately 8.8% of the purchases are made by pre-policy flippers, but only 0.3% are resold in 2 years and 1.34% are resold in 3 years. We also observe a wider gap between the dotted and dashed lines after the introduction of the policy, which implies that most of the properties purchased by pre-policy flippers after SSD implementation are held for longer terms (over 2 years).

[------ PLACE FIGURE 6 ABOUT HERE ------]

Table 3, Panel B summarizes the holding periods of pre-policy flippers across different phases of the SSD policy. Before the implementation of SSD Phase 1, close to 75% of the resale transactions made by pre-policy flippers are held for less than 2 years, which verifies that most of the home purchases made by these buyers before SSD implementation are for flipping speculations. Only 19% of their home purchases are held for more than 4 years. This pattern is consistent for the samples in the year before SSD implementation, which verifies that the SSD delivered an unexpected

surprise to the market and that the anticipation effect is likely small. During Phase 1 of the SSD, only 3.43% of the properties purchased by pre-policy flippers are resold within 2 years. After the 2-year lock-in period ends, 7.37% of the properties are resold immediately within the next 6 months. Over 77% of the properties purchased by pre-policy flippers are held for more than 4 years, which shows that many pre-policy flippers become long-term holders because of the SSD. Within 1 year of SSD Phase 2 implementation, only 2.41% of the properties purchased by pre-policy flippers are resold within 3 years because of the extended lock-in period, whereas 7% of the properties are resold immediately within 6 months of the lock-in period ending.

We re-estimate Equation (4) using the subsample of resales made by pre-policy flippers only. Column (3) in Table 4, Panel A shows the corresponding estimation results. Similar to the findings reported in Section 5.1, we confirm that the SSD prolongs the holding periods by 1.52 times, which is statistically significant at the 1% level. We also provide additional evidence by using subsamples of only pre-policy flippers, with various window lengths around the initiation of SSD Phase 1. The results are reported in Table 4, Panel C. In Column (1), we include home purchases made by pre-policy flippers from 1992 to 2017. We find that SSD Phase 1 prolongs the flippers' holding periods by 1.24 times.[15] In Columns (2)–(4), we include home purchases made by pre-policy flippers within the [-5, +5], [-2, +2], and [-1, +1] year windows around SSD Phase 1, respectively. Correspondingly, we find that the holding periods of the flippers increase by 127%, 132%, and 135%, respectively. As the average holding period of flippers in the pre-policy period is 1.024 years, these two estimates translate to increases of 1.30, 1.35, and 1.38 years, respectively, in the holding period. All of these estimates are statistically significant the 1% level. This result indicates that the SSD significantly increases the holding periods of experienced flippers.

5.3 Pre-Policy Flippers' Post-Policy Investment Behaviors

Finally, we analyze the extent to which the SSD drives flippers out of the housing market by checking whether pre-policy flippers make significantly fewer property purchases in the post-policy

[15] This estimate likely serves as a lower bound for the positive impact of SSD on extending pre-policy flippers' holding periods because many home purchases made by these flippers in the post-policy period are not sold before 2017; their holding periods in the post-policy periods are thus downward-biased. All of our findings remain robust if we only include transactions held for less than 5 years in the pre- and post-policy periods.

period. We estimate the impact of the SSD on pre-policy flippers' home purchase likelihoods by testing the change in the percentage of home purchases made by pre-policy flippers in the market before and after SSD implementation. We use a Probit model, shown below:

$$Purchase_{it}^{b} = \beta_1 SSD_{i,t_p} + X'_{it}\lambda + \gamma M_t + \varphi_i + \varepsilon_{it}. \quad \text{--- (6)}$$

In the post-policy period, we identify the purchase likelihood based on the home purchase decisions of pre-policy flippers regardless of their selling time. Specifically, $Purchase_{it}^{b}$ is a dummy variable that denotes all of the home purchases made by pre-policy flippers. The definitions of the other variables remain the same as in Equation (5). We estimate the marginal effect at the means, and the coefficient β_1 denotes the impact of the SSD on the probability of home purchases made by pre-policy flippers in the market.

The estimation results are reported in Table 4, Panel D. Similar to Panel B, we include samples in the entire sample period in Column (1), whereas in Columns (2)–(4), we only include samples within the [-5, +5], [-2, +2], and [-1, +1] year windows of SSD implementation. Using these different sampling windows, we find that following SSD implementation, the share of purchases made by pre-policy flippers in the Hong Kong residential property market decreases from 19.54 to 21.15 percentage points. All of these estimates are statistically significant at the 1% level. Therefore, our findings reveal that because of the SSD policy, pre-policy flippers not only extend their holding periods until after the lock-in period but also make fewer transactions. This further implies that the SSD policy may restrict liquidity in the secondary market.

We also conduct robustness checks for this set of empirical results. One potential concern regarding our identification strategy for potential flippers in the post-policy period is that not all transactions made by pre-policy flippers are likely to be speculative. Therefore, in the robustness check, we further restrict our samples to multiple-property holders. The assumption is that in the post-policy period, transactions made by pre-policy flippers who hold multiple properties are more likely to be speculative investments. Internet Appendix IA3 reports the corresponding results using the restricted sample. We obtain similar results in terms of both the magnitude and statistical significance, which shows that our results are robust.

In summary, our findings indicate that the SSD effectively curtails pre-policy flippers in the housing market. These pre-policy flippers make fewer transactions (in percentage) after SSD implementation. The holding periods of those who still enter the markets are significantly prolonged, and their housing returns are decreased. Because of the challenge of identification, previous studies mainly document the impact of Tobin taxes on flippers who can still resell in the lock-in period (e.g., Fu et al., 2015). Our study advances knowledge in this field by considering all of the potentially deferred flipping transactions in the post-policy period.

5.4 Flippers' Strategic Responses: Bunching of Urgent Sales after Lock-In Periods

In this section, we examine the bunching effect of urgent sales made immediately after the lock-in period ends. Our sample for this analysis includes home sales with purchase dates within the [-2, +2] year window around November 20, 2010 (effective date of SSD Phase 1) and holding periods of up to 5 years.[16]

To provide a more thorough analysis of the bunching effect, Table 5, Panel A reports the holding period distributions of home resales as in Table 3, but with a more detailed holding period breakdown and a restriction of the holding period to a maximum of 5 years. Consistent with the patterns shown in Table 3, we find that the share of resales made in the first month after the 2-year lock-in period ends is 1.89% in the pre-policy period, which jumps to 6.11% under SSD Phase 1. After SSD Phase 2 is introduced with an extended lock-in period of 3 years, we find that the share of resales in the first month after the 3-year period ends soars to 10.79%, whereas the corresponding shares in the pre-policy period and under SSD Phase 1 are 1.16% and 2.36%, respectively.

[------ PLACE TABLE 5 ABOUT HERE ------]

Next, we conduct a back-of-the-envelope calculation of the bunching degree, following the bunching technique outlined in Best and Kleven (2018) and based on the sales distribution statistics in Table 5, Panel A. For sales made within 1 month after holding for 2 years, we show that the proportion increases from 1.89% pre-policy to 6.11% during SSD Phase 1. Considering the sales

[16] As the home sale sample in the post-policy period runs from 2012 to 2017, the maximum holding period that we can observe in the post-policy sample is 5 years. To balance the holding periods in the pre- and post-policy periods, we require the holding period in the pre-policy period to have an upper limit of 5 years.

distribution in the pre-policy period as the counterfactual density, these statistics indicate a bunching mass of 4.22% (= 6.11% – 1.89%) and a bunching degree of 2.23 (= 4.22%/1.89%) within 1 month of the end of the SSD lock-in period. The bunching mass within 6 months of the end of the SSD lock-in period is 17.07%, with a ratio of 1.25. The missing mass below the 2-year holding period threshold is estimated to be 50.20% (= 60.41% – 10.21%), with a missing ratio of 4.92 (= 50.20%/10.21%) if we compare the densities below the 2-year holding period. Although 17.07% of the 50.20% missing mass is sold in the 6 months following the end of the 2-year lock-in period, 33.13% of the properties are held for over 2.5 years. This result indicates that the SSD not only extends the mechanical holding period for about one-third of the flippers but also encourages the rest of the flippers to hold for substantially longer than 2 years.

Similarly, for sales made within 1 month after holding for 3 years, the proportion increases from 1.16% pre-policy to 10.79% during SSD Phase 2, implying a bunching mass of 9.63% and a bunching degree of 9.30. The missing mass below the 3-year holding period threshold is estimated to be 64.73% (= 79.05% – 14.32%), with a missing ratio of 4.52 (= 50.20%/10.21%) when we compare the densities below the 3-year holding period. These statistics are comparable in magnitude to other bunching estimation exercises. For example, Best and Kleven (2018) estimate the bunching ratio to be between 1.64 and 1.85 and the missing ratio to be between 2.21 and 2.27 for stamp duty thresholds in the U.K.

Further, we examine the bunching of urgent resales before and after SSD implementation using the following Probit model:

$$Sell2Yr1Mth_{it} = \beta_1 SSD_{i,t_p} + X'_{it}\lambda + \gamma M_t + \varphi_i + \varepsilon_{it}, \quad \text{--- (7)}$$

where $Sell2Yr1Mth_{it}$ is a dummy variable that denotes whether the resales are made in the first month after the 2-year lock-in period ends. SSD_{i,t_p} is a dummy variable that denotes whether the transaction is affected by SSD Phase 1 (i.e., the purchase date is between November 20, 2010 and October 27, 2012). The coefficient β_1 therefore denotes the impact of the SSD on the urgent sales percentage within the first month following the end of the lock-in period. The definitions of the other variables remain the same as in Equations (5) and (6).

Column (1) in Table 5, Panel B shows the estimation results of Equation (7). The resales in the first month following the end of the 2-year lock-in period under SSD Phase 1 increase by 3.53 percentage points (among all of the transactions made in the 1-year window after the lock-in period ends), which is 2.87 times the corresponding share in the pre-policy period, given that the corresponding share of resales is 1.89% in the pre-policy period.[17]

In Column (2), we change the dependent variable to $Sell2Yr3Mth_{it}$, which denotes whether the resale is made within the first 3 months after the lock-in period ends. We find that the share of resales in the 3 months after the lock-in period ends increases by 7.84 percentage points after SSD Phase 1, which is 2.39 times (5.63%) that in the pre-policy period. These results confirm the SSD policy's impact of motivating property holders to urgently dispose of properties immediately after the 2-year lock-in period.

In Columns (3) and (4), we analyze the impact of SSD Phase 2 using samples of homes with purchase dates falling within the [-2, +2] year window around October 27, 2012 (the effective date of SSD Phase 2). The empirical model is accordingly modified from Equation (7). We find that the shares of sales made in the first month and the first 3 months after the 3-year lock-in period ends increase by 4.89 and 12.68 percentage points, respectively. This implies that holders sell immediately after the lock-in period ends to reduce taxation under SSD Phase 2. These translate to increases of 4.89 times and 5.28 times, respectively, compared to shares (1.0% and 2.4%, respectively) in the pre-policy period.[18]

Lastly, we analyze the resale likelihoods within the first 1 (3) month(s) after the lock-in period ends for pre-policy flippers. The results are shown in Table, 5 Panel C and are consistent with previous observations[19]. Overall, our results reveal a bunching effect on resales made immediately

[17] The ratio of immediate sale percentage in the first month after 2-year lock-in period ends in the post-policy period relative to the pre-policy period is calculated as (3.53 + 1.89)/1.89 = 2.87 times. The ratio of immediate sales in the 3 months after the 2-year lock-in period ends is calculated as (7.84 + 5.63)/5.63 = 2.39 times.

[18] In an additional test, we use the subsample of resales within 1 year of the lock-in period ending as the base to calculate the share of bunching sales, as reported in Appendix Table IA4. We find that among home resales made within 1 year of the lock-in period ending, the share of urgent sales made 1 and 3 months following the end of the lock-in period also significantly increases because of the SSD. These findings further support our observation that many flippers who strategically defer their sales choose to dispose of the property immediately after the lock-in period ends to avoid further holding costs.

[19] Note that although the raw distribution statistics in Panel A show that pre-policy flippers have a stronger bunching tendency, we that find the effect of the SSD cannot adequately explain the bunching effect of pre-flippers when we control for housing features and other fixed effects. Therefore, the joint explanatory power of the control variables points

after the SSD lock-in period ends. Although previous studies on the bunching sales effect mainly focus on transaction prices around the kink points of the tax rate (e.g., Best & Kleven, 2017), we provide unique evidence regarding the holding periods of property flippers.

6. Effectiveness of the SSD in Cooling the Housing Market

6.1 Housing Price and Transaction Volume in Primary and Secondary Markets

After introduction of the SSD, we observe that the housing prices in Hong Kong continue to soar, indicating the ineffectiveness of the policy in cooling down the housing market. In this section, we formally test the effect of the SSD on housing prices and market liquidity in both the secondary and primary markets. We hypothesize that the SSD reduces the housing supply and dries up liquidity in the secondary market. Given the relative stability of housing stock, we expect the SSD to cause the supply curve to shift to the left (Mankiw & Taylor, 2014). In response to this curve shift, the market price in the secondary market should increase.

Moreover, there exists a dichotomy in the real estate market, i.e., the primary and secondary housing market segments. Although the two market segments have different sellers, the demand for housing in general does not depend on whether it is in the primary or secondary market (Soundararajan et al., 2018). As properties in the primary market serve as a natural substitute for those in the secondary market, the unmet demand in the secondary market can flow into the primary market and potentially drive up housing prices in the primary market, especially as the supply in the primary market is relatively inelastic in the short to medium term. As shown in Appendix 2, the number of newly constructed housing units in Hong Kong was stable when the SSD was introduced and increased only slightly after 2013.[20] As a result, housing prices in the primary market are expected to continuously grow.

We examine the impact of the SSD on inflation-adjusted housing prices in primary and secondary markets using the following model:

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to the heterogeneity of urgent sales across different housing features and locations. For instance, certain districts may have more urgent sales after the lock-in period ends, potentially due to less pleasant district features.

[20] Our regression results on the impact of SSD on housing price and transaction volume remain robust when we further control for the monthly number of newly completed buildings that obtain occupation permits, which serves as a proxy for the monthly supply of new homes in the market.

$$\log(Price_{it}) = \beta_1 SSD_{it} + X'_{it}\lambda + \gamma M_t + \varphi_i + \varepsilon_{it}, \qquad \text{--- (8)}$$

where SSD_{it} denotes whether the property is purchased after the SSD was enacted on November 20, 2010. We exclude time fixed effects in this model, which implies that the coefficient β_1 captures the overall change in housing price before and after the implementation of the SSD. The definitions of the other variables are the same as in Equation (1). We include subsamples of the primary and secondary transactions in separate regressions and cluster standard errors by district.

We also test the impact of the SSD on the transaction volumes in the two markets as follows:

$$Volume_{it} = \beta_2 SSD_{it} + \gamma M_t + \varphi_i + \varepsilon_{it}, \qquad \text{--- (9)}$$

where $Volume_{it}$ denotes the aggregate number of transactions made in district i during month t and SSD_{it} denotes whether month t is after November 2010. φ_i is the district fixed effect and ε_{it} is the error term. Standard errors are clustered by district.

Table 6, Panel A reports the estimation results obtained using subsamples within 1 year before and after the SSD Phase 1 effective date. Columns (1) and (2) report the estimation results of Equation (8), whereas Columns (3) and (4) report the estimation results of Equation (9). Columns (1) and (3) include subsamples of the primary transactions and Columns (2) and (4) include subsamples of the secondary transactions. We find that in the short term of 1 year after SSD introduction, the prices of primary units increase by 12.64% (Column (1)) and those of secondary units increase by 15.76% (Column (2)). These estimates are statistically significant at the 1% level. At the district level, the total number of secondary transactions made per month decreases by 69.35 (Column (4)) after the SSD is introduced, but there are no statistically significant changes in the number of primary transactions (Column (3)). As our data cover all of the transactions made in the Hong Kong residential property market, where there is insufficient supply for the demand (Leung, 2015), this result indicates that the supply of new construction homes is relatively inelastic in the short term after SSD implementation.

[------ PLACE TABLE 6 ABOUT HERE ------]

We further examine the long-term effects of introducing the SSD on transaction price and volume by including subsamples within 5 years before and after its implementation. Panel B reports the corresponding estimation results. Similar to Panel A, we report the estimation results of Equation

(8) in Columns (1) and (2) and the results of Equation (9) in Columns (3) and (4). We include subsamples of primary transactions in Columns (1) and (3) and those of secondary transactions in Columns (2) and (4). Five years after SSD implementation, both the secondary and primary housing prices increase drastically, by 37.96% and 26.60%, respectively. The monthly secondary transaction number in a given district is reduced by around 73.26 (Column (4)). All of these estimates are statistically significant at the 1% level. However, the supply of primary properties remains relatively inelastic, as evidenced by the statistically insignificant estimate in Column (3).

Given the severe supply shortage in both the primary and secondary markets after SSD implementation, one can expect long-term investors to be more likely to sell their property holdings. The timing is lucrative for long-term investors to sell, as their property holdings satisfy the tax exemption requirement, and therefore, they need not pay extra SSD and can sell at high prices because of the overall supply shortage. We define long-term investors as those who hold multiple properties for at least 5 years and analyze their selling activities before and after SSD implementation. However, we do not observe that long-term holders increase their selling rates after SSD implementation, which implies the presence of counterbalancing forces such as investment style and return expectation. Long-term investors are likely to prefer longer investment horizons and stable rental incomes. Data from the Hong Kong RVD show that the rental yield has been reasonably high and stable over the past decade.[21] Further, reinvestment costs can be high if these investors sell their current investments to purchase other properties. In addition, long-term investors can delay selling and expect higher price appreciation if they are confident about the housing price outlook.

6.2 Counterfactual Analysis

Although the housing price in Hong Kong maintained a significant upward trend after implementation of the SSD policy, it is not sufficient to justify the policy's lack of a cooling effect on the market. It is possible that the market price would have risen higher without this policy; i.e., the policy may have slowed the increase in the housing price compared to a counterfactual scenario without an SSD. To strengthen our argument on the policy's ineffectiveness in cooling down the

[21] See: https://data.gov.hk/en-data/dataset/hk-rvd-tsinfo_rvd-property-market-statistics.

market, we conduct two counterfactual analyses to assess whether the prices would have increased by a much higher rate in the absence of an SSD.

First, we construct a set of hypothetical housing price indices of the primary and secondary markets in the post-policy period by extrapolating the pre-policy housing price indices with the average monthly growth rates in the pre-policy period. More specifically, we construct hedonic housing price indices using transactions within the [-5, +5] year window around SSD Phase 1 initiation. We then calculate the average monthly growth in the 5 years preceding the policy and predict the housing price indices for 5 years post-policy.[22] The assumption is that in the absence of policy interventions, the housing price would continue to grow at the average speed recorded in the recent past. Figure 7 plots the corresponding predicted counterfactual housing price indices. It reveals that in both the primary and secondary markets, the actual housing price movements do not significantly differ from the predictions made based on historical growth rates. Therefore, this result supports our argument that the cooling effect of the SSD policy is not obvious.

[------ PLACE FIGURE 7 ABOUT HERE ------]

Second, we follow the literature on policy interventions that lack control groups (e.g., Fu & Gu, 2017) and conduct a time-wise difference-in-differences analysis that compares the housing price growth in the post-policy period with that in the pre-policy period. We set the treatment group as the housing price and transaction volume across the [-6, +6] month window around SSD Phase 1 (i.e., between May 20, 2010 and May 19, 2011). Then, we define a placebo policy date at exactly 1 year before the initiation of SSD Phase 1 (i.e., November 20, 2009) and a control group with the housing price and transaction volume over the [-6, +6] month window around the placebo policy date (i.e., between May 20, 2009 and May 19, 2010).[23] The first difference in the treatment group is the changes in the housing price and transaction volume before and after the *actual* policy date. The

[22] Our extrapolative prediction of the housing price indices in the post-policy period are robust to using the average monthly growth within 1 or 2 years before SSD Phase 1 instead of 5 years, as shown in Internet Appendix Figures IB4 and IB5. The differences between these predicted indices obtained using the different windows are all within 1% and statistically insignificant. This implies that the monthly housing price growth in Hong Kong is stable in the pre-policy period, which strengthens our assumption that the pre-policy growth is a reliable predictor of counterfactuals in the post-policy period in the absence of an SSD.

[23] We choose this short window between May 20, 2009 and May 19, 2011 to construct our treatment and control groups for three reasons: 1) the treatment and control groups should not overlap; 2) the placebo shock should occur at the same time in the previous year as the actual policy date to control for potential seasonality; and 3) this window effectively excludes the potential confounding effects from the Great Financial Crisis in 2008 and other cooling measures enacted by the government since 2012.

first difference in the control group is the changes in housing price and transaction volume before and after the *placebo* policy date. The second difference is thus the difference between the corresponding first differences in the treatment and control groups. The assumption is that in the absence of an SSD policy intervention in November 2010, the housing price growth (or changes in transaction number) will remain similar to that recorded over the same period in the previous year. The empirical models are expressed as follows:

$$\log(Price_{it}) = \beta_1 Treat_{it} * Post_{it} + X_{it}'\lambda + \gamma M_t + \varphi_i + \omega_t + \varepsilon_{it}, \quad \text{--- (10)}$$

$$Volume_{it} = \beta_2 Treat_{it} * Post_{it} + \gamma M_t + \varphi_i + \omega_t + \varepsilon_{it}. \quad \text{--- (11)}$$

$Treat_{it}$ is a dummy variable that equals 1 if the transaction date falls within the 12-month period between May 20, 2010 and May 19, 2011 (i.e., the treatment group), and 0 otherwise. $Post_{it}$ is a dummy variable that equals 1 if the transaction date is after the *actual* policy date in the treatment group (between November 20, 2010 and May 19, 2011) or after the *placebo* policy date in the control group (between November 20, 2009 and May 19, 2010), and 0 otherwise. The coefficients β_1 and β_2 of the interaction terms represent the impact of the SSD on housing price and transaction volume, respectively, compared with the changes over the same period in the previous year. The individual terms $Treat_{it}$ and $Post_{it}$ are omitted in the models, as we control for the time fixed effects (ω_t). The definitions of the other variables are the same as in the baseline Equation (1). Standard errors are clustered at the district level.

