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Examining the Impacts of the Pandemic on the Housing Bubble in Hong Kong

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Abstract

Purpose: The COVID-19 pandemic has significantly disrupted the housing market in Hong Kong and created economic uncertainty and job losses. Therefore, this study aims to revisit the current housing bubble in Hong Kong and to check whether the pandemic is a shock that led to the burst of the housing bubble. The insights derived from this study are crucial for shaping future housing policies in response to such economic events.

Design/methodology/approach: This study utilizes four bubble testing techniques of right-tailed Augmented Dickey-Fuller (ADF) tests to examine the presence of a housing bubble and determine its starting and ending dates.

Findings: The findings reveal that COVID-19 triggered a significant negative shock to the housing market, leading to a bubble burst during the pandemic. Additionally, the analysis indicates a rise in negative equity cases following the burst, largely due to reliance on highly leveraged mortgage loans.

Originality/value: The novelty of this study lies in its use of inflation-adjusted real housing prices to detect the housing bubble. Furthermore, developers could use our findings to improve their selling strategies during the housing market downturn, which, in turn, adds valuable insights to the housing and financial literature.

Practical implications: This study highlights the financial risks associated with the burst of housing bubbles and provides valuable policy recommendations for stabilizing the housing market. The findings emphasize that financial institutions should reduce the credit risks linked to mortgage loan portfolios before negative equity cases increase. The study offers professionals in the housing and finance sectors insight into risk management strategies.

Keywords: Housing bubble, right-tailed ADF test, COVID-19 pandemic, developers

JEL Classifications: R21, R31

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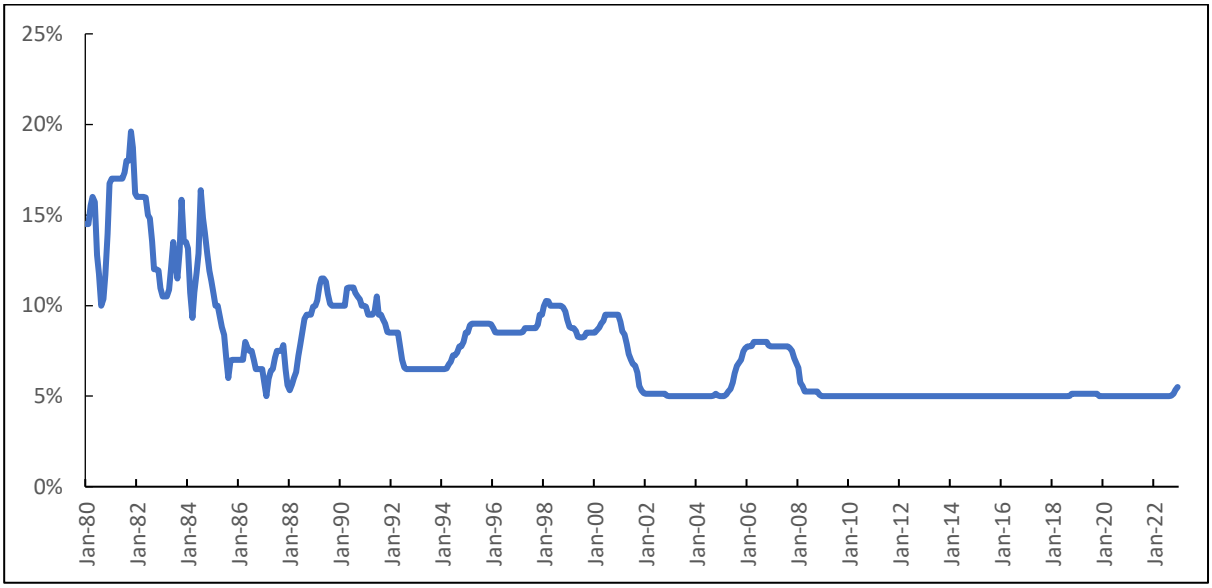
1. Introduction

Traditional finance theories are built on the assumption that financial markets are frictionless and investors are rational, making rational investment decisions. However, real-world financial markets are imperfect due to information asymmetry among participants, transaction costs, and psychological biases influencing investors. These imperfections lead to the mispricing of assets in traditional financial products such as stocks and bonds and emerging assets like cryptocurrencies. Mispricing significantly affects investors, companies, and the overall economy. A typical example is Hong Kong during the Asian Financial Crisis. During Jan 1990 and Mar 1997, Hong Kong experienced a significant increase across key financial indicators, a growth of 3.8% in real wages, 153.1% in the Hang Seng Index, and 101.4% in real housing prices. This rapid growth widened income inequality, inflated asset bubbles, and weakened Hong Kong's competitiveness. Moreover, it attracted speculators seeking to profit from the exchange rate and stock markets through "double market play," which involved exploiting interest rate fluctuations and potential collapses in the pegged exchange rate system. In response, the Hong Kong government raised interest rates and utilized official reserves to purchase stocks from financial markets, safeguarding the linked exchange rate system and preventing economic collapse. Nonetheless, the sharp rise in interest rates precipitated an asset bubble burst, which led to a significant increase in delinquency rates, rising from 0.84% in 1998 to 1.31% in 2000.

Following the Asian Financial crisis, Hong Kong's housing market again attracted international attention in 2010 due to its well-known unaffordability[1]. Furthermore, quantitative easing in the United States contributed to market exuberance by fueling significant capital inflows into the Hong Kong housing market. In addition, low interest rates (Figure 1) further contributed to the second housing bubble in Hong Kong by easing the debt servicing burden for homebuyers and facilitating passing stress tests in mortgage financing. Another possible factor contributing to this bubble was the limited supply of new housing. As illustrated in Figure 2, new housing completions remained low throughout the 2010[2]. Population growth led to a housing shortage, forcing potential buyers to compete for limited supply. In the primary market, homes often sold out quickly on the first day of sale. Meanwhile, the secondary market became a sellers' market, making price negotiations increasingly difficult for buyers.