Table 7 reports the corresponding estimation results. We find that the housing price growth in the secondary market further increases by 0.92% after SSD implementation compared with 1 year before its implementation (Column (2)). The estimate is statistically significant at the 1% level. The housing price growth in the primary market does not slow down either, as we observe a positive but statistically insignificant coefficient for the interaction term (Column (1)). The transaction volume decreases by 89 transactions per district in the secondary market because of the SSD (Column (4)), but there are no statistically significant changes in the primary market compared with the pre-policy period.

[------ PLACE TABLE 7 ABOUT HERE ------]

In conclusion, we show that the SSD is ineffective in cooling down the market. As the policy artificially limits liquidity in the secondary market, the secondary market price increases by more than in the pre-policy period. Interestingly, the SSD channels excess demand from the secondary market into the primary market. As a consequence, the housing prices in the primary market continue to grow. The upward trend of housing prices is further perpetuated by the scarce and inelastic supply in the Hong Kong primary housing market.

7. Additional Analysis: Other Strategic Policy Responses by Flippers

7.1 Urgent Sale Discount after the Lock-In Period Ends

We have shown in Section 5 that flippers avoid paying SSD taxes by deferring resales and then urgently disposing of their properties within a very short period after the SSD exemption takes effect. To speed up the selling process and avoid further holding costs, some flippers may offer discounts in their selling prices. To quantify the urgent sale discount, we examine the impact of urgent sales made within 1 month of the lock-in period ending on the selling price relative to sales that occur later on.

As there are two phases of the SSD policy and each has different windows during which it is in effect, we divide the entire sample period into three subsamples based on property purchase dates. The first subsample consists of properties purchased before November 20, 2010 (the pre-policy period), during which no extra stamp duty is levied for selling within 2 or 3 years of purchase. Therefore, we expect to see no price discounts if the property is sold in month [t+24, t+25) or [t+36, t+37) for the first subsample. The second subsample consists of homes purchased during SSD Phase 1, when the extra stamp duty is exempt if the holding period is longer than 2 years. The third subsample includes homes purchased during SSD Phase 2, when the government extended the lock-in period from 2 to 3 years. As a result, the 3-year holding period, rather than the 2-year holding period, is the cutoff date for tax-saving incentives under SSD Phase 2.

Utilizing these differences in the Tobin tax exemption, we examine urgent sale discounts offered in each subsample immediately after the lock-in periods end. Specifically, we consider SSD

Phase 1 as the treatment period with a 2-year cutoff date, and we consider the pre-policy period and SSD Phase 2 as the placebo test periods for which no effects of urgent sale discount are expected at the 2-year cutoff date. Similarly, for the tax exemption effect at 3 years, we consider SSD Phase 2 as the treatment period and the other two as the placebo test periods.

For urgent sales made after the 2-year lock-in period ends, we use the following empirical specification to estimate the impact of urgent property disposal immediately after SSD exemption on the transaction prices:

$$log(Price_{it}) = \beta_1 Urgent\ Sale\ [t+24, t+25)_{it} + X_{it}'\lambda + \gamma M_t + \varphi_i + \omega_t + \varepsilon_{it}. \quad \text{--- (12)}$$

The sample includes all resales with holding periods ranging from 24 to 36 months. $Urgent\ Sale\ [t+24, t+25)_{it}$ is a dummy variable that denotes whether the specific property is urgently sold within 1 month after the lock-in period of 2 years ends. Therefore, the base group in the regression includes those sold in $[t+25, t+36)$ months. The corresponding coefficient β_1 thus represents the impact of urgent sales made in the first month after the lock-in period on resale prices ends relative to other resales made in the subsequent 11 months. The definitions of the other variables are the same as in Equations (1)–(3). Standard errors are clustered at the district level.

For urgent sales made after the 3-year lock-in period ends, we update the regression specification accordingly:

$$log(Price_{it}) = \beta_1 Urgent\ Sale\ [t+36, t+37)_{it} + X_{it}'\lambda + \gamma M_t + \varphi_i + \omega_t + \varepsilon_{it}. \quad \text{--- (13)}$$

The sample includes all transactions whose holding periods range from 36 to 48 months. $Urgent\ Sale\ [t+36, t+37)_{it}$ is a dummy variable that denotes whether the specific property is urgently sold within 1 month after the lock-in period of 3 years ends. Therefore, the base group in this specification includes homes sold in $[t+37, t+48)$ months.

We estimate the urgent sale effect in the treatment period and placebo test periods separately. Table 8, Panel A reports the estimation results of Equation (12). Columns (1)–(3) report the results obtained using subsamples of units purchased in the pre-policy period, SSD Phase 1, and SSD Phase 2, respectively. We find that in the placebo test periods, i.e., the pre-policy period (Column (1)) and SSD Phase 2 (Column (3)), there are no statistically significant differences in the transaction prices if

the seller holds the unit for 24–25 months or for 25–36 months. Column (2) presents the estimation results for the treatment period, i.e., SSD Phase 1; the price of urgent sales made within the first month after the SSD lock-in period ends is 1.05% lower than that of sales made in the subsequent 11 months. This estimate is statistically significant at the 1% level. Therefore, our empirical findings imply that after the SSD lock-in period ends, many flippers sell their units urgently and at a discount.

[------ PLACE TABLE 8 ABOUT HERE ------]

Table 8, Panel B reports the estimation results of Equation (13). Column (1) presents the price discount estimation obtained using the placebo test periods (i.e., by combining the pre-policy period and SSD Phase 1) and Column (2) presents the results for the treatment period (SSD Phase 2). We expect that in the presence of stamp duty exemption after t+36 months, urgent sales made in [t+36, t+37) months should negatively impact sales prices relative to those sold in [t+37, t+48) months, all else being equal. However, we find that relative to resales made in [t+37, t+48) months, those sold in [t+36, t+37) months either before or after SSD Phase 2 do not show significant differences in sale prices, indicating that when the lock-in period is extended to 3 years, flippers no longer offer urgent sale discounts. Potential explanations for why the urgent sales discounts disappear in the later periods are that 1) flippers now have longer search periods to find interested buyers, which leads to better search outcomes, and 2) the housing supply issue is exacerbated in later periods after SSD Phase 2 because of the longer lock-in periods and consequently, the market price grows further because of the relatively stable demand. Thus, flippers no longer have to offer discounts in a booming housing market with severe supply shortage.

7.2 Strategic Underpricing Near Stamp Duty Kink Points within the Lock-In Periods

The stamp duty rates for property transactions generally have a nonlinear schedule. When the transaction price is higher than a certain cutoff price, a higher stamp duty rate is applied on the excess amount over the cutoff prices. The literature documents several tax avoidance behaviors driven by the nonlinear tax schedule. Several studies focus on tax avoidance of income tax (Chetty et al. 2011; Friedberg, 2000; Saez, 2010), and many others investigate the effect of nonlinear stamp duty rates on housing prices (Best & Kleven, 2017; Hilber & Lyytikäinen, 2017; Kopczuk &

Munroe, 2015). In Hong Kong specifically, Leung et al. (2015) find that sellers may strategically lower their transaction prices to near stamp duty cutoff points to reduce the tax obligations of buyers. These buyers may then compensate the sellers off the books.[24]

In this section, we investigate whether flipper/sellers underprice their properties to near the price cutoff points of the stamp duty schedule. Appendix 3 illustrates the normal stamp duty schedule that was applicable to all property buyers in Hong Kong from February 28, 2007 to November 15, 2016.[25] The stamp duty rate ranges from near 0 to 3.75% for transactions settled between February 28, 2007 and March 30, 2010, with cutoff prices of 2 million, 3 million, 4 million, and 6 million HKD. For instance, the stamp duty for properties priced between 5.5 million and 6 million HKD is 3%. However, if the property is sold at a price greater than 6 million and within 6.5 million HKD, then the stamp duty rate is gradually increased to 3.75%. On March 31, 2010, the government raised the stamp duty rate for all property prices, but not the cutoff points on the stamp duty schedule. Finally, to further control for the overheated market, the government introduced a uniform 15% stamp duty for all homebuyers except first-time local buyers on November 15, 2016.

After introduction of the SSD, a proportion of flippers continued to resell properties during the lock-in period. Our hypothesis is that because of the increased tax obligation, these flippers may have strategically reduced the home prices to be slightly below the stamp duty cutoff points to reduce tax expenses. To test this conjecture, we use the difference in transaction and market prices as a proxy measure of this strategic underpricing (Leung et al., 2015). First, we estimate the market price of property i at time t based on a hedonic regression model in Equation (14), following the seminal study of Rosen (1974). The sample includes all transactions made from February 28, 2007 to March 30, 2010, which is before SSD implementation, and use

$$\log(Price_{it}) = X_{it}'\lambda + \varphi_i + \omega_t + \varepsilon_{it}. \qquad \text{--- (14)}$$

We then obtain the residuals of Equation (14), $Residual_{it}$, by subtracting the predicted price from the actual price (both prices are in log form). The residuals thus denote the extent of overpricing or underpricing relative to the market price. Lastly, we select those transactions with sales prices in

[24] Cases of "stamp duty cheating" for tax avoidance have been prosecuted in Hong Kong. Refer to the Legal Appendix in Leung et al. (2015) for more details.
[25] We focus on this study period because the stamp duty kink points remain unchanged during this period of 2007–2016. See Leung et al. (2015) for a more detailed discussion of the nonlinear tax schedule from 1996 to 2008.

price brackets adjacent to the tax cutoff prices and regress $Residual_{it}$ on a dummy variable ($Below_{it}$) that denotes whether the actual price is below the tax cutoff price:

$$Residual_{it} = \beta_1 Below_{it} + \varepsilon_{it}. \qquad \text{--- (15)}$$

Specifically, we hypothesize that if some flippers strategically price the property below the stamp duty cutoff price when they dispose of their property holdings, then there will be more negative residuals for transactions immediately below the cutoff price, and the coefficient β_1 will thus be negative.

Columns (1)–(4) in Table 9, Panel A report the estimation results of Equation (15), obtained using transactions near 4 million, 5 million, 6 million, or 7 million HKD, respectively. Specifically, we define transactions near a price as those within 0.2 million below or above that price.[26] During our study period of 2007–2016, the stamp duty cutoff prices were 4 million and 6 million HKD. Therefore, the treatment groups consist of transactions made near the left neighborhood of these two prices. As 5 million and 7 million HKD are not stamp duty cutoff prices, they form the placebo groups. Our results reveal that in the treatment groups, the residuals for transactions under the cutoff price are significantly lower (Columns (1) and (3)). The differences are 5.68% for transactions under 4 million HKD and 1.80% for transactions under 6 million HKD. Both estimates are statistically significant at the 1% level. In the placebo groups, however, there are no statistically significant differences between the residuals. Therefore, this indicates that transactions made slightly below the stamp duty cutoff price are strategically underpriced.

[------ PLACE TABLE 9 ABOUT HERE ------]

To further investigate whether the SSD results in more strategic underpricing by flippers, we interact $Below_{it}$ with a dummy variable that denotes whether the transaction is subject to the SSD. Table 9, Panel B reports the corresponding estimation results for transactions between 5.8 million and 6.2 million HKD.[27] The samples for Columns (1) and (2) include only flipping sales and those for Columns (3) and (4) include only non-flipping sales. We find that flippers who sell units for slightly below 6 million HKD underprice their properties by 7.07% (Column (1)) and 15.22%

[26] The estimation results are qualitatively similar if we use subsamples within 0.1 million below and above the cutoff price.
[27] There are too few transactions near 4 million HKD after introduction of the SSD, especially after SSD Phase 2.

(Column (3)) after the introduction of the SSD in 2010 and 2012, respectively. Both of the estimates are statistically significant at the 5% level. However, the SSD does not result in any further underpricing by non-flipper home sellers, as indicated by the statistically insignificant coefficients in Columns (2) and (4).

In addition, we conduct a falsification test using transactions near 5 million HKD, which is a non-stamp duty cutoff price, as a robustness check. Appendix Table IA5 reports the corresponding estimation results and reveals that the SSD does not result in any underpricing near the non-stamp duty cutoff price by either flippers or non-flippers.

In summary, these empirical findings provide new evidence of strategic underpricing by sellers near cutoff points under a nonlinear tax schedule (Hilber & Lyytikäinen, 2017; Kopczuk & Munroe, 2015). Moreover, our results contribute to the literature by showing that tax avoidance and evasion behaviors are stronger when the transaction costs are increased (Best & Kleven, 2017; Leung et al., 2015).

8. Conclusion

This study examines the market impact of a series of Tobin tax policies on short-term housing speculations in the Hong Kong housing market and provides a timely assessment of the effectiveness of these policies in terms of curbing speculations and in cooling down the housing market. Using a rich dataset with a large number of housing transaction records from 1992 to 2017, we examine 1) flippers' roles in the housing market and the impact of Tobin taxes (SSD) on their investment performance; 2) whether the SSD successfully deters speculative flipping transactions; 3) the market cooling effect of the SSD; and 4) flippers' strategical responses to the policy and property market dynamics in primary and secondary markets in response to stamp duty policies.

First, we document that property flippers in Hong Kong obtain 12.7% higher annual returns than other market participants before the implementation of the SSD policy. Their purchase prices are approximately 3.3% lower and their resale prices are approximately 3.2% higher, which suggests that flippers potentially possess superior marketing skills and have expertise in identifying arbitrage opportunities. After the implementation of the SSD, the annualized returns of flippers still in the

market are drastically reduced by 8.81%. The SSD also increases the flippers' purchase prices by 2.04% and reduces their selling prices by 1.86%. We also find that flipping sales drive up housing prices in nearby neighborhoods. A 1-percentage-point increase in the lagged proportion of flipping sellers is associated with a 0.2–1% increase in subsequent non-flippers' sale prices in the same building.

Second, we show that these Tobin tax policies are reasonably effective in curtailing flippers, as the presence of flippers is reduced from 23.2% in 2009 before policy implementation to 2.4% in 2011 shortly after SSD Phase 1 and 0.9% in 2013 after SSD Phase 2. Utilizing an alternative identification strategy that defines flippers as those with prior flipping experience before SSD implementation, we find that these pre-policy flippers significantly extend their holding periods by at least 2.5 times in the post-policy period and that their likelihood of making housing transactions drops by about 20%, potentially because of lower returns and higher holding costs after SSD implementation. We also find a large and acute bunching effect on urgent sales made immediately after the lock-in period ends, revealing flippers' urgent desire to dispose of properties and avoid further holding costs.

Third, we do not find any evidence to support the policy's market cooling effect. We offer explanations based on the dynamics of the dichotomous property market segments. The SSD effectively suppresses the supply in the secondary market and channels unmet demand into the primary market. Given that the supply in the primary market is inelastic in both the short and medium terms, the price in the primary market is pushed up even further. We find that 5 years after introduction of the SSD, the secondary housing price increases drastically by 38% and the primary housing price also increases significantly by 27%. Our findings suggest that such liquidity-restricting stamp duty policies are not a good method by which to cool down the housing market.

This study mainly contributes to two branches of literature. The first examines the role of Tobin tax policies in regulating financial and housing markets (Bradley, 2018; Cai et al., 2021; Deng et al., 2016; Fu et al., 2015; Kopczuk & Munroe, 2015). We provide a detailed assessment of the effectiveness of Tobin tax policies in regulating speculations in the property market and show that the SSD policy effectively curbs short-term speculations but does not effectively cool the market. We

offer explanations from the perspectives of the flippers' strategic responses and housing market dynamics.

The second concerns the impact of flippers on housing markets. Our findings shed light on how speculative investments drive up housing prices and render housing unaffordable (Gao et al., 2020), which is especially relevant given the extent of the housing problem in Hong Kong. Our results imply that although speculative property trading drives up housing prices, merely restricting flippers is not enough to cool down the housing market and hence cannot solve the housing unaffordability problem. In fact, such policies may have unintended consequences of reducing supply in the secondary market, which triggers investors' migration into the primary market and exacerbates the price bubble risk in both market segments.

In conclusion, using comprehensive housing transaction data and an ideal setting with a series of Tobin tax policy shocks, this study provides an in-depth analysis of property-flipping activities and the impact of Tobin tax policy on curbing speculations, thus addressing the intense public concern about property flippers. These results thus shed new light on the effectiveness and appropriateness of anti-speculation Tobin tax measures for the Hong Kong housing market. Our findings can be generalized to other metropolises with globally popular housing markets that attract investment interests and short-term speculators.

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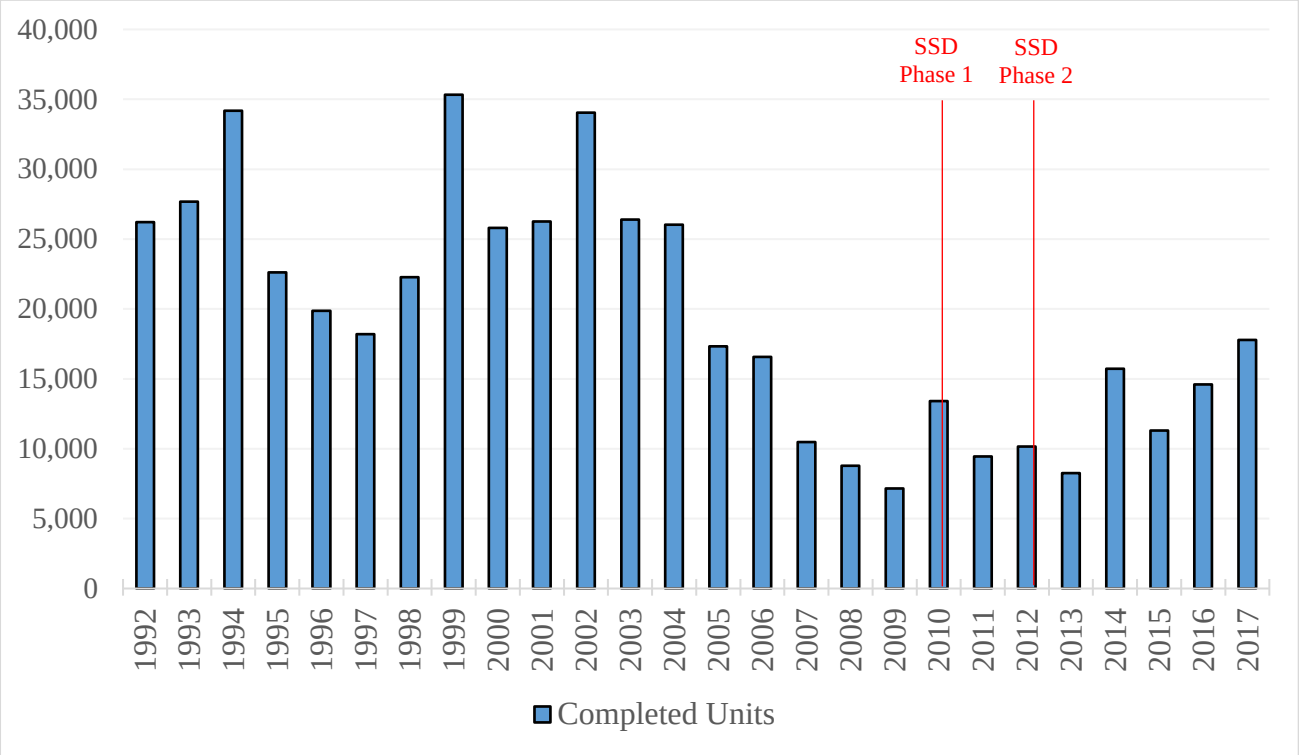
Appendix 1. Definitions of Key Variables

Variable Name	Definition
Flip	A dummy variable that denotes flipping transactions, in which the resale date of a home is within 2 years of its purchase date.
PreFlip	A dummy variable that denotes a homebuyer with prior flipping transactions (i.e., properties held for less than 2 years) before the initiation of SSD Phase 1.
Primary	A dummy variable that denotes whether the sale is in the primary market of newly constructed properties.
Secondary	A dummy variable that denotes resale properties.
Total Price	Pretax transaction price in million HKD, adjusted by CPI of the month (base = October 2014), trimmed at top and bottom 1% level.
Area size	Gross floor area in 100 square feet, trimmed at the top and bottom 1% levels.
Annualized Housing Return	Percentage change in total price (before tax) since last transaction, annualized by holding years and trimmed at the top 5% and bottom 1% levels.
Region	1 = Hong Kong Island; 2 = Kowloon; 3 = New Territories.
Building Type	1 = Estate Block; 2 = Single Building; 3 = Village House.
District	District codes assigned by the EPRC: 1 = Aberdeen/Ap Lei Chau; 2 = Causeway Bay; 3 = Central; 4 = Chai Wan; 5 = Happy Valley; 6 = Kennedy Town; 7 = Mid-Level West; 8 = Mid-Level Central; 9 = Mid-Level East; 10 = North Point; 11 = North Point Hill; 12 = Peak; 13 = Pokfulam; 14 = Quarry Bay; 15 = Repulse Bay; 16 = Sai Ying Pun; 17 = Shau Kei Wan; 18 = Sheung Wan; 19 = Siu Sai Wan; 20 = Stanley; 21 = Tai Tam; 22 = Wan Chai; 23 = Wong Chuk Hang; 24 = Cheung Sha Wan; 25= Diamond Hill; 26 = Ho Man Tin; 27 = Hung Hom; 28 = Kai Tak; 29 = Kowloon Bay; 30 = Kowloon City; 31 = Kowloon Tong; 32 = Kwun Tong; 33 = Lai Chi Kok; 34 = Lam Tin; 35 = Mong Kok; 36 = Ngau Chi Wan; 37 = Ngau Tau Kok; 38 = San Po Kong; 39 = Sham Shui Po; 40 = Shek Kip Mei; 41 = Tai Kok Tsui; 42 = Tsim Sha Tsui; 43 = Tsz Wan Shan; 44 = Wang Tau Hom; 45 = Wong Tai Sin; 46 = Yau Ma Tei; 47 = Yau Tong; 48 = Fan Ling; 49 = Islands; 50 = Kwai Chung; 51 = Ma On Shan; 52 = Sai Kung; 53 = Sha Tin; 54 = Sheung Shui; 55 = Tai Po; 56 = Tseung Kwan O; 57 = Tsing Yi; 58 = Tsuen Wan; 59 = Tuen Mun; 60 = Yuen Long.

Appendix 2. Number of Newly Completed Private Residential Units in Hong Kong

This figure presents the number of newly completed private residential units in Hong Kong from 1992 to 2017 by year. The data are obtained from the Hong Kong Rate and Valuation Department. SSD: Special Stamp Duty.



Appendix 3. Progressive Stamp Duty Rates in Hong Kong

This figure plots the general stamp duty schedule for property buyers in Hong Kong from February 28, 2007 to November 15, 2016. This stamp duty rate is applicable to all transactions of residential properties in Hong Kong. Note that this rate does not include any additional stamp duties levied for specific groups of buyers/sellers, such as the Special Stamp Duty (SSD) for flippers and the Buyer's Stamp Duty (BSD) for non-resident buyers. Source: https://www.gov.hk/en/residents/taxes/stamp/stamp_duty_rates.htm (Date accessed: December 2019).

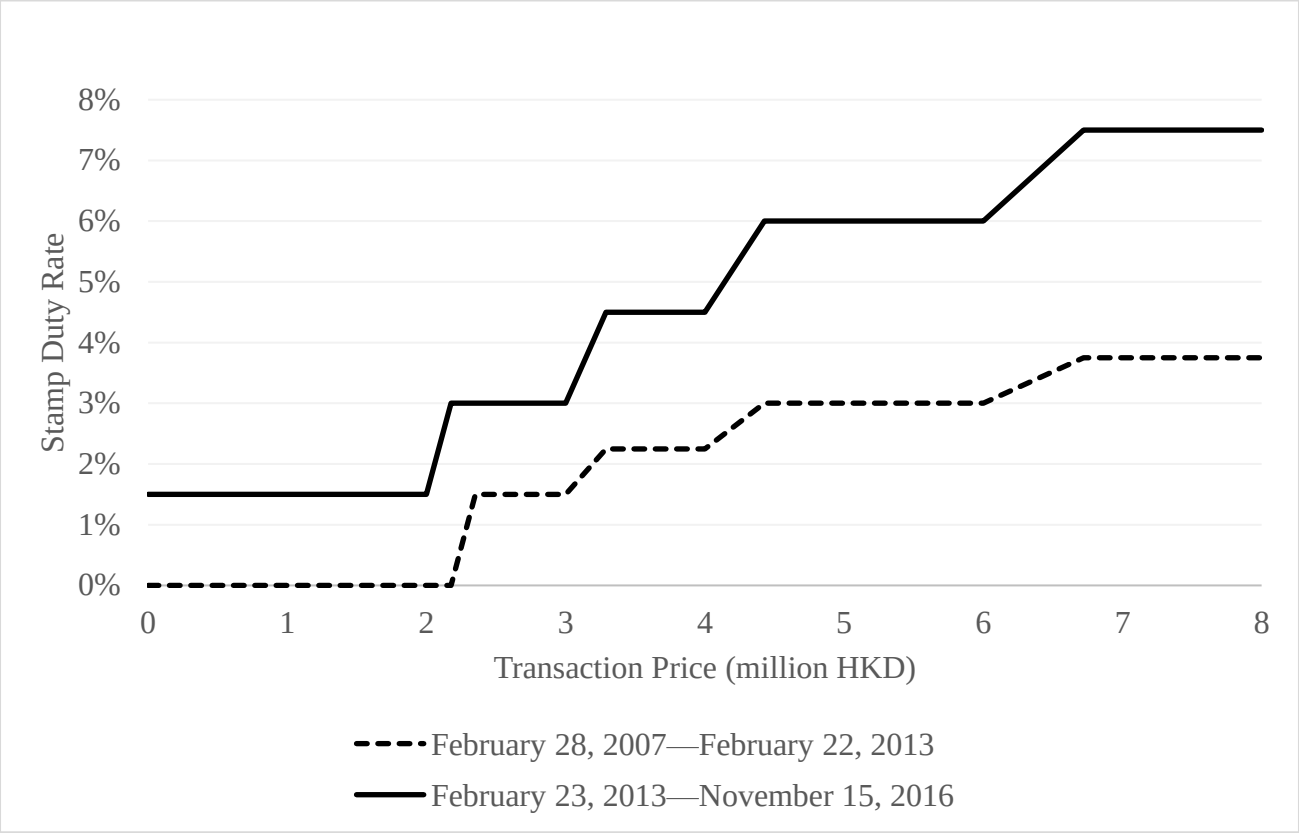


Figure 1. Private Domestic Property Price Index in Hong Kong

This figure presents the housing price index for all private domestic properties in Hong Kong from 1992 to 2018. Source: Hong Kong Rating and Valuation Department. SARS: severe acute respiratory syndrome; SSD: Special Stamp Duty.

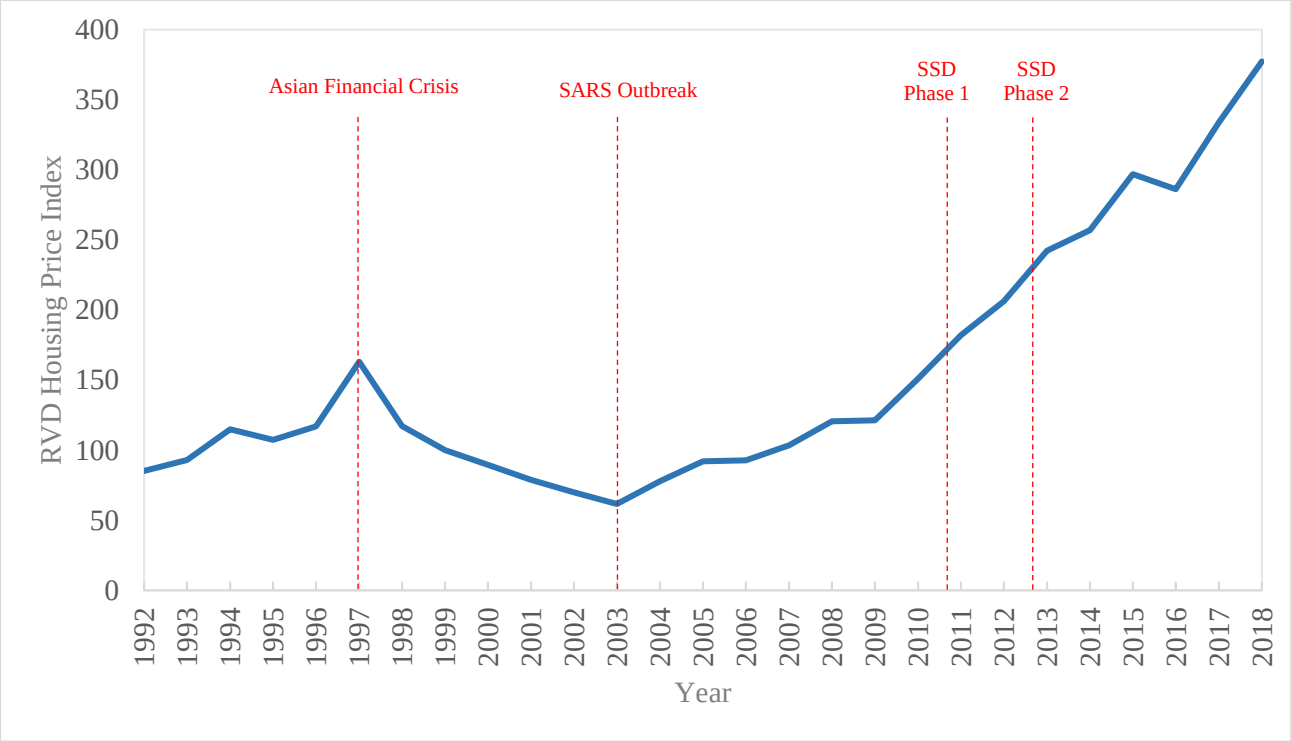


Figure 2. Special Stamp Duty (SSD) Policies and Tax Rates over Time

This figure plots the SSD rates for home sellers with respect to holding periods under the SSD policy. The black line indicates that there was no SSD for the 2-year holding period cutoff before November 20, 2010. The orange line indicates the SSD rate for homes purchased between November 20, 2010 and October 26, 2012. The gray line indicates the SSD rate for units purchased after October 27, 2012.

Data source: https://www.gov.hk/en/residents/taxes/stamp/stamp_duty_rates.htm (Date accessed: April 2021).

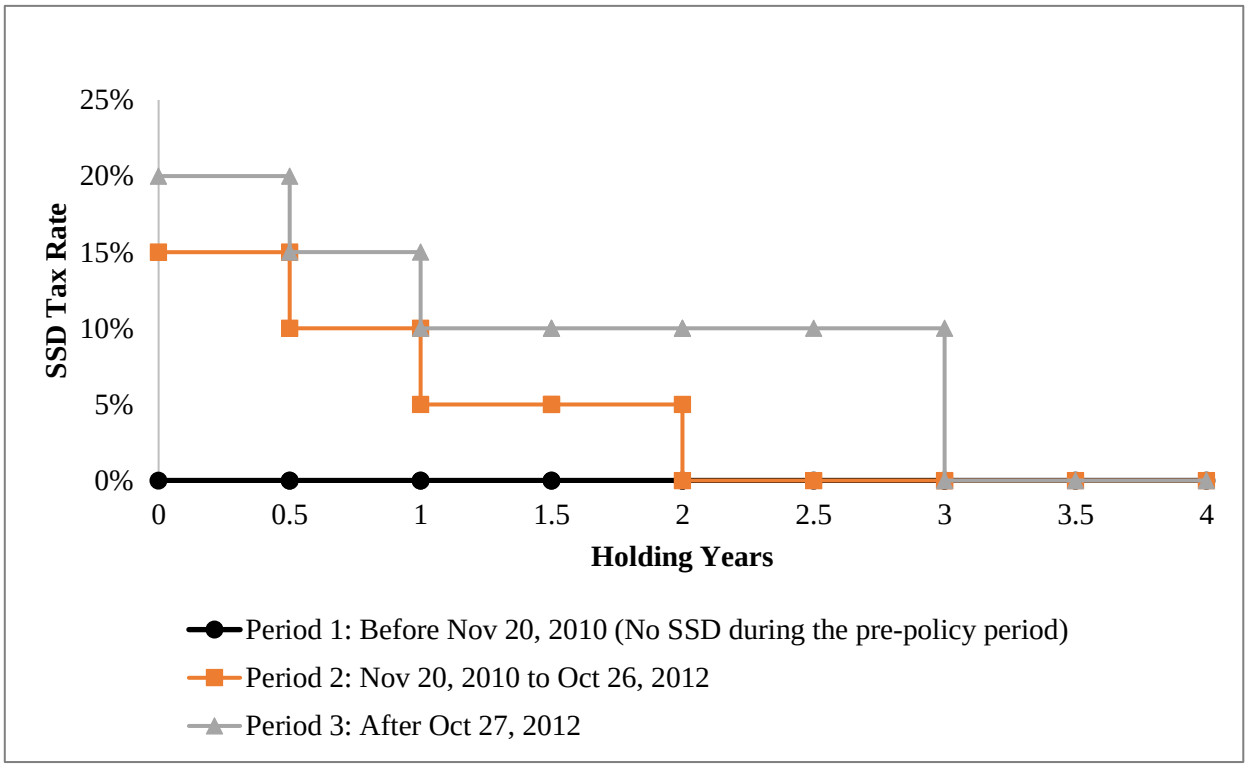
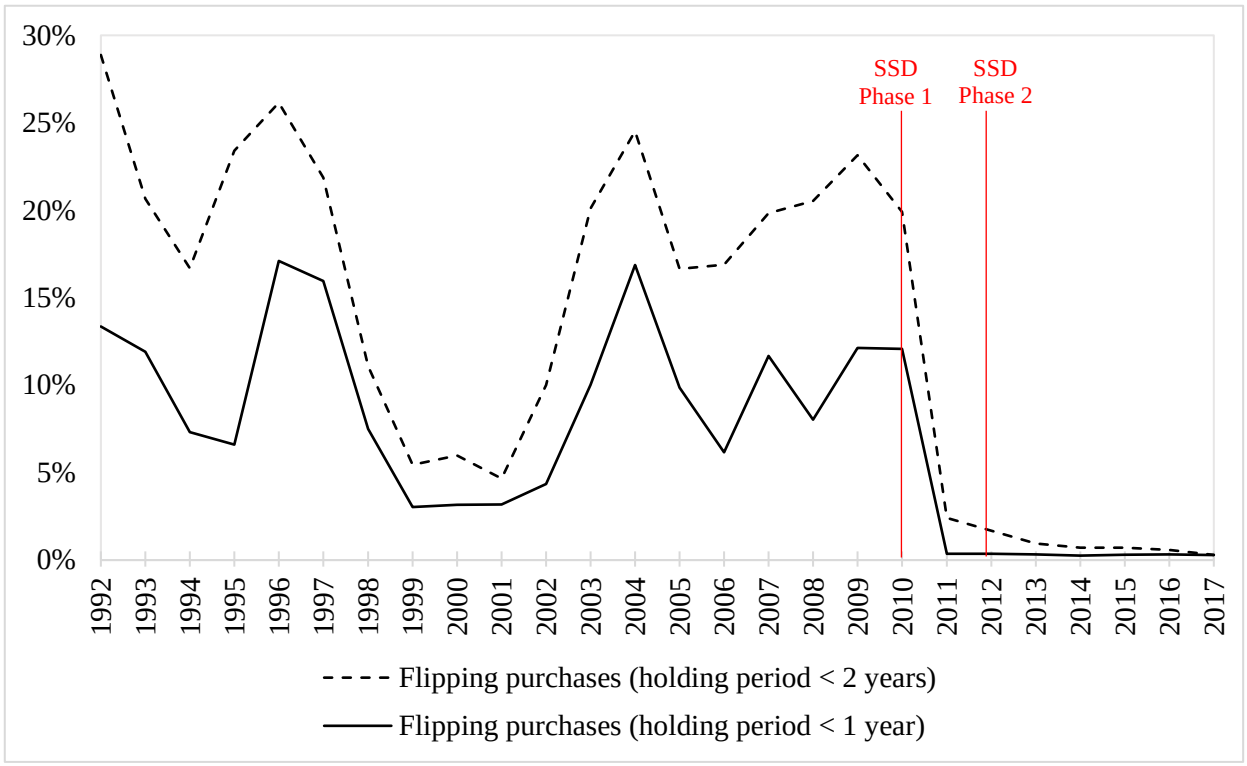


Figure 3. Flipping Purchases in the Housing Market

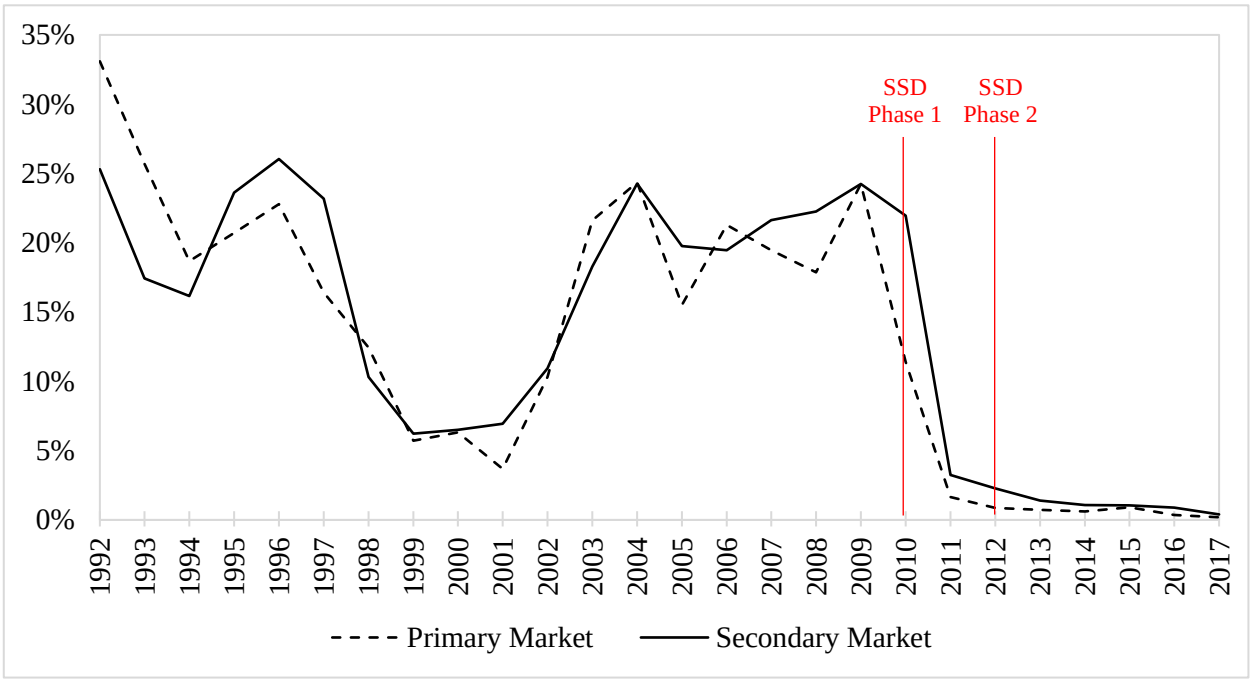
Panel A. Proportion of Flipping Purchases by Year

The figure plots the market share of flipping purchasing transactions from 1992 to 2017 by year of purchase. The solid line denotes the proportion of flipping home purchases with a hold period of less than two 2 years; the dashed line denotes the proportion of flipping home purchases with a holding period of less than 1 year. SSD: Special Stamp Duty.



Panel B. Proportion of Flipping Purchases in the Primary and Secondary Markets

This figure plots the market share of flipping purchases in the primary and secondary markets from 1992 to 2017 by year of purchase. Flipping purchases are defined as home purchases with holding periods of less than two years. The dashed line denotes the proportion of flipping home purchases in the primary market and the solid line denotes the proportion of flipping home purchases in the secondary resale market. SSD: Special Stamp Duty.



Panel C. Proportion of Flipping Purchases by Region

This figure plots the market share of flipping purchases in the three major regions of Hong Kong: Hong Kong Islands, Kowloon, and New Territories from 1992 to 2017 by year of purchase. Flipping purchases are defined as home purchases with a holding period of less than 2 years. The dashed line denotes Hong Kong, the solid line denotes Kowloon, and the dotted line denotes the New Territories. SSD: Special Stamp Duty.

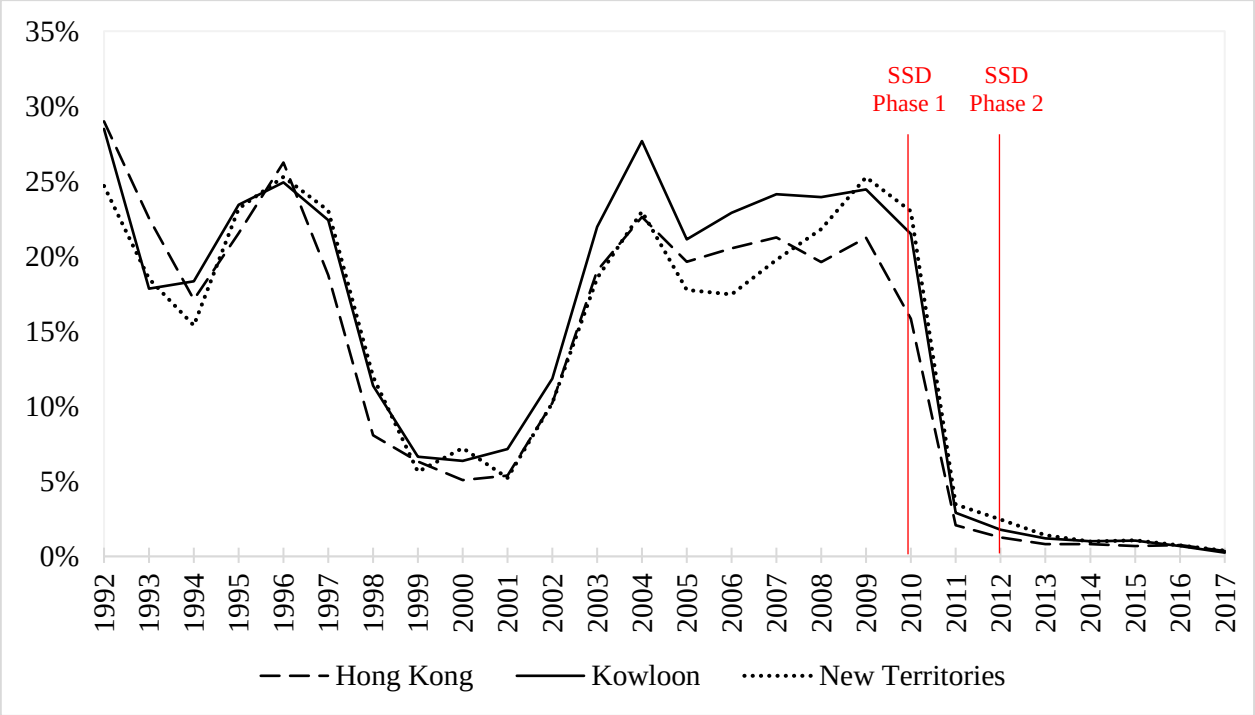


Figure 4. Heat Map of Flipping Purchases by District

This figure presents the average market share of flipping purchase transactions in the 18 planning districts of Hong Kong from 1992 to 2017. Flipping purchases are defined as home purchases that are sold within 2 years of their purchase dates.

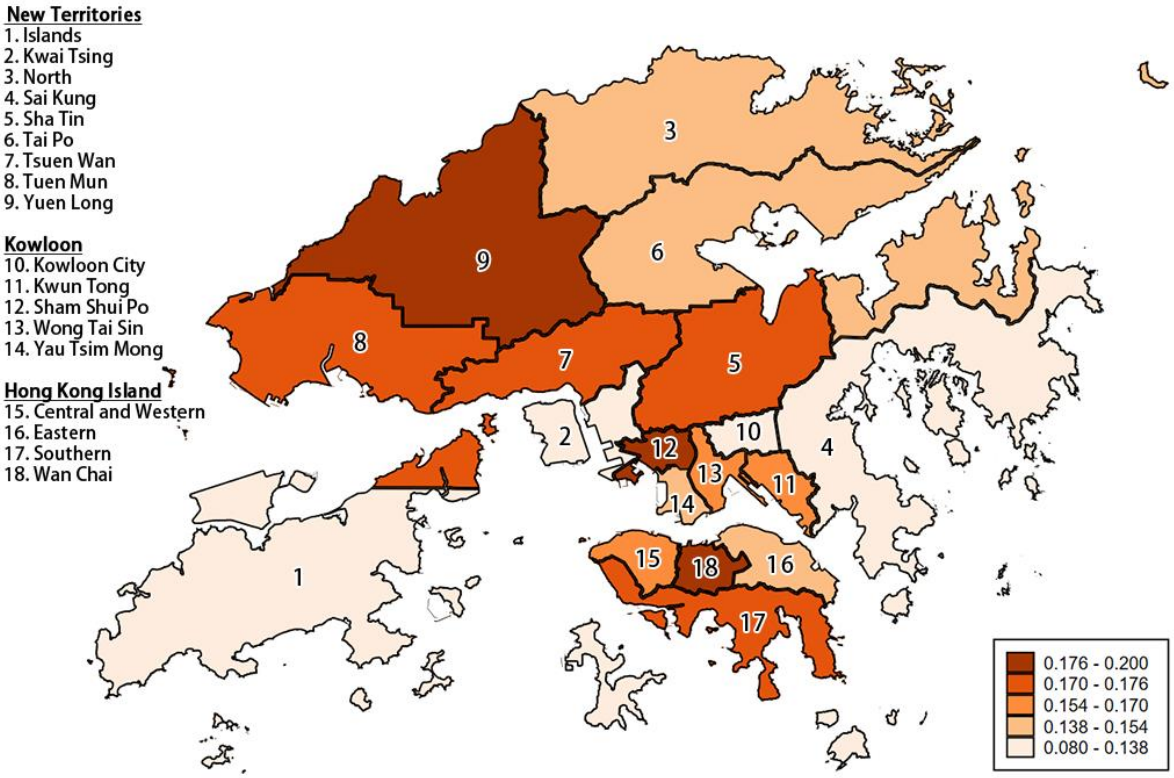
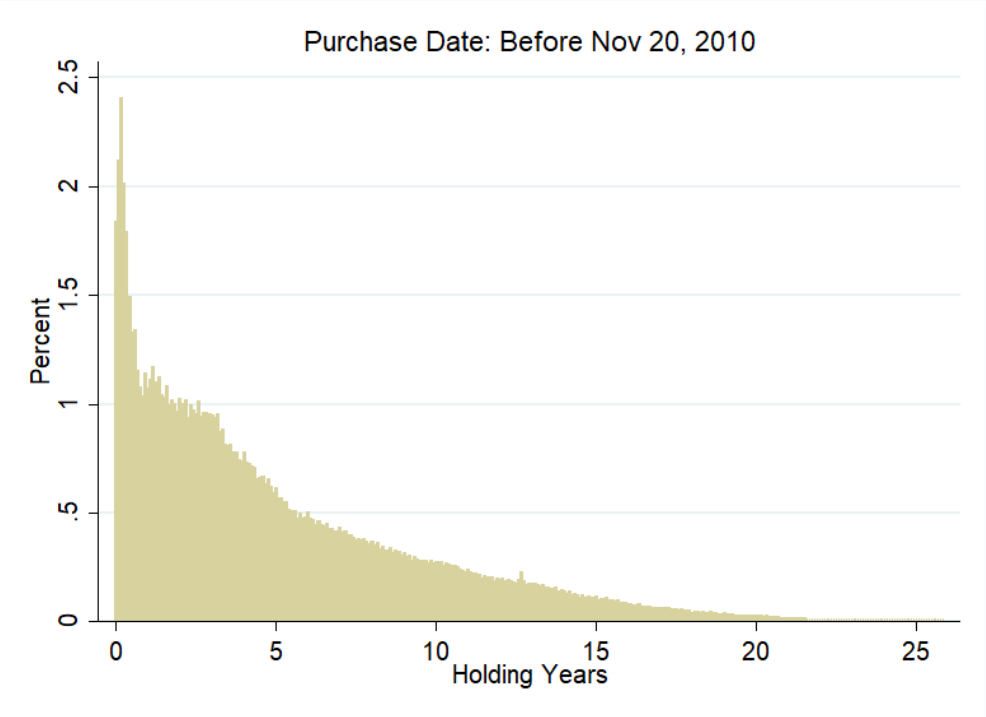


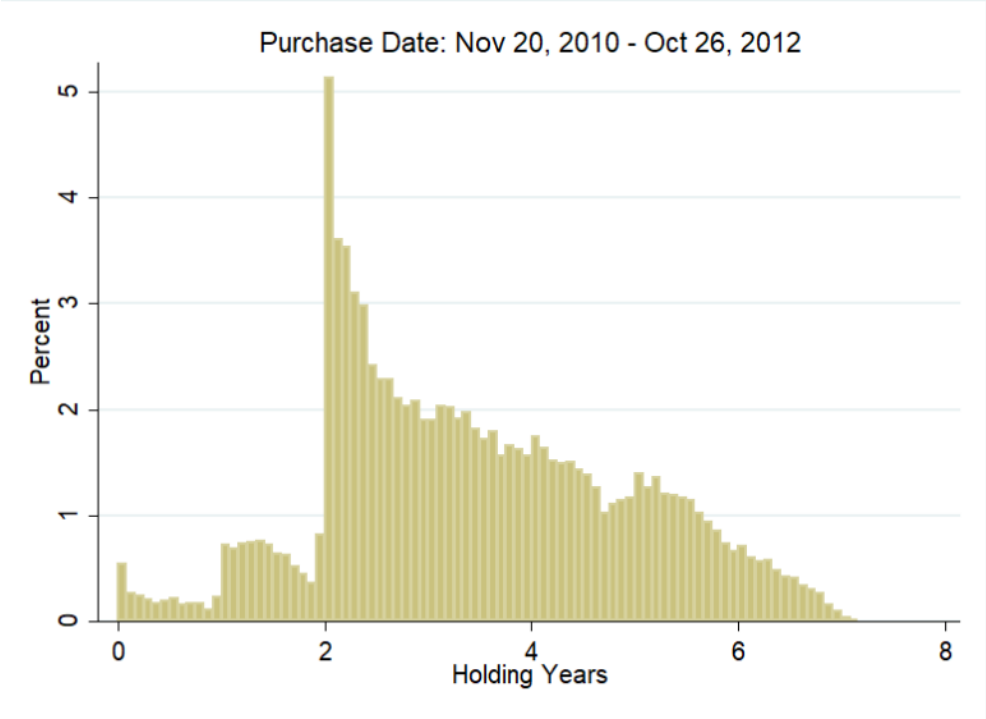
Figure 5. Distribution of Homebuyers' Holding Periods

This figure presents the distribution of homebuyers' holding periods in years. We separate the sample into three subsamples with respect to the purchase dates of the properties. Panel A presents the histogram of holding periods for properties purchased before the implementation of Special Stamp Duty (SSD) Phase 1 (i.e., before November 20, 2010). Panel B plots the histogram of holding periods for the subsample of properties purchased during SSD Phase 1 (i.e., November 20, 2010 to October 26, 2012). Panel C shows the subsample of properties purchased after the implementation of SSD Phase 2 (i.e., after October 26, 2012).

Panel A. Subsample of Homes Purchased Before November 20, 2010 (Pre-Policy Period)



Panel B. Subsample of Homes Purchased from November 20, 2010 to October 26, 2012 (SSD Phase 1)



Panel C. Subsample of Homes Purchased after October 27, 2012 (SSD Phase 2)

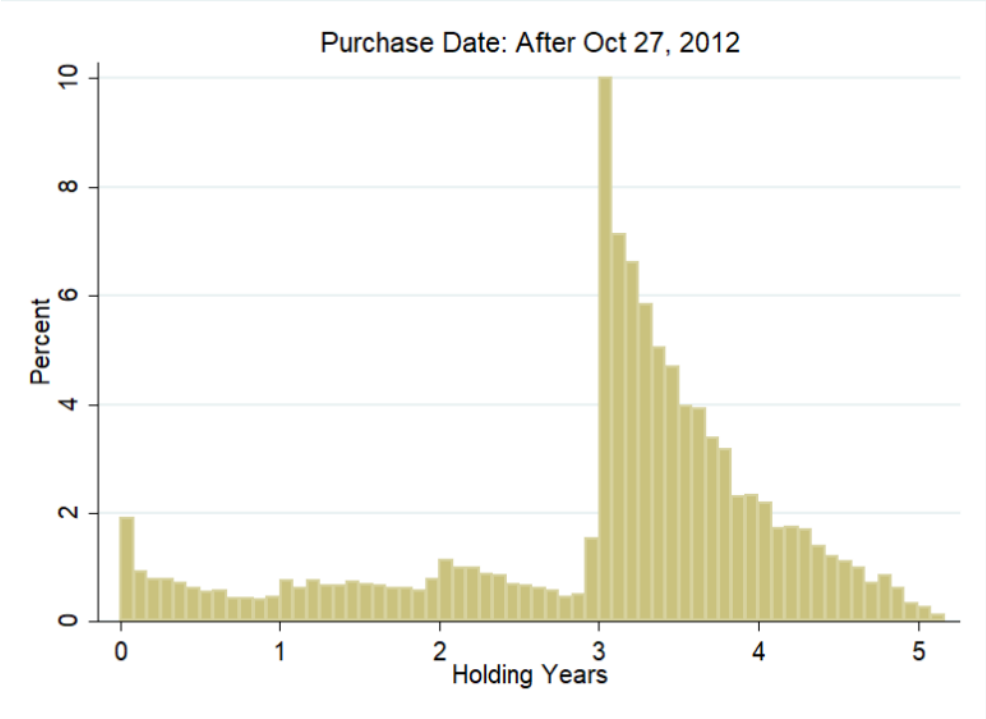


Figure 6. Flipping Purchases by Pre-Policy Flippers over Time

This figure plots the market share of home purchases made by pre-policy flippers from 1992 to 2017. The dotted line denotes the proportion of all home purchases by pre-policy flippers, defined as those who have made flipping transactions with less than a 2-year holding period before the introduction of Special Stamp Duty (SSD) Phase 1 (November 20, 2010). The solid line denotes the proportion of pre-policy flippers' home purchases with holding periods of less than 2 years. The dashed line denotes the proportion of pre-policy flippers' home purchases with holding periods of less than 1 year.

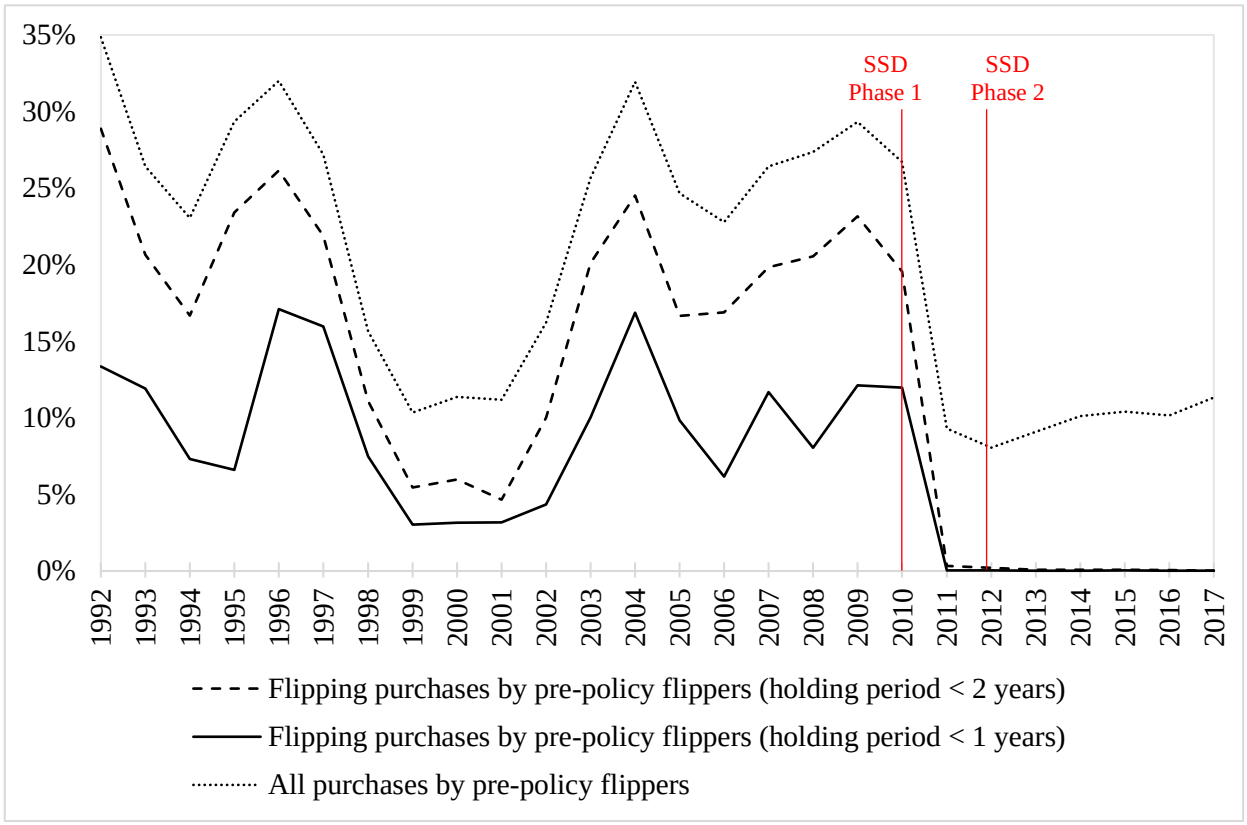
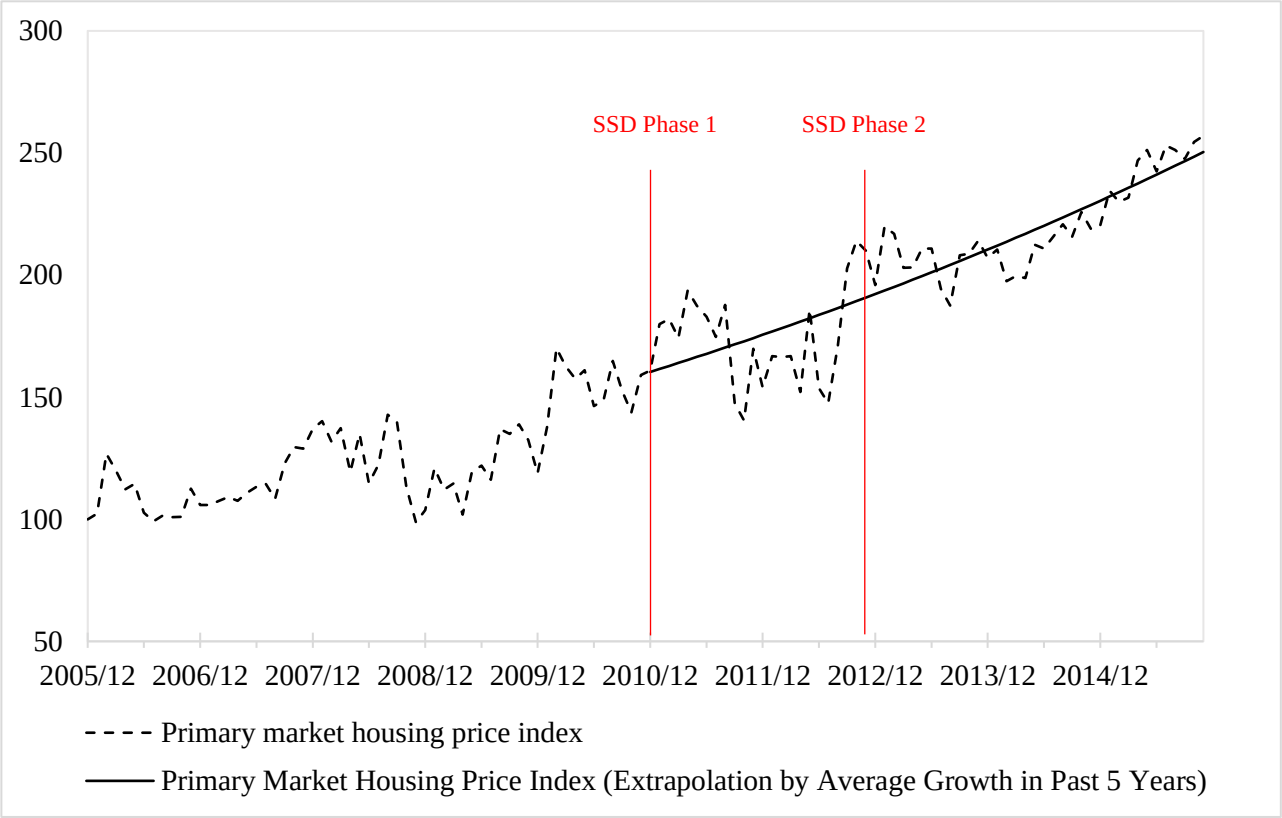


Figure 7. Predicted Counterfactual Housing Price Index Without Special Stamp Duty (SSD) Policy

This figure plots the predicted counterfactual housing price index in Hong Kong in the absence of an SSD policy. Panel A and B present the indices in the primary and secondary markets in the [-5, +5] year window around the initiation of SSD Phase 1 (November 20, 2010), respectively. The dashed line denotes the actual housing price index, estimated using the hedonic housing price model. The predicted counterfactual housing price index (solid line) is extrapolated using the average monthly growth in the previous 5 years before SSD Phase 1 implementation.

Panel A. Primary Market



Panel B. Secondary Market

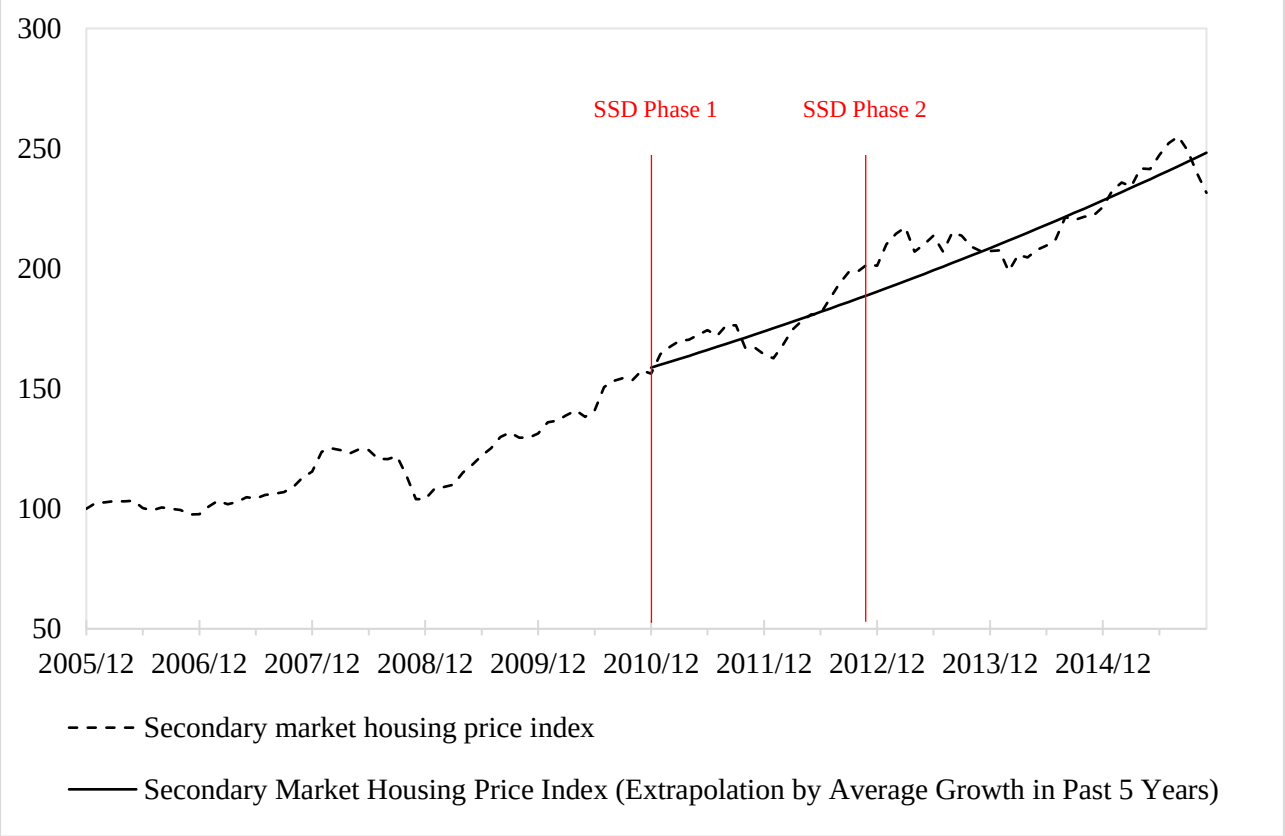


Table 1. Summary Statistics of Key Variables

This table presents the summary statistics of key variables on property and transaction characteristics of the housing transaction dataset. A home purchase is defined as a flip purchase if the resale date of the home purchase is within 2 years of its purchase date, denoted by the variable *Flip*. Columns (1)–(3) summarize the full sample of transactions. Columns (4)–(6) summarize the subsample of home purchases made by flippers (*Flip* = 1). Columns (7)–(9) summarize the subsample of home purchases made by non-flippers (*Flip* = 1). Columns (10)–(11) report the t-test results for the differences between Column (5) and (8). Refer to Appendix 1 for more detailed variable definitions. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	All Transactions			*Flip* = 1			*Flip* = 0			t-test: (5) – (8)	
	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.	Diff.	Std. Err.
Property Characteristics											
Gross Floor Area (sq. ft.)	1,556,528	7.071	2.512	245,376	6.825	2.570	1,311,152	7.117	2.498	-29.194***	0.5520
Bedrooms	1,556,528	2.098	0.954	245,376	2.016	0.967	1,311,152	2.114	0.951	-0.098***	0.0021
Living Rooms	1,556,528	1.264	0.930	245,376	0.996	0.960	1,311,152	1.314	0.916	-0.317***	0.0020
Building Age	1,556,528	10.146	9.577	245,376	9.562	9.228	1,311,152	10.256	9.637	-0.694***	0.0211
Remaining Lease Term (Year)	1,556,528	99.501	194.127	245,376	103.997	198.659	1,311,152	98.659	193.256	5.338***	0.4270
Floor	1,556,528	18.770	12.283	245,376	17.814	11.939	1,311,152	18.949	12.338	-1.135***	0.0270
Transaction Characteristics											
Flip	1,556,528	0.158	0.365								
PreFlip	1,556,528	0.222	0.416	245,376	0.987	0.115	1,311,152	0.079	0.270	0.908***	0.0006
Total Price (million HKD)	1,556,528	4.137	3.133	245,376	3.752	3.020	1,311,152	4.209	3.148	-0.457***	0.0069
Unit Price (1,000 HKD p.s.f.)	1,556,528	5.556	2.609	245,376	5.127	2.305	1,311,152	5.637	2.655	-0.510***	0.0057
Primary	1,556,528	0.252	0.434	245,376	0.258	0.438	1,311,152	0.251	0.434	0.007***	0.0010
Holding Years	812,958	5.233	4.384	206,742	1.024	0.556	606,216	6.669	4.191	-5.645***	0.0092
Capital Gain Return	812,958	0.156	0.422	206,742	0.119	0.198	606,216	0.169	0.474	-0.049***	0.0011
Annualized Capital Gain Return	812,958	0.056	0.148	206,742	0.163	0.231	606,216	0.019	0.077	0.144***	0.0003

Table 2. Impact of the Special Stamp Duty (SSD) on Flippers' Housing Returns and Transaction Prices

This table presents the regression results for the impacts of the SSD on the housing return, purchase price, and resale prices of flipping transactions. The sample includes all housing transactions made from 1992 to 2017. Panel A presents the impact of the SSD on the housing returns and prices of all flipping transactions. Panel B focuses on the housing transactions conducted by pre-policy flippers (*PreFlip*). Pre-policy flippers are defined as those who have sold properties within 2 years of their purchase dates before November 20, 2010, which is the effective date of SSD Phase 1. *Flip* is a dummy variable that denotes whether a home sale is a flipping transaction, for which the resale date is within 2 years of the purchase date. *SSD* is a dummy variable that indicates whether the transaction is affected by the SSD policy. Standard errors are clustered at the district level. Robust standard errors are presented in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Panel A. Impact of the SSD on All Flippers' Housing Returns and Transaction Prices

	(1)	(2)	(3)
	Y: Annual return	Y: Log (Purchase price)	Log (Resale price)
Flip * SSD	-0.0881***	0.0204*	-0.0186**
	(0.0068)	(0.0109)	(0.0084)
Flip	0.1272***	-0.0332***	0.0321***
	(0.0069)	(0.0068)	(0.0046)
Area size	0.0002	0.1468***	0.1472***
	(0.0004)	(0.0040)	(0.0040)
Rooms	-0.0044***	0.0305***	0.0308***
	(0.0007)	(0.0061)	(0.0061)
log (Building Age)	0.0135***	-0.1112***	-0.1111***
	(0.0010)	(0.0081)	(0.0080)
Floor	-0.0003***	0.0040***	0.0041***
	(0.0000)	(0.0005)	(0.0005)
Prime Lending Rate	0.0112***	-0.0700***	-0.0705***
	(0.0026)	(0.0147)	(0.0148)
Year * Quarter Fixed Effect	Y	Y	Y
Building Type Fixed Effect	Y	Y	Y
District Fixed Effect	Y	Y	Y
Observations	812,958	1,556,528	1,556,528
R-squared	0.348	0.855	0.855

Panel B. Impact of the SSD on Pre-Policy Flippers' Housing Returns and Transaction Prices

	(1) Y: annual return	(2) Y: log (purchase price)	(3) Y: log (sale price)
PreFlip * SSD	-0.0916***	0.0164**	-0.0158**
	(0.0054)	(0.0081)	(0.0076)
PreFlip	0.1012***	-0.0294***	0.0315***
	(0.0057)	(0.0054)	(0.0046)
Physical Features	Y	Y	Y
Prime Lending Rate	Y	Y	Y
Year * Quarter Fixed Effect	Y	Y	Y
District Fixed Effect	Y	Y	Y
Observations	812,958	1,556,528	1,556,528
R-squared	0.312	0.855	0.855

Table 3. Distribution of Holding Periods Around Special Stamp Duty (SSD)

This table presents the distribution of holding periods for properties purchased in four windows: all years before the SSD, 1 year before SSD Phase 1, during SSD Phase 1, and during SSD Phase 2. Panel A presents the statistics of the holding periods of all resales in the four windows. Panel B presents the statistics for resale transactions undertaken by pre-policy flippers.

Panel A. Holding Period Statistics of All Resales

	Before SSD			1 Year before SSD			During SSD Phase 1			During SSD Phase 2		
	1992.01.01–2010.11.19			2009.11.20–2010.11.19			2010.11.20–2012.10.26			2012.10.27–2013.10.26		
Holding Period	N	%	Cum.	N	%	Cum.	N	%	Cum.	N	%	Cum.
0–1 year	134,849	10.45%	10.45%	12,746	12.81%	12.81%	487	0.41%	0.41%	113	0.35%	0.35%
1–2 years	106,566	8.26%	18.72%	8,134	8.18%	20.99%	2,211	1.86%	2.27%	199	0.61%	0.96%
2–2.5 years	49,682	3.85%	22.57%	4,436	4.46%	25.45%	6,831	5.76%	8.03%	246	0.76%	1.71%
2.5–3 years	48,844	3.79%	26.36%	2,620	2.63%	28.08%	4,170	3.51%	11.54%	179	0.55%	2.26%
3–3.5 years	46,003	3.57%	29.92%	1,667	1.68%	29.76%	3,887	3.28%	14.82%	1,952	6.00%	8.26%
3.5–4 years	39,357	3.05%	32.97%	1,838	1.85%	31.60%	3,287	2.77%	17.59%	1,506	4.63%	12.89%
over 4 years	864,511	67.03%	100%	68,045	68.40%	100%	97,810	82.41%	100%	28,361	87.11%	100%
Total	1,289,812			99,486			118,683			32,556		

Panel B. Holding Period Statistics of Resales by Pre-Policy Flippers

	Sample: Resale transactions by Pre-policy Flippers only											
	All before SSD			1 Year before SSD			During SSD Phase 1			During SSD Phase 2		
	1992.01.01–2010.11.19			2009.11.20–2010.11.19			2010.11.20–2012.10.26			2012.10.27–2013.10.26		
Holding Period	N	%	Cum.	N	%	Cum.	N	%	Cum.	N	%	Cum.
0–1 year	134,849	42.08%	42.08%	12,746	45.73%	45.73%	57	0.55%	0.55%	11	0.39%	0.39%
1–2 years	106,566	33.25%	75.33%	8,134	29.18%	74.91%	301	2.88%	3.43%	18	0.64%	1.03%
2–2.5 years	5,477	1.71%	77.04%	521	1.87%	76.78%	770	7.37%	10.80%	19	0.67%	1.70%
2.5–3 years	4,820	1.50%	78.54%	285	1.02%	77.81%	464	4.44%	15.24%	20	0.71%	2.41%
3–3.5 years	4,252	1.33%	79.87%	153	0.55%	78.35%	408	3.90%	19.14%	198	7.00%	9.41%
3.5–4 years	3,488	1.09%	80.96%	193	0.69%	79.05%	329	3.14%	22.28%	133	4.70%	14.11%
over 4 years	61,035	19.04%	100%	5,840	20.95%	100%	8,120	77.71%	100%	2,428	85.89%	100%
Total	320,487			27,872			10,449			2,827		

Table 4. Impact of the Special Stamp Duty (SSD) on Holding Periods of Resale Transactions

This table reports the estimated impact of the SSD on the holding periods of resale transactions. Pre-policy flippers are defined as those who have ever sold their properties within 2 years of the purchase dates before November 20, 2010, which is the effective date of SSD Phase 1. Panel A presents the effect of the SSD on the holding periods of all resales. The dependent variable is the logarithm of the holding period (in days). *SSD* is a dummy variable that indicates whether the transaction is made after the SSD policy was enacted in November 20, 2010. Panel B reports the impact of the SSD on the market presence of flippers, estimated with Probit models. Panel C presents the effect of the SSD on the holding periods of pre-policy flippers; the sample includes resales made by pre-policy flippers only. Panel D presents the Probit estimation of the impact of the SSD on the housing investment likelihood of pre-policy flippers. The dependent variable is a dummy variable that denotes a home purchase made by pre-policy flippers. The margins of the Probit estimation at the mean are reported in Panel D. Standard errors are clustered at the district level. Robust standard errors are presented in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Panel A. Impact of the SSD on Holding Periods of All Resales

	(1)	(2)	(3)
	Dependent Variable: log(holding period in days)		
	[-1, +1] year around the initiation of SSD Phase 1		
SSD	0.6873***	-0.0501***	-0.1534***
	(0.0361)	(0.0071)	(0.0092)
Flip		-1.7407***	
		(0.0280)	
Flip * SSD		0.5451***	
		(0.0531)	
PreFlip			-1.5751***
			(0.0285)
PreFlip * SSD			1.5215***
			(0.0286)
Physical Features	Y	Y	Y
Prime Lending Rate	Y	Y	Y
District Fixed Effect	Y	Y	Y
Observations	60,968	60,968	60,968
R-squared	0.153	0.666	0.546

Panel B. Impact of the SSD on Flippers' Market Presence

	(1)	(2)	(3)	(4)
	Dependent Variable: Flip Dummy			
Probit Model	All years	[-5, +5] years	[-2, +2] years	[-1, +1] year
SSD	-0.3108***	-0.2667***	-0.2446***	-0.2195***
	(0.0039)	(0.0031)	(0.0031)	(0.0040)
Physical Features	Y	Y	Y	Y
Prime Lending Rate	Y	Y	Y	Y
District Fixed Effect	Y	Y	Y	Y
Observations	1,556,528	596,040	303,538	160,314
Pseudo R-squared	0.0741	0.1410	0.1540	0.1520

Panel C. Impact of the SSD on Pre-Policy Flippers' Holding Periods

	(1)	(2)	(3)	(4)
	Dependent Variable: log (holding period in days)			
	All years	[-5, +5] years	[-2, +2] years	[-1, +1] year
SSD	1.2438***	1.2676***	1.3162***	1.3529***
	(0.0327)	(0.0244)	(0.0279)	(0.0335)
Physical Features	Y	Y	Y	Y
Prime Lending Rate	Y	Y	Y	Y
District Fixed Effect	Y	Y	Y	Y
Observations	292,696	93,322	47,356	25,039
R-squared	0.031	0.096	0.159	0.191

Panel D. Impact of the SSD on Pre-Policy Flippers' Likelihood of Housing Investment

	(1)	(2)	(3)	(4)
	Dependent Variable: Purchase Dummy			
Probit Model	All years	[-5, +5] years	[-2, +2] years	[-1, +1] year
SSD	-0.2048***	-0.2058***	-0.2115***	-0.1954***
	(0.0064)	(0.0076)	(0.0066)	(0.0076)
Physical Features	Y	Y	Y	Y
Prime Lending Rate	Y	Y	Y	Y
District Fixed Effect	Y	Y	Y	Y
Observations	1,556,528	596,040	303,538	160,314
Pseudo R-squared	0.0373	0.0688	0.0869	0.0854

Table 5. Urgent Sales Made After the Special Stamp Duty (SSD) Lock-in Period Ends

This table reports the Probit estimation result for the impact of the SSD on urgent sales made within 1 month or 3 months after the lock-in periods of SSD Phase 1 and Phase 2 end. We use transaction samples with holding periods less than 5 years. Panel A reports the sample's distribution by holding periods. Panel B shows resale transactions and Panel C shows the resale transactions of pre-policy flippers only. In Columns (1) and (2), the sample includes homes with dates of purchase T_p that are within the [-2, +2] year window around the initiation of SSD Phase 1 and holding periods of within 5 years. The dependent variables *Sell2Yr1Mth* and *Sell2Yr3Mth* denote resales made within 1 month and 3 months after the 2-year lock-in period ends, respectively. In Columns (3) and (4), we include homes purchased within the [-2, +2] year window of SSD Phase 2 and holding periods of within 5 years. The dependent variables *Sell3Yr1Mth* and *Sell3Yr3Mth* denote resales made within 1 month and 3 months after the lock-in period ends, respectively. Standard errors are clustered at district level. Robust standard errors are presented in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Panel A. Holding Period Statistics for Resales Held for Less Than 5 Years

	All Resales						Resales by Pre-Policy Flipper Only					
	2 Years Before SSD		During SSD Phase 1		2 Years After SSD Phase 2		2 Years Before SSD		During SSD Phase 1		2 Years After SSD Phase 2	
Holding Period	N	%	N	%	N	%	N	%	N	%	N	%
0–1 Year	22,672	34.03%	487	1.84%	190	2.23%	22,672	52.99%	57	2.04%	20	2.41%
1–2 Years	17,576	26.38%	2,211	8.37%	362	4.26%	17,576	41.08%	301	10.80%	39	4.70%
2 Years–2Yr1Mth	1,263	1.89%	1,616	6.11%	312	3.67%	173	0.40%	191	6.85%	37	4.46%
2Yr1Mth–2Yr2Mth	1,244	1.87%	1,163	4.40%	88	1.04%	122	0.29%	119	4.27%	14	1.69%
2Yr2Mth–2Yr3Mth	1,252	1.88%	1,185	4.48%	52	0.61%	129	0.30%	135	4.84%	4	0.48%
2Yr3Mth–2Yr6Mth	5,369	8.06%	4,170	15.78%	72	0.85%	512	1.20%	464	16.64%	3	0.36%
2.5–3 Years	3,288	4.94%	2,867	10.85%	141	1.66%	357	0.83%	325	11.66%	4	0.48%
3 Years–3Yr1Mth	770	1.16%	624	2.36%	917	10.79%	77	0.18%	66	2.37%	108	13.01%
3Yr1Mth–3Yr2Mth	743	1.12%	661	2.50%	690	8.12%	71	0.17%	53	1.90%	72	8.67%
3Yr2Mth–3Yr3Mth	738	1.11%	653	2.47%	666	7.83%	63	0.15%	70	2.51%	76	9.16%
3Yr3Mth–3Yr6Mth	1,983	2.98%	1,949	7.37%	1,540	18.11%	179	0.42%	219	7.86%	149	17.95%
3.5–4 Years	3,343	5.02%	3,287	12.44%	1,869	21.98%	290	0.68%	329	11.80%	173	20.84%
4–5 Years	6,381	9.58%	5,558	21.03%	1,603	18.85%	563	1.32%	459	16.46%	131	15.78%
Total	66,622	100%	26,431	100%	8,502	100%	42,784	100%	2,788	100%	830	100%

Panel B. Urgent Sales Bunching Immediately After the Lock-In Period Ends (All Resales)

	(1) *Sell2Yr1Mth*	(2) *Sell2Yr3Mth*	(3) *Sell3Yr1Mth*	(4) *Sell3Yr3Mth*
Y = 1 if sold within X months after the lock-in period ends	1 Month	3 Months	1 Month	3 Months
Policy	SSD Phase 1 (2-year lock-in)		SSD Phase 2 (3-year lock-in)	
SSD Phase 1	0.0353***	0.0784***		
	(0.0018)	(0.0051)		
SSD Phase 2			0.0489***	0.1268***
			(0.0016)	(0.0033)
Sample	T_p in [-2,+2] years around SSD Phase 1, and $T_p \leq T_s \leq T_p + 5\ years$		T_p in [-2,+2] years around SSD Phase 2, and $T_p \leq T_s \leq T_p + 5\ years$	
Physical Features	Y	Y	Y	Y
Prime Lending Rate	Y	Y	Y	Y
District Fixed Effect	Y	Y	Y	Y
Observations	93,412	93,668	74,945	75,108
Pseudo R-squared	0.0453	0.0415	0.131	0.145

Panel C. Urgent Sales Bunching Immediately After the Lock-In Period Ends (Resales by Pre-Policy Flippers)

	(1) *Sell2Yr1Mth*	(2) *Sell2Yr3Mth*	(3) *Sell3Yr1Mth*	(4) *Sell3Yr3Mth*
Y = 1 if sold within X months after the lock-in period ends	1 Month	3 Months	1 Month	3 Months
Policy	SSD Phase 1 (2-year lock-in)		SSD Phase 2 (3-year lock-in)	
SSD Phase 1	0.0230***	0.0523***		
	(0.0009)	(0.0013)		
SSD Phase 2			0.0192***	0.0442***
			(0.0005)	(0.0007)
Sample	T_p in [-2,+2] years around SSD Phase 1, $T_p \leq T_s \leq T_p + 5\ years$		T_p in [-2,+2] years around SSD Phase 2, and $T_p \leq T_s \leq T_p + 5\ years$	
Physical Features	Y	Y	Y	Y
Prime Lending Rate	Y	Y	Y	Y
District Fixed Effect	Y	Y	Y	Y
Observations	43,434	45,077	38,217	42,759
Pseudo R-squared	0.183	0.186	0.280	0.308

Table 6. Impact of the Special Stamp Duty (SSD) on Housing Price

This table reports the regression result of the impacts of the SSD on sales prices and transaction volumes in the primary and secondary markets. Panel A examines the short-term effect of the SSD on sales prices and transaction volumes within the [-1, +1] year window around the SSD Phase 1 effective date of November 20, 2010. The sample includes all transactions made from Nov 20, 2009 to Nov 19, 2011. Panel B examines the long-term effect of the SSD on sales prices and transaction volumes within the [-5, +5] year window. The sample includes all transactions made from Nov 20, 2005 to Nov 19, 2015. *SSD* is a dummy variable that indicates whether the transaction is subject to SSD Phase 1. Transaction volume is defined as the number of transactions aggregated at the district level each month. Standard errors are clustered at the district level. Robust standard errors are presented in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Panel A. Short-term Impact Using the 1-Year Window

	(1)	(2)	(3)	(4)
	Using [-1, +1] year window around SSD Phase 1: 2009.10.20–2011.11.20			
	Primary Market Y: log (price)	Secondary Market Y: log (price)	Primary Market Y: Volume	Secondary Market Y: Volume
SSD	0.1264***	0.1576***	-2.9761	-69.3467***
	(0.0430)	(0.0046)	(2.9444)	(10.1662)
Physical Features	Yes	Yes	N/A	N/A
Prime Lending Rate	Yes	Yes	Yes	Yes
District Fixed Effect	Yes	Yes	Yes	Yes
Observations	17,713	142,601	1,416	1,416
R-squared	0.932	0.870	0.147	0.838

Panel B. Long-term Impact Using the 5-Year Window

	(1)	(2)	(3)	(4)
	Using [-5, +5] year window: 2005.11.20–2015.11.20			
	Primary Market Y: log (price)	Secondary Market Y: log (price)	Primary Market Y: Volume	Secondary Market Y: Volume
SSD	0.2660***	0.3796***	3.1609	-73.2609***
	(0.0630)	(0.0157)	(2.4688)	(9.8110)
Physical Features	Yes	Yes	N/A	N/A
Prime Lending Rate	Yes	Yes	Yes	Yes
District Fixed Effect	Yes	Yes	Yes	Yes
Observations	73,352	522,688	6,844	6,844
R-squared	0.885	0.855	0.094	0.710

Table 7. Impact of the Special Stamp Duty (SSD) on Housing Price: Difference-in-Differences Analysis

This table reports the time-wise difference-in-differences analysis result of the impacts of the SSD on sales prices and transaction volumes in the primary and secondary markets. The sample period is from May 20, 2009 to May 19, 2011. $Treat$ is a dummy variable that equals 1 if the transaction date is between May 20, 2010 and May 19, 2011, i.e., within a [-6, +6] month window around SSD Phase 1 (treatment group). It equals 0 if the transaction date is between May 20, 2009 and May 19, 2010, i.e., within a [-6, +6] month window around the placebo policy date (November 20, 2009) exactly 1 year before SSD Phase 1 (control group). In the treatment group, $Post$ is a dummy variable that equals 1 if the transaction date is after the actual policy date (November 20, 2010). In the control group, $Post$ is a dummy variable that equals 1 if the transaction date is after the placebo policy date (November 20, 2009). Standard errors are clustered at the district level. Robust standard errors are presented in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

	(1)	(2)	(3)	(4)
	Sample Period: 2009.05.20–2011.05.20			
	Primary Market Y: log (price)	Secondary Market Y: log (price)	Primary Market Y: Volume	Secondary Market Y: Volume
Treat * Post	0.0414	0.0092***	-15.6169	-88.9213***
	(0.0287)	(0.0032)	(10.7281)	(13.2817)
Physical Features	Yes	Yes	N/A	N/A
Prime Lending Rate	Yes	Yes	Yes	Yes
District Fixed Effect	Yes	Yes	Yes	Yes
Year * Quarter Fixed Effect	Yes	Yes	Yes	Yes
Observations	20,550	165,942	1,369	1,369
R-squared	0.948	0.883	0.137	0.923

Table 8. Flippers' Urgent Sale Discounts Offered After the Special Stamp Duty (SSD) Lock-In Dates End

This table reports the estimated urgent sale discounts offered by flippers after the SSD exemption dates pass. Our sample includes all housing transactions with holding periods of 2–3 years. The initial purchase time of the property is denoted as *t*. If the property is sold in the nth month after purchase, then it is denoted as being sold at *t*+*n*. Column (1) includes sales of units initially purchased before November 20, 2010. Column (2) includes sale of units initially purchased between November 20, 2010 and Oct 26, 2012. Column (3) includes resale units initially purchased after October 27, 2012. Note that only for transactions in Column (2) will there be an SSD rate difference instantly after the lock-in period of 2 years ends. Standard errors are clustered at the district level. Robust standard errors are presented in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Panel A. Urgent Sales Made After the 2-Year Lock-In Period Under SSD Phase 1 Ends

	(1)	(2)	(3)
	Subsample of Resales Made Between [t+24, t+36) Months		
	Before 2010.11.20	2010.11.20–2012.10.26	After 2012.10.27
Y: log (sale price)	No Tax Cut at t+24	With Tax Cut at t+24	No Tax Cut at t+24
Base: Sell at [t+25, t+36)			
Urgent Sale at [t+24, t+25)	-0.0040	-0.0105***	-0.0170
	(0.0029)	(0.0039)	(0.0140)
Physical Features	Y	Y	Y
Prime Lending Rate	Y	Y	Y
Year * Quarter Fixed Effect	Y	Y	Y
District Fixed Effect	Y	Y	Y
Observations	98,590	10,982	850
R-squared	0.888	0.874	0.868

Panel B. Urgent Sales Made After the 3-Year Lock-In Period Under SSD Phase 2 Ends

	(1)	(2)
	Subsample of Resales Made Between [t+36, t+48) Months	
	Before 2012.10.27	After 2012.10.27
Y: log (sale price)	No Tax Cut at t+36	With Tax Cut at t+36
Base: Sell at [t+37, t+48)		
Urgent Sale at [t+36, t+37)	0.0048	0.0019
	(0.0030)	(0.0056)
Physical Features	Y	Y
Prime Lending Rate	Y	Y
Year * Quarter Fixed Effect	Y	Y
District Fixed Effect	Y	Y
Observations	92,231	5,745
R-squared	0.877	0.854

Table 9. Strategic Underpricing Near Stamp Duty Cutoff Prices

This table presents the regression results for the log sale price on a list of stamp duty cutoff dummies. Sample includes all housing sales from 2007 to 2016. Panel A presents the regression results for the log sale price on a list of stamp duty cutoff dummies. Panel B focuses on home prices in the [-0.2, +0.2]-million HKD range around the price cutoff of 6 million HKD and reports the interaction effect of stamp duty cutoffs and SSD policies to examine whether the underpricing is reinforced for flippers after SSD implementation. Flippers are defined as homebuyers who sell properties within 2 years of their purchase dates. *SSD Phase 1* is a dummy variable that indicates whether the transaction is subject to the SSD Phase 1 policy introduced on November 20, 2010. *SSD Phase 2* is a dummy variable that indicates whether the transaction is subject to the SSD Phase 2 policy introduced on October 27, 2012. Standard errors are clustered at the district level. Robust standard errors are presented in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Panel A. Strategic Underpricing Near Stamp Duty Cutoff Price

	(1)	(2)	(3)	(4)
	Subsample of Transactions from 2007 to 2016			
	With Tax Cutoff	No Tax Cutoff	With Tax Cutoff	No Tax Cutoff
Y: log (price)	3.8–4.2 million HKD	4.8–5.2 million HKD	5.8–6.2 million HKD	6.8–7.2 million HKD
Below 4 million	-0.0568***			
	(0.0050)			
Below 5 million		-0.0045		
		(0.0064)		
Below 6 million			-0.0180***	
			(0.0039)	
Below 7 million				-0.0043
				(0.0055)
Observations	35,265	22,339	14,904	9,407
R-squared	0.0239	0.0001	0.0018	0.0001

Panel B. Interaction Effect with Stamp Duty Thresholds

	(1)	(2)	(3)	(4)
	2007–2016 Sample with Home Prices in the Range of 5.8–6.2 million HKD			
Y: Residual of log (price)	Flipper	Flipper	Non-Flipper	Non-Flipper
Below 6 million * SSD Phase 1	-0.0707**		0.0001	
	(0.0341)		(0.0065)	
Below 6 million * SSD Phase 2		-0.1522**		0.0005
		(0.0677)		(0.0081)
Observations	1,180	1,180	13,724	13,724
R-squared	0.010	0.008	0.009	0.003

Internet Appendix A: Supplementary Tables

Table IA1. Univariate Test: Impact of the Special Stamp Duty (SSD) on Flippers' Presence in the Housing Market

This table reports the univariate test results of the differences in the percentage of flippers before and after SSD Phase 1 initiation on November 20, 2020. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Panel A. All Samples

	Before SSD Phase 1			After SSD Phase 1			t-test	
	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.	Difference in Mean	Std. Err.
Flipper Buyers (Sell within 2 years)	1,289,812	0.187	0.390	266,716	0.014	0.118	0.1733***	0.0004
Flipper Buyers (Sell within 1 years)	1,289,812	0.105	0.306	266,716	0.004	0.060	0.1013***	0.0003

Panel B. Secondary Transactions

	Before SSD Phase 1			After SSD Phase 1			t-test	
	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.	Obs.	Mean
Flipper Buyers (Sell within 2 years)	918,604	0.194	0.396	244,996	0.014	0.119	0.1801***	0.0005
Flipper Buyers (Sell within 1 years)	918,604	0.115	0.319	244,996	0.004	0.060	0.1117***	0.0004

Panel C. Primary Transactions

	Before SSD Phase 1			After SSD Phase 1			t-test	
	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.	Obs.	Mean
Flipper Buyers (Sell within 2 years)	371,208	0.170	0.376	21,720	0.011	0.105	0.1587***	0.0009
Flipper Buyers (Sell within 1 years)	371,208	0.079	0.270	21,720	0.003	0.056	0.0758***	0.0006

Table IA2. Impact of the Special Stamp Duty (SSD) on Flipper Number: Building-Level Evidence

This table reports the estimated impact of the SSD on the presence of flippers in housing estates. The dependent variable is the total number of flippers aggregated at each month at each individual building level. Flippers are defined as homebuyers who sell their properties within 2 years of the purchase dates. *SSD* is a dummy variable that denotes whether the date of purchase is after November 2010. Standard errors are clustered at the district level. Robust standard errors are presented in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

	(1)	(2)	(3)
Y: Number of Flippers	All years	[-2, +2] years	[-1, +1] year
SSD	-0.2979***	-0.4882***	-0.4711***
	(0.0257)	(0.0323)	(0.0386)
Physical Features	Y	Y	Y
Prime Lending Rate	Y	Y	Y
District Fixed Effect	Y	Y	Y
Observations	620,817	133,033	69,162
R-squared	0.031	0.039	0.068

Table IA3. Impact of the Special Stamp Duty (SSD) on Curbing Flippers: Robustness Checks

This table reports the robustness check results for the impact of the SSD on curbing pre-policy flippers. Pre-policy flippers are defined as the multiple-property holders who have sold their properties within 2 years of the purchase dates before SSD Phase 1 implementation. Panel A presents the summary statistics of the pre-policy flippers' holding periods. In Panels B–D, *SSD* is a dummy variable that indicates whether the transaction is affected by SSD Phase 1. In Panel B, we include the subsamples of only pre-policy flippers. The dependent variable is the logarithmic form of the number of holding days. In Panel C, we include the full sample of transactions. The dependent variable is a dummy variable that denotes the pre-policy flippers. The margins of the Probit estimation at mean are reported. In Panel D, we include the full sample of transactions; the dependent variables are the annual return, log purchase price, and log sale price in Columns (1)–(3), respectively. Standard errors are clustered at the district level. Robust standard errors are presented in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Panel A. Impact of the SSD on Pre-Policy Flippers' Holding Periods

	(1)	(2)	(3)	(4)
		Subsample of Pre-Policy Flippers		
Y: log (holding days)	All years	[-5, +5] years	[-2, +2] years	[-1, +1] year
SSD	1.1100***	1.1316***	1.1893***	1.2205***
	(0.0346)	(0.0319)	(0.0319)	(0.0298)
Physical Features	Y	Y	Y	Y
Prime Lending Rate	Y	Y	Y	Y
District Fixed Effect	Y	Y	Y	Y
Observations	56,560	26,861	14,230	8,521
R-squared	0.069	0.143	0.218	0.233

Panel B. Impact of the SSD on Pre-policy Flippers' Property Purchases

	(1)	(2)	(3)	(4)
		Probit Model		
Y: PreFlip Dummy	All years	[-5, +5] years	[-2, +2] years	[-1, +1] year
SSD	-0.0123***	-0.0231***	-0.0278***	-0.0309***
	(0.0018)	(0.0033)	(0.0032)	(0.0031)
Physical Features	Y	Y	Y	Y
Prime Lending Rate	Y	Y	Y	Y
District Fixed Effect	Y	Y	Y	Y
Observations	1,556,513	596,040	303,538	160,278
Pseudo R-squared	0.0552	0.0294	0.0336	0.0341

Panel C. Impact of the SSD on Pre-Policy Flippers' Housing Prices and Holding Returns

	(1) Y: Annual Return	(2) Y: log (purchase price)	(3) Y: log (sale price)
PreFlip * SSD	-0.0482***	0.0260***	0.0198**
	(0.0020)	(0.0051)	(0.0082)
PreFlip	0.0576***	-0.0309***	0.0043
	(0.0022)	(0.0036)	(0.0063)
Physical Features	Y	Y	Y
Prime Lending Rate	Y	Y	Y
Year * Quarter Fixed Effect	Y	Y	Y
District Fixed Effect	Y	Y	Y
Observations	812,958	1,556,528	1,556,528
R-squared	0.228	0.855	0.855

Table IA4. Urgent Sales Bunching Immediately After the Special Stamp Duty (SSD) Lock-In Period Ends: Robustness Checks

This table reports the robustness check results for the impact of the SSD on urgent sales bunching immediately after the lock-in period ends. Panels A and B use home purchases within the [-2, +2] year window around SSD implementation, whereas Panels C and D use home purchases within the [-1, +1] year window around SSD implementation. Panels A and C use the full sample of resale transactions and Panels B and D only include the resale transactions of pre-policy flippers. In Columns (1) and (2) of each panel, the sample is further restricted to the units resold in 24–36 months, i.e., 1 year after the lock-in period ends. The dependent variables *Sell2Yr1Mth* and *Sell2Yr3Mth* denote resales made within 1 months and 3 months after the lock-in period ends, respectively. In Columns (3) and (4) of each panel, the sample is further restricted to the units resold in 36–48 months, i.e., 1 year after the lock-in period ends. The dependent variables *Sell3Yr1Mth* and *Sell3Yr3Mth* denote resales made within 1 months and 3 months after the lock-in period ends, respectively. Standard errors are clustered at the district level. Robust standard errors are presented in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Panel A. Urgent Sales Bunching Immediately After the Lock-In Period Ends (All Resales)

	(1)	(2)	(3)	(4)
	Sell2Yr1Mth	*Sell2Yr3Mth*	*Sell3Yr1Mth*	*Sell3Yr3Mth*
SSD Phase 1	0.0418***	0.0478***		
	(0.0042)	(0.0109)		
SSD Phase 2			0.0550***	0.1030***
			(0.0068)	(0.0103)
Sample	T_p: [-2,+2] years around SSD Phase 1 and $T_p + 2\ years \leq T_s \leq T_p + 3\ years$		T_p: [-2,+2] years around SSD Phase 2 and $T_p + 3\ years \leq T_s \leq T_p + 4\ years$	
Physical Features	Y	Y	Y	Y
Prime Lending Rate	Y	Y	Y	Y
District Fixed Effect	Y	Y	Y	Y
Observations	23,543	23,594	13,143	13,182
Pseudo R-squared	0.0132	0.0090	0.0232	0.0222

Panel B. Urgent Sales Bunching Immediately After the Lock-In Period Ends (Resales by Pre-Policy Flippers)

	(1)	(2)	(3)	(4)
	Subsample of Resales by Pre-policy Flippers Only			
	Sell2Yr1Mth	*Sell2Yr3Mth*	*Sell3Yr1Mth*	*Sell3Yr3Mth*
SSD Phase 1	0.0476***	0.0478**		
	(0.0164)	(0.0197)		
SSD Phase 2			0.0823***	0.1584***
			(0.0175)	(0.0270)
Sample	T_p: [-2,+2] years around SSD Phase 1 and $T_p + 2\ years \leq T_s \leq T_p + 3\ years$		T_p: [-2,+2] years around SSD Phase 2 and $T_p + 3\ years \leq T_s \leq T_p + 4\ years$	
Physical Features	Y	Y	Y	Y
Prime Lending Rate	Y	Y	Y	Y
District Fixed Effect	Y	Y	Y	Y
Observations	2,421	2,486	1,131	1,231
Pseudo R-squared	0.0291	0.0218	0.0413	0.0577

Panel C. Urgent Sales Bunching for All Homebuyers (Probit Analysis)

	(1)	(2)	(3)	(4)
	Sell2Yr1Mth	*Sell2Yr3Mth*	*Sell3Yr1Mth*	*Sell3Yr3Mth*
SSD Phase 1	0.0373***	0.0059		
	(0.0046)	(0.0118)		
SSD Phase 2			0.0337***	0.0619***
			(0.0085)	(0.0123)
Sample	T_p: [-1,+1] year around SSD Phase 1 and $T_p + 2\ years \leq T_s \leq T_p + 3\ years$		T_p: [-1,+1] year around SSD Phase 2 and $T_p + 3\ years \leq T_s \leq T_p + 4\ years$	
Physical Features	Y	Y	Y	Y
Prime Lending Rate	Y	Y	Y	Y
District Fixed Effect	Y	Y	Y	Y
Observations	12,128	12,151	6,856	6,933
Pseudo R-squared	0.0164	0.0078	0.0294	0.0173

Panel D. Urgent Sales Bunching for Pre-Policy Flippers (Probit Analysis)

	(1)	(2)	(3)	(4)
	Subsample of Pre-Policy Flippers			
	Sell2Yr1Mth	*Sell2Yr3Mth*	*Sell3Yr1Mth*	*Sell3Yr3Mth*
SSD Phase 1	0.0573***	0.0230		
	(0.0204)	(0.0311)		
SSD Phase 2			0.0810***	0.1731***
			(0.0226)	(0.0319)
Sample	T_p: [-1,+1] year around SSD Phase 1 and $T_p + 2\ years \leq T_s \leq T_p + 3\ years$		T_p: [-1,+1] year around SSD Phase 2 and $T_p + 3\ years \leq T_s \leq T_p + 4\ years$	
Physical Features	Y	Y	Y	Y
Prime Lending Rate	Y	Y	Y	Y
District Fixed Effect	Y	Y	Y	Y
Observations	1,339	1,373	572	645
Pseudo R-squared	0.0620	0.0465	0.0583	0.0869

Table IA5. Strategic Underpricing Near Stamp Duty Cutoff Price: Falsification Test

This table reports the falsification test results for the impact of the Special Stamp Duty (SSD) on reinforcing strategic underpricing by flippers to near stamp duty cutoff prices. Specifically, we use 5 million HKD as the placebo cutoff price and test whether SSD polices result in stronger strategic underpricing for the transactions within the [-0.2, +0.2] million HKD window around 5 million HKD. As 5 million HKD is not a kink point in the tax schedule of stamp duty in Hong Kong, we do not expect to observe any strategic underpricing behavior in the transactions made around this price. Standard errors are clustered at the district level. Robust standard errors are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

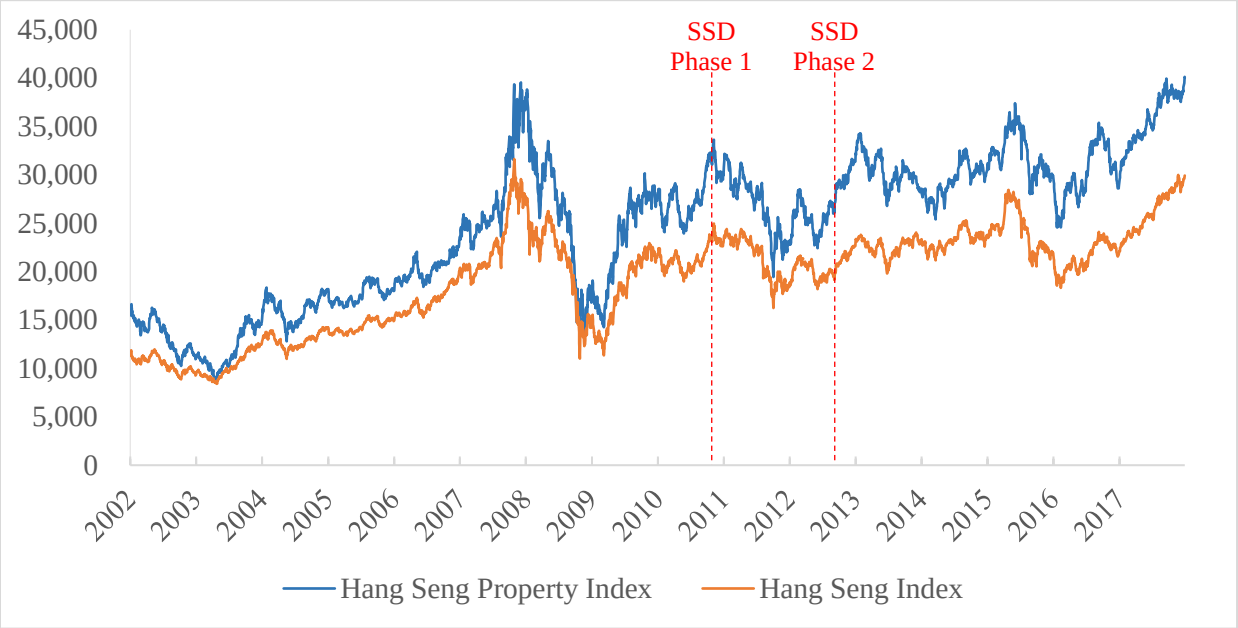
	(1)	(2)	(3)	(4)
	2007–2016 Sample with Home Prices in Range: 4.8–5.2 million HKD			
Y: Residual of log (price)	Flipper	Flipper	Non−Flipper	Non−Flipper
Below 5 million * SSD Phase 1	0.0164		0.0166	
	(0.0318)		(0.0142)	
Below 5 million * SSD Phase 2		-0.0793		0.0124
		(0.0621)		(0.0153)
Observations	2,025	2,025	20,314	20,314
R-squared	0.006	0.006	0.026	0.026

Internet Appendix B: Supplementary Figures

Figure IB1. Stock Market Reaction of Major Property Developers to the Special Stamp Duty (SSD)

Panel A plots the daily closing prices of the Hang Seng Property Index (HSPI) in blue, from its first available year (2002) to the end of our study period (2017). The HSPI covers the composite firms of the Hang Seng Index (HSI) in the real estate industry and represents the performance of the real estate sector in the Hong Kong stock market. The daily closing prices of the HSI are also plotted in yellow for the same period as for the market benchmark. Panel B plots the difference between the two indices for ease of comparison.

Panel A: Daily Closing Prices of the HSPI and HIS



Panel B: Difference Between the Daily Closing Prices of the HSPI and HIS

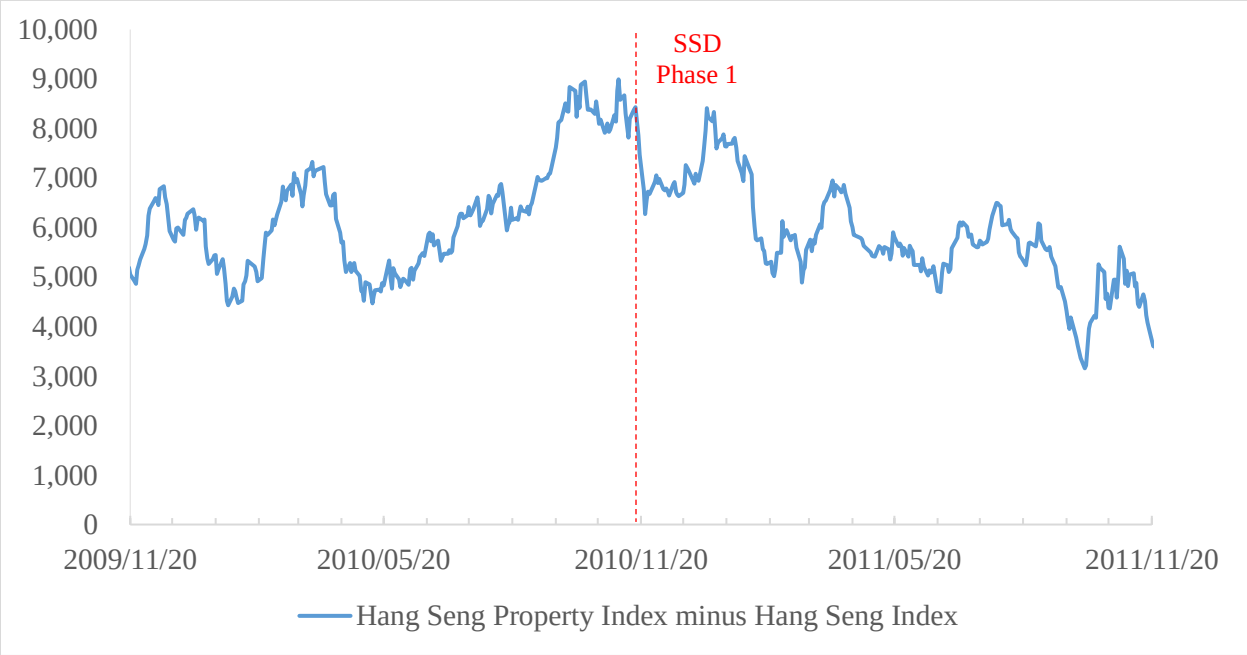
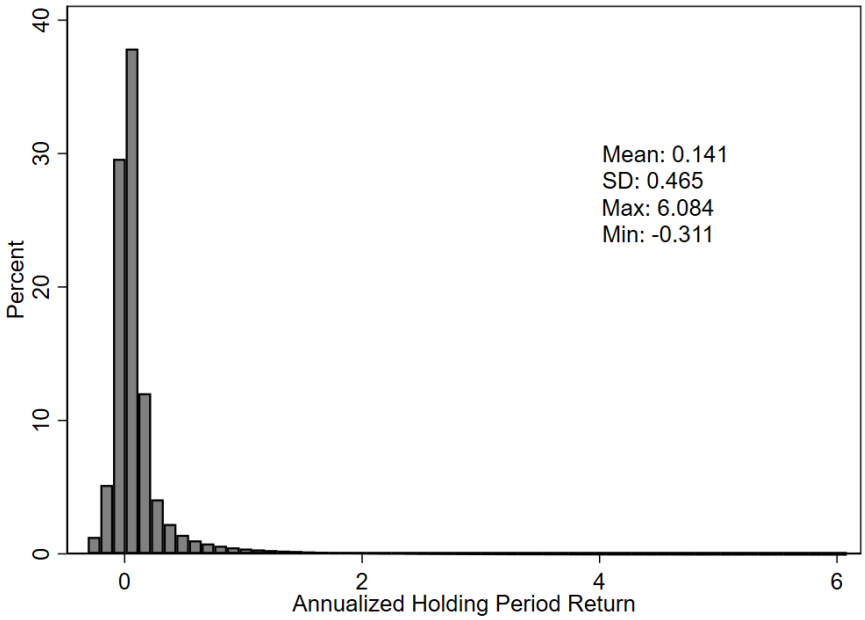


Figure IB2. Histogram of the Annualized Holding Period Return
This figure plots the histogram of the annualize holding period return for our sample after the return is trimmed at the top and bottom 1% levels (Panel A) and at the top 5% and bottom 1% levels (Panel B).

Panel A. Trimmed at the Top and Bottom 1% Levels



Panel B. Trimmed at the Top 5% and Bottom 1% Levels

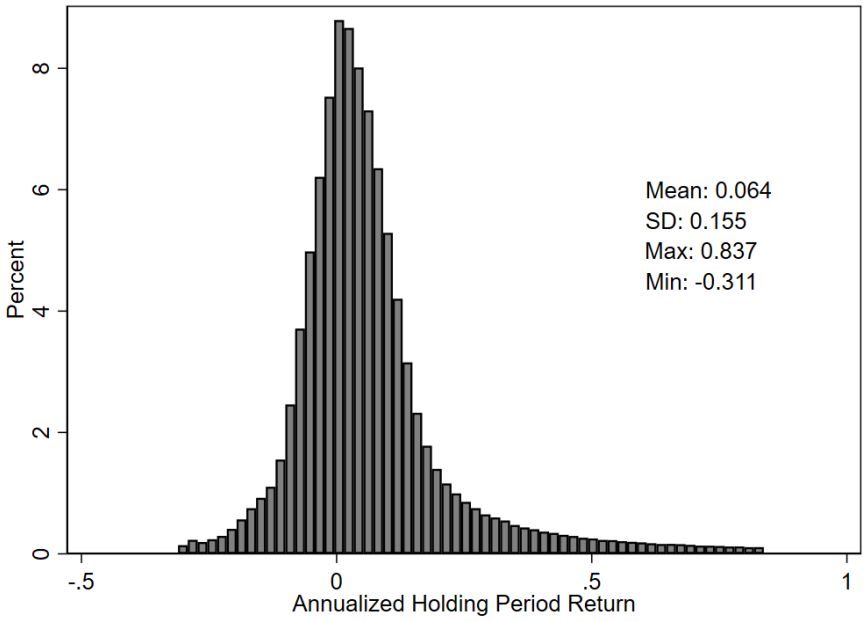


Figure IB3. The Proportion of Property Buyers Who Resell Within 2.5 or 3.5 Years of Purchase Dates

This figure plots the proportion of property buyers who resell within 2.5 years (denoted by the dashed line) and 3.5 years (denoted by the solid line) of the purchase dates relative to all homebuyers in each year from 1992 to 2017. The two vertical red lines denote the implementation of the Special Stamp Duty (SSD) policies in 2010 and 2012.

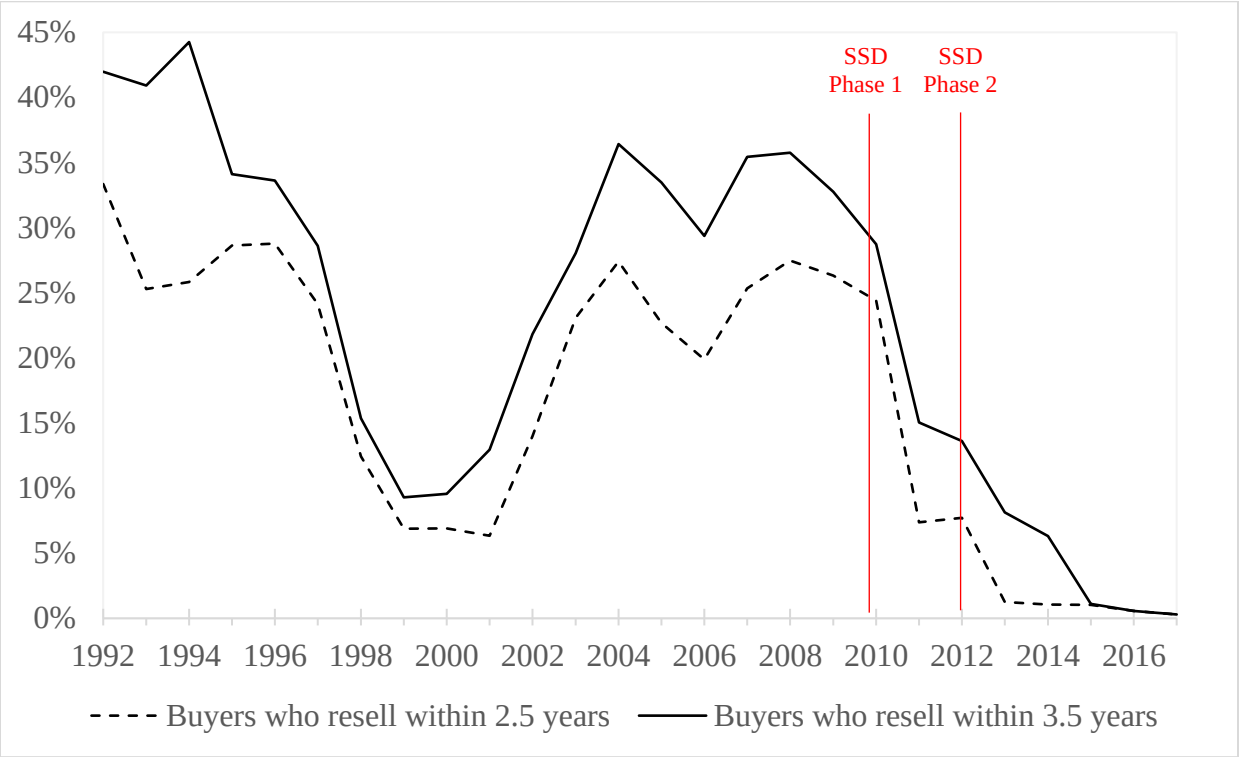
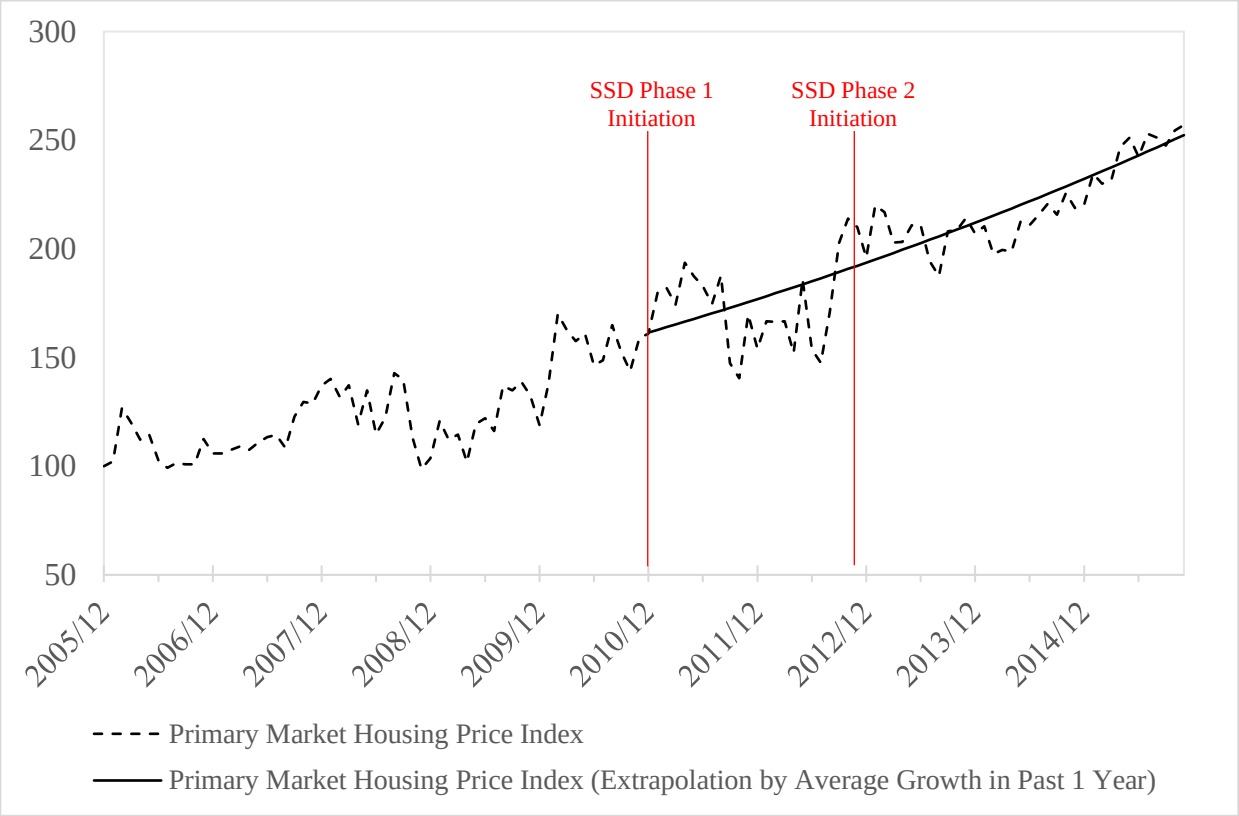


Figure IB4. Predicted Counterfactual Housing Price Index Without Special Stamp Duty (SSD) Policy Implementation Using Average Monthly Growth Rate in the Year Before SSD Implementation

This figure plots the predicted counterfactual housing price index in Hong Kong in the absence of an SSD policy. Panels A and B present the indices in the primary and secondary markets in the [-1,+ 1] year window around SSD Phase 1 initiation, respectively. The dashed line is the actual housing price index, estimated using the hedonic housing price model. The predicted counterfactual housing price index (solid line) is extrapolated using the average monthly growth in the year preceding SSD Phase 1 implementation.

Panel A. Primary Market



Panel B. Secondary Market

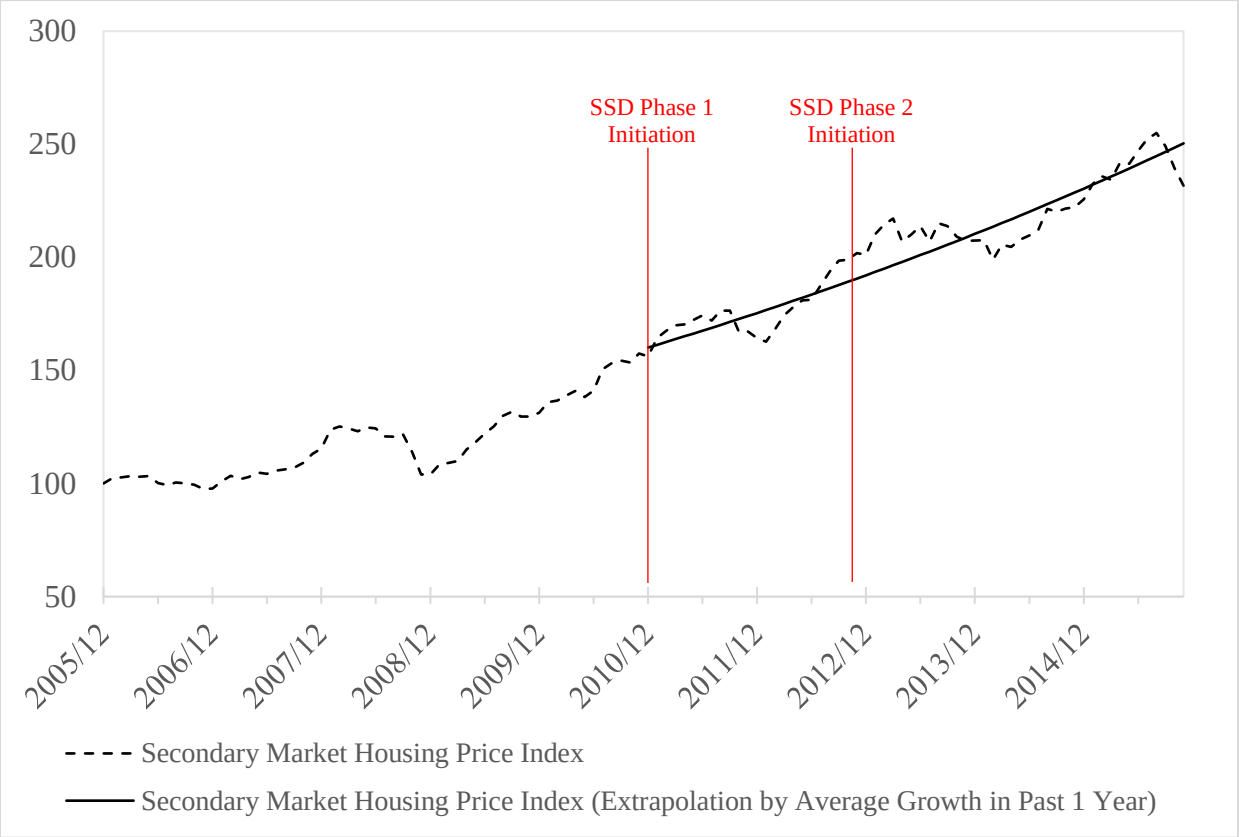
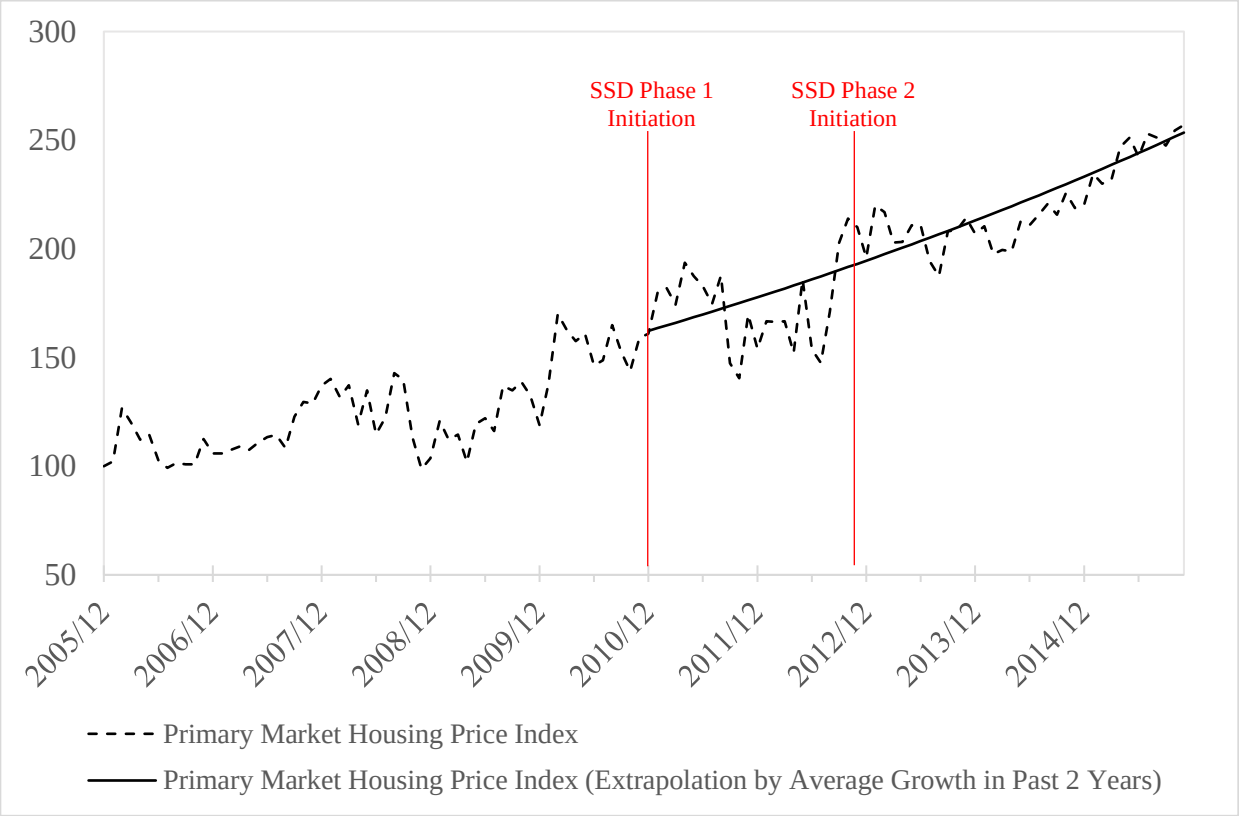


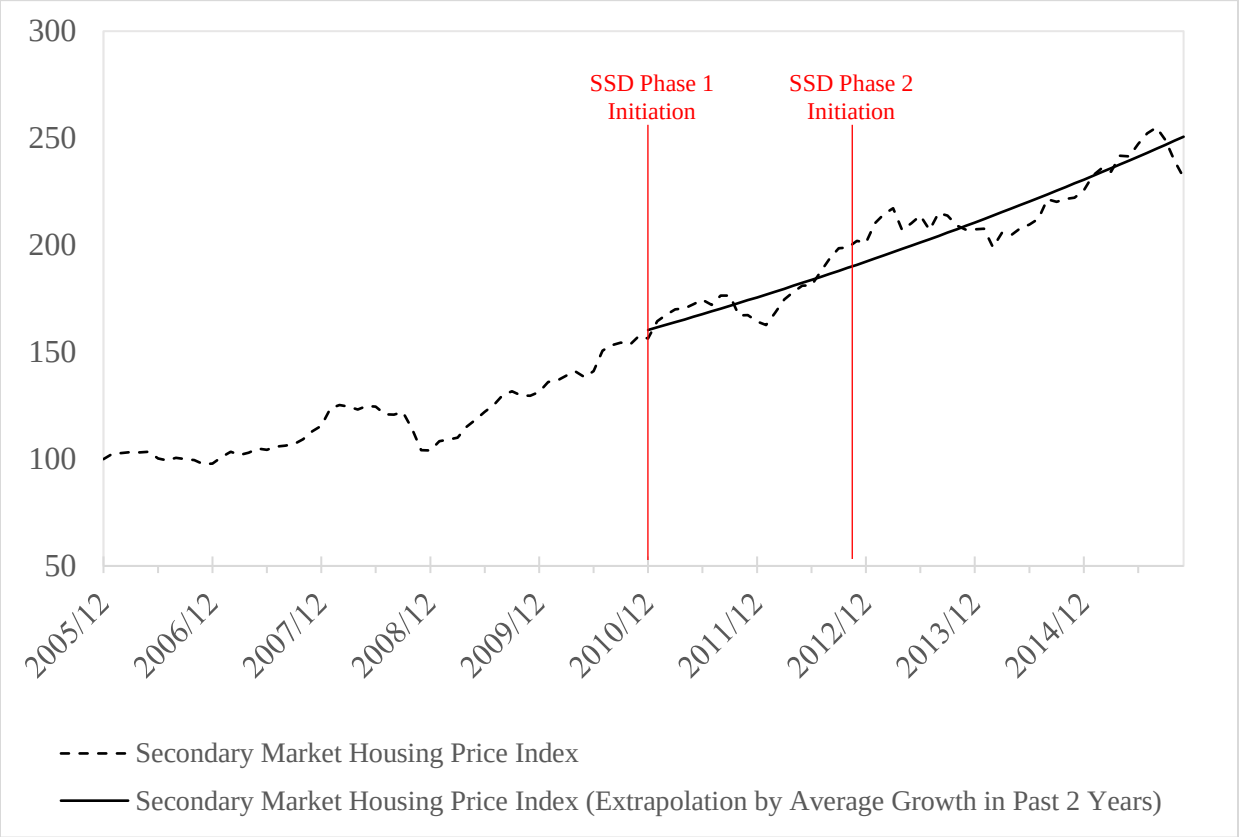
Figure IB5. Predicted Counterfactual Housing Price Index Without Special Stamp Duty (SSD) Policy Implementation Using Average Monthly Growth Rate in the 2 Years Before SSD Implementation

This figure plots the predicted counterfactual housing price index in Hong Kong in the absence of an SSD policy. Panels A and B present the indices in the primary and secondary markets in the [-2, +2] year window around SSD Phase 1 initiation, respectively. The dashed line is the actual housing price index, estimated using the hedonic housing price model. The predicted counterfactual housing price index (solid line) is extrapolated using the average monthly growth in the 2 years preceding SSD Phase 1 implementation.

Panel A. Primary Market



Panel B. Secondary Market



Internet Appendix C. Spillover Effect of Flippers on Subsequent Non-Flippers' Transaction Prices

In this section, we explore the spillover effect of lagged flipping transactions on the prices of other normal transactions in the housing market. Specifically, we follow the empirical strategy used by Campbell et al. (2011) and assess the effect at the nearby neighborhood (building) level:

$$log(Price_{it}) = \beta_1 Flip^s_{i,t-1} + X'_{it}\lambda + M'_t\gamma + \varphi_i + \varepsilon_{it}. \qquad \text{--- (C1)}$$

Our sample consists only of non-flipping sales. $\log(Price_{it})$ is defined as the natural logarithm of the transaction price of unit i at transaction time t. $Flip^s_{i,t-1}$ denotes the proportion of lagged flipping sales in the same building over the preceding 12 months. β_1 represents the impact of lagged flipping sales on the housing prices of non-flipping sales in the same building. X_{it} is a set of control variables for the physical features of unit i at time t. M_t is a set of control variables for the housing market condition, which includes the primary lending rate for home mortgages and monthly property price index.[32] φ_i denotes the district fixed effects. ε_{it} denotes the error term. Robust standard errors are clustered at the district level.

Unobserved factors that correlate with both the lagged flipping sellers and subsequent housing price may bias the ordinary least squares (OLS) estimates, which is a common challenge faced by previous studies (Deng et al., 2019). The institutional setting in our data provides an ideal policy shock to address the issue of endogeneity. Specifically, we use introduction of the SSD in 2010 as an IV for the proportion of flippers in the housing market. The first-stage equation of the IV estimation is as follows:

$$Flip^s_{i,t-1} = \beta_2 SSD_{i,t-1} + X'_{it}\lambda + M'_t\gamma + \varphi_i + \varepsilon_{it}. \qquad \text{--- (C2)}$$

SSD_{t-1} is a dummy variable that indicates whether the SSD was enacted at time $t-1$. The rationale for using the introduction of the SSD in 2010 as an IV is that the presence of flippers and enactment of the SSD are highly correlated, as the SSD discourages flippers. The assumption of correlation is evident from the significant decrease in flippers since the enactment of the SSD (Figure 3). The assumption of exclusion also holds because the lagged policy shock at time $t-1$ only impacts subsequent non-flipping transactions at time t by curbing flippers. The policy

[32] We include the monthly housing market control instead of a time fixed effect to avoid the issue of multicollinearity in the later IV estimation by using introduction of the SSD as the instrument.

shock is also applicable for the entire city, as it does not correlate with unobserved factors at the district or building level.

Flippers can sell homes at higher prices and achieve higher annual returns than non-flippers. We would like to further understand how the presence of flippers impacts subsequent non-flipper transactions at the nearby neighborhood (building) level. Internet Appendix Table IC1 reports the corresponding estimation results and Panel A reports the first-stage results of the IV estimations (Equation (C2)). As expected, both the lagged proportion and lagged number of flippers are highly correlated with our IV, which is the dummy variable that indicates whether the SSD was in effect in the previous year. The first-stage F-statistics are all over 100, mitigating concerns regarding a weak instrument.

Table IC1, Panel B reports the OLS estimation and second-stage IV estimation results obtained using Equation (C1). Columns (1) and (2) report the results using the lagged percentage of flipping sales in the building as the IV. Columns (3) and (4) report the results using the absolute number of lagged flipping sales as the IV. Columns (1) and (3) report the OLS estimation results, and Columns (2) and (4) report the IV estimation results.

With a 1% increase in the proportion of flipping sales, the subsequent non-flippers' sale price is estimated to increase by 0.18% (Column (1)) to 1.02% (Column (2)). Similarly, we find that having one additional flipper in the building increases the price of the following non-flipping sales by 0.45% (Column (3)) to 1.76% (Column (4)). All of these estimates are statistically significant at the 1% level. These results remain robust if we use the subsamples within a [-2, +2] year window around SSD implementation, as reported in Internet Appendix Table ID2. Thus, our empirical evidence implies that if more flippers flow into a building and realize a high housing return within a short holding period, then the subsequent transaction price for normal sellers will also be pushed up. This result is comparable to empirical findings made by Li et al. (2019) for the U.S. but provides finer details at the building level, which is better suited to an urban context with high population density.

Our estimation results suggest that the OLS estimates might be biased downward because of unobserved features that correlate to both the lagged flipping sellers and subsequent housing price. For instance, a flipper's selection of a property and the timing of resale are endogenous. Flippers are normally experienced sellers and may sooner notice that units in specific buildings

or regions are overpriced or have little growth potential in the following year. As a result, more flippers sell their holding units in the previous period while the growth of housing prices in the later period slows, as they expect.

We draw theoretical inferences from the recent literature on the spillover effect from lagged flipping transactions to the subsequent housing market. For example, DeFusco et al. (2018) provide a theoretical framework that predicts a lead–lag relationship between volume and price after flippers enter the market. They argue that flippers amplify volume by selling more frequently and thereby destabilize prices through positive feedback. Our finding is also closely related to the common puzzle in the literature of how a small proportion of investors can significantly impact the entire housing market (Deng et al., 2019; Miller, 1977). Past studies have demonstrated that a small proportion of foreclosed properties can have a significant spillover effect on non-foreclosed properties (Anenberg & Kung, 2014; Campbell et al., 2011; Harding et al., 2009). Fan et al. (2019) provide evidence that a small percentage of mainland Chinese buyers create upward price momentum in the Hong Kong housing market. Piazzesi and Schneider (2009) demonstrate that a small fraction of optimistic investors impacts prices without buying a large share of the housing stock. Gao et al. (2020) document the impact of speculators on housing price appreciation due to an anchoring effect on past housing price changes.

In summary, our baseline result reveals that in Hong Kong, flippers realize higher annualized housing returns than non-flippers by purchasing underpriced properties and reselling them at higher prices. If flippers flow in, then the subsequent housing price for non-flippers in the same building will also increase. Introduction of the SSD therefore effectively curbs flipping transactions in Hong Kong because both the number of flippers and flippers' annual returns decrease significantly.

Table IC1. Impact of Flipping Sales on Transaction Prices of Subsequent Non-Flipping Sales

This table reports the estimated effect of flipping sales on subsequent non-flipping sales. Flippers are defined as homebuyers who sell properties within 2 years of their purchase dates. The sample includes only transactions made by non-flippers. Lagged number/proportion of flipping sales are aggregated at the building level for the preceding 12 months. Panel A presents the first-stage instrumental variable (IV) estimation result. The ordinary least squares (OLS) and the second-stage IV results are reported in Panel B. *SSD* is a dummy variable that indicates the treatment effect of the Special Stamp Duty (SSD) policy enacted on November 20, 2010. Standard errors are clustered at the district level. Robust standard errors are presented in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Panel A. First-Stage IV Estimation Results

	(1)	(2)
	Y: Lagged Proportion of Flippers	Y: Lagged Number of Flippers
SSD	-0.1394***	-8.0246***
	(0.0114)	(0.6785)
Physical Features	Y	Y
Prime Lending Rate	Y	Y
District Fixed Effect	Y	Y
First-stage F-stats	142.87	127.34
Observations	872,264	883,473

Panel B. OLS Estimation and Second-Stage IV Estimation Results

	(1)	(2)	(3)	(4)
	Subsample of Non-Flipping Sales			
Y: log (price)	OLS	IV	OLS	IV
Lagged Proportion of Flipping Sales	0.1763***	1.0245***		
	(0.0225)	(0.1362)		
Lagged Number of Flipping Sales			0.0045***	0.0176***
			(0.0006)	(0.0028)
Physical Features	Y	Y	Y	Y
Prime Lending Rate	Y	Y	Y	Y
District Fixed Effect	Y	Y	Y	Y
First-stage F-stats		148.51		139.86
Observations	872,264	872,264	883,473	883,473
R-squared	0.861	0.820	0.861	0.844

Table IC2. Impact of Flipping Sales on Transaction Prices of Subsequent Non-Flipping Sales: Robustness Check

This table reports the robustness check results of the impact of flipping sales on subsequent non-flipping sales. We include the subsamples within a [-2, +2] year window around the Special Stamp Duty (SSD) (November 20, 2008 to November 19, 2012). Flippers are defined as homebuyers who sell properties within 2 years of their purchase dates. The sample includes only non-flipping sales. Lagged number/proportion of flippers are aggregated at the building level for the preceding 12 months. Panel A presents the first-stage instrumental variable (IV) estimation results. The ordinary least squares (OLS) and the second stage IV results are reported in Panel B. *SSD* is a dummy variable that indicates the treatment effect of the SSD policy enacted on November 20, 2010. Standard errors are clustered at the district level. Robust standard errors are presented in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Panel A. First-Stage IV Estimation Results

	(1)	(2)
	Y: Lagged Proportion of Flippers	Y: Lagged Number of Flippers
SSD	-0.0451***	-4.3947***
	(0.0084)	(0.4763)
Physical Features	Y	Y
Prime Lending Rate	Y	Y
District Fixed Effect	Y	Y
First-stage F-stats	28.62	85.12
Observations	205,780	207,726

Panel B. OLS Estimation and Second-stage IV Estimation Results

	(1)	(2)	(3)	(4)
	Subsample of Non-Flipping Sales			
Y: log (price)	OLS	IV	OLS	IV
Lagged Proportion of Flipping Sales	0.0561*	1.3957***		
	(0.0322)	(0.3016)		
Lagged Number of Flipping Sales			0.0022**	0.0144***
			(0.0010)	(0.0021)
Physical Features	Y	Y	Y	Y
Prime Lending Rate	Y	Y	Y	Y
District Fixed Effect	Y	Y	Y	Y
First-stage F-stats		28.62		85.12
Observations	205,780	205,780	207,726	207,726
R-squared	0.878	0.764	0.879	0.865

Internet Appendix D. Robustness Checks for the Impact of the Special Stamp Duty (SSD) on Flippers' Housing Returns and Transaction Prices

In this section, we conduct a battery of robustness checks for our baseline estimation results on the impact of the SSD policy on flippers' housing prices and returns. First, there might be a potential sample selection bias for the non-flipper sample because the non-flippers who have not sold their properties in our sample period may also have high unrealized housing returns. As discussed by Bayer et al. (2020), this concern can be partially addressed by using a long sample period (our sample spans 25 years). In addition, we conduct a robustness check by only including transactions from 1992 to 2012 and comparing flippers with non-flippers who hold their units for less than 5 years. In this setting, all non-flippers who sell within 2–5 years will appear in our sample period from 1992 to 2017.

Table ID1, Panel A reports the corresponding estimation result obtained using these subsamples; it shows that flippers enjoy 12.17% higher annual returns than non-flippers. After the SSD is implemented, however, flippers' returns decrease drastically by 7.84%. Both estimates are statistically significant at the 1% level. This result also confirms that the decrease in flippers' returns is mainly due to their diminishing advantage in searching for underpriced investment opportunities, which is explained by the restriction of liquidity after SSD implementation.

Second, there might be concerns of other macroeconomic and policy confounding effects over our 25-year sample period. For instance, the government introduced two other types of stamp duty policies after October 2012, which could potentially confound the effect of the SSD. Specifically, the buyer's stamp duty (BSD) was introduced on October 27, 2012 for foreign buyers and the double stamp duty (DSD) was introduced on February 22, 2013 for buyers purchasing a second property. Nevertheless, unlike the SSD, which is levied based on homeowners' holding periods after home purchases, the other two stamp duty policies are levied based on buyer characteristics at the time of purchase. These two policies aim to limit housing demand from certain groups of buyers; i.e., to reduce the likelihood of foreign buyers and second-home investors entering the market. As a result, there is a higher proportion of local and first-home buyers in the market. However, the SSD remains applicable to buyers who enter the market. Therefore, it is unlikely that the BSD or DSD would cause any confounding effects on the SSD.

To further alleviate this concern, we conduct two additional robustness tests by including only subsamples in the [-1, +1] year and [-2, +2] year windows around SSD Phase 1. This prevents confounding effects from other concurrent cooling measures implemented in October 2012 as well as other macroeconomic shocks such as the global financial crisis (GFC) in 2008. Panels B and C in Table ID1 report the corresponding estimation results. The estimates are similar in magnitude to our baseline result, which indicates that our baseline result is robust.

Third, in our baseline analysis, we follow previous studies (e.g., Bayer et al. (2020) and Fu & Qian (2014)) define flipping sales as transactions with holding periods of less than 2 years. We also conduct robustness checks by defining flipping sales as those home sales with holding periods of less than 1 year. Panel D of Table ID1 reports the corresponding estimation results and reveals that our main findings are robust.

Table ID1. Impact of the Special Stamp Duty (SSD) on Flippers' Housing Returns and Transaction Prices: Robustness Checks

This table reports the robustness estimation results of the impact of the SSD on flippers' housing returns and transaction prices. *SSD* is a dummy variable that indicates whether the transaction is affected by the SSD policy implemented in 2010. Flippers are defined as homebuyers who sell properties within 2 years of their purchase dates, denoted by the dummy variable *Flip*. In Panel A, the sample includes transactions made from 1992 to 2012 with holding periods of less than 5 years. In Panel B, we include the sample within a 2-year window before and after SSD implementation. In Panel C, we include the sample within a 1-year window before and after SSD implementation. In Panel D, we revise the definition of flip and define flipping sales as transactions with holding periods of less than 1 year (*Flip1Yr*). Standard errors are clustered at the district level. Robust standard errors are presented in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Panel A. Using Samples with Holding Periods of Less Than 5 Years from 1992 to 2012

	(1)	(2)	(3)
	Subsamples with Holding Years ≤ 5 from 1992 to 2012		
	Y: Annual Return	Y: log (purchase price)	Y: log (sale price)
Flip * SSD	-0.0784***	0.0408***	-0.0008
	(0.0050)	(0.0098)	(0.0079)
Flip	0.1217***	-0.0478***	0.0191***
	(0.0051)	(0.0055)	(0.0039)
Physical Features	Y	Y	Y
Prime Lending Rate	Y	Y	Y
Year * Quarter Fixed Effect	Y	Y	Y
District Fixed Effect	Y	Y	Y
Observations	482,314	520,988	520,988
R-squared	0.338	0.877	0.876

Panel B. Using Samples Within a 2-Year Window Before and After SSD Introduction

	(1)	(2)	(3)
	Sample Period: 2008.11.20–2012.11.19		
	Y: Annual Return	Y: log (purchase price)	Y: log (sale price)
Flip * SSD	-0.0843***	0.0304***	0.0109
	(0.0039)	(0.0048)	(0.0085)
Flip	0.1271***	-0.0390***	0.0061
	(0.0046)	(0.0049)	(0.0066)
Physical Features	Y	Y	Y
Prime Lending Rate	Y	Y	Y
Year * Quarter Fixed Effect	Y	Y	Y
District Fixed Effect	Y	Y	Y
Observations	110,762	303,538	303,538
R-squared	0.431	0.896	0.895

Panel C. Using Samples Within a 1-Year Window Before and After SSD Introduction

	(1)	(2)	(3)
	Sample Period: 2009.11.20 – 2011.11.19		
	Y: Annual Return	Y: log (purchase price)	Y: log (sale price)
Flip * SSD	-0.0872***	0.0179***	0.0124
	(0.0043)	(0.0055)	(0.0120)
Flip	0.1239***	-0.0343***	0.0011
	(0.0049)	(0.0057)	(0.0113)
Physical Features	Y	Y	Y
Prime Lending Rate	Y	Y	Y
Year * Quarter Fixed Effect	Y	Y	Y
District Fixed Effect	Y	Y	Y
Observations	59,382	160,314	160,314
R-squared	0.411	0.896	0.895

Panel D. Flipping Sales with Holding Periods of Less Than 1 Year

	(1)	(2)	(3)
	Sample Period: 2009.11.20 – 2011.11.19		
	Y: Annual Return	Y: log (purchase price)	Y: log (sale price)
*Flip1Yr * SSD*	-0.2062***	0.0495***	0.0068
	(0.0097)	(0.0142)	(0.0068)
Flip1Yr	0.1992***	-0.0608***	-0.0057
	(0.0083)	(0.0097)	(0.0121)
Physical Features	Y	Y	Y
Prime Lending Rate	Y	Y	Y
Year * Quarter Fixed Effect	Y	Y	Y
District Fixed Effect	Y	Y	Y
Observations	812,958	1,556,528	1,556,528
R-squared	0.406	0.855	0.855

SSD: Special Stamp Duty.

Internet Appendix E. Mechanisms Underlying Flippers' Housing Returns

In this section, we examine the potential mechanism by which flippers obtain higher returns. One potential explanation for our baseline estimation is that flippers may purchase poorly maintained properties and invest in renovation to improve the property quality before putting them back on the market. Given that we cannot control for quality improvement because of the unavailability of data on property renovations, the higher returns of flippers may result from unobserved investments in property upgrades (Bayer et al., 2020). We test this mechanism by examining market heterogeneity in both the primary and secondary markets. Properties bought from the primary market are brand new, purchased directly from developers, and in general do not need much quality improvement compared with the ones from the secondary market, where maintenance and renovations are more important for quality improvement.

Internet Appendix Table IE1 reports the estimation results of Equation (1), obtained using subsamples of primary and secondary transactions. Column (1) shows that flippers enjoy 14.19% higher annual returns than non-flippers for properties purchased from the secondary market. If flippers purchase primary properties, then they still enjoy 8.57% higher returns than non-flippers after selling these units (Column (2)). Both results indicate that flippers obtain excess returns than other market participants in both primary and secondary markets. More importantly, the higher excess in the primary market is unlikely to be due to the flippers' investments in property renovation and upgrades, thereby ruling out this mechanism. We also find consistent evidence that flippers' returns drop by 10.09% and 7.96% in the secondary and primary markets, respectively, after introduction of the SSD. All of the estimates are statistically significant at the 1% level.

Another key mechanism underlying flippers' superior housing returns is the possession of market information advantages. Specifically, flippers may have better market knowledge because of past experience, which reduces information friction and enables them to find better matches in their search processes (Fu et al., 2015). To investigate this mechanism, we measure a flipper's experience and market knowledge as the number of prior flipping transactions that he or she has made (denoted as *Prior Flips*). We then interact *Prior Flips* with the dummy variable *Flip* in the baseline models. The coefficient of *Flip* then indicates the excess return for a first-time flipper, whereas the coefficient for the interaction term between *Prior Flips* and *Flip* indicates the

change in returns due to more flipping experience. We expect flippers with more prior flipping experience in the Hong Kong housing market to earn higher returns.

We report the corresponding estimation results obtained using samples within the [- 2, +2] year window around Phase 1 in Appendix Table IE2. Column (1) shows that first-time flippers earn 11.44% higher returns than non-flippers, whereas flippers with one additional prior flipping experience earn additional 0.95% returns. First-time flippers purchase at 3.31% cheaper prices than non-flippers, provided that the housing features are held constant (Column (2)). Flippers with one additional past flipping transaction purchase at 0.83% lower prices. We also find that both first-time and experienced flippers tend to resell at the market price, as shown in Column (3). These results imply that more experienced flippers achieve higher returns by purchasing properties at lower prices. Lastly, in Columns (4)–(6), we show that the housing returns of first-time and experienced flippers both drop after implementation of the SSD, likely because the policy and the reduced housing supply make it more difficult for them to find discounted properties. In summary, our results indicate that flippers' market advantages explain their higher returns.

Table IE1. Impact of the Special Stamp Duty (SSD) on Flippers' Housing Returns: Heterogeneity Test by Primary and Secondary Markets

This table presents the regression result of the effect of flippers on returns in the primary and secondary markets. The dependent variable is annualized housing return. *Flip* denotes homebuyers who sell properties within 2 years of their purchase dates. Standard errors are clustered at the district level. Robust standard errors are presented in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

	(1)	(2)
Y: Annual Return	Secondary Market	Primary Market
Flip * SSD	-0.1009***	-0.0796***
	(0.0043)	(0.0210)
Flip	0.1419***	0.0857***
	(0.0035)	(0.0130)
Area size	-0.0005	0.0016**
	(0.0004)	(0.0007)
Rooms	-0.0040***	-0.0015
	(0.0006)	(0.0014)
log (Building Age)	0.0120***	-0.0049**
	(0.0016)	(0.0023)
Floor	-0.0002***	-0.0001
	(0.0000)	(0.0001)
Prime Lending Rate	0.0109***	0.0112**
	(0.0025)	(0.0043)
Year * Quarter Fixed Effect	Y	Y
Building Type Fixed Effect	Y	Y
District Fixed Effect	Y	Y
Observations	581,324	231,634
R-squared	0.368	0.327

Table IE2. Impact of Prior Flipping Experiences on Flippers' Housing Returns

This table presents the regression result of the effect of flippers' prior flipping experiences on housing return, holding period, purchase price, and resale price. We include the sample within a 2-year window before and after Special Stamp Duty (SSD) implementation. *Flip* denotes homebuyers who sell properties within 2 years of their purchase dates. *Prior Flips* denotes the number of prior flipping transactions made by the flipper in the Hong Kong housing market, and it equals 0 for non-flippers. Standard errors are clustered at the district level. Robust standard errors are presented in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

	(1)	(2)	(3)	(4)	(5)	(6)
	Y: Annual Return	Y: log (purchase price)	Y: log (sale price)	Y: Annual Return	Y: log (purchase price)	Y: log (sale price)
Flip * Prior Flips	0.0095***	-0.0083***	-0.0004	0.0101***	-0.0085***	0.0005
	(0.0016)	(0.0016)	(0.0014)	(0.0017)	(0.0017)	(0.0017)
Flip	0.1144***	-0.0331***	0.0101	0.1233***	-0.0354***	0.0059
	(0.0036)	(0.0050)	(0.0063)	(0.0042)	(0.0050)	(0.0063)
Flip * Prior Flips * SSD				-0.0097***	0.0035	-0.0033
				(0.0020)	(0.0030)	(0.0021)
Flip * SSD				-0.0804***	0.0285***	0.0120
				(0.0036)	(0.0053)	(0.0088)
Physical Features	Y	Y	Y	Y	Y	Y
Prime Lending Rate	Y	Y	Y	Y	Y	Y
Year * Quarter Fixed Effects	Y	Y	Y	Y	Y	Y
District Fixed Effects	Y	Y	Y	Y	Y	Y
Observations	110,762	303,538	303,538	110,762	303,538	303,538
R-squared	0.426	0.896	0.895	0.434	0.896	0.895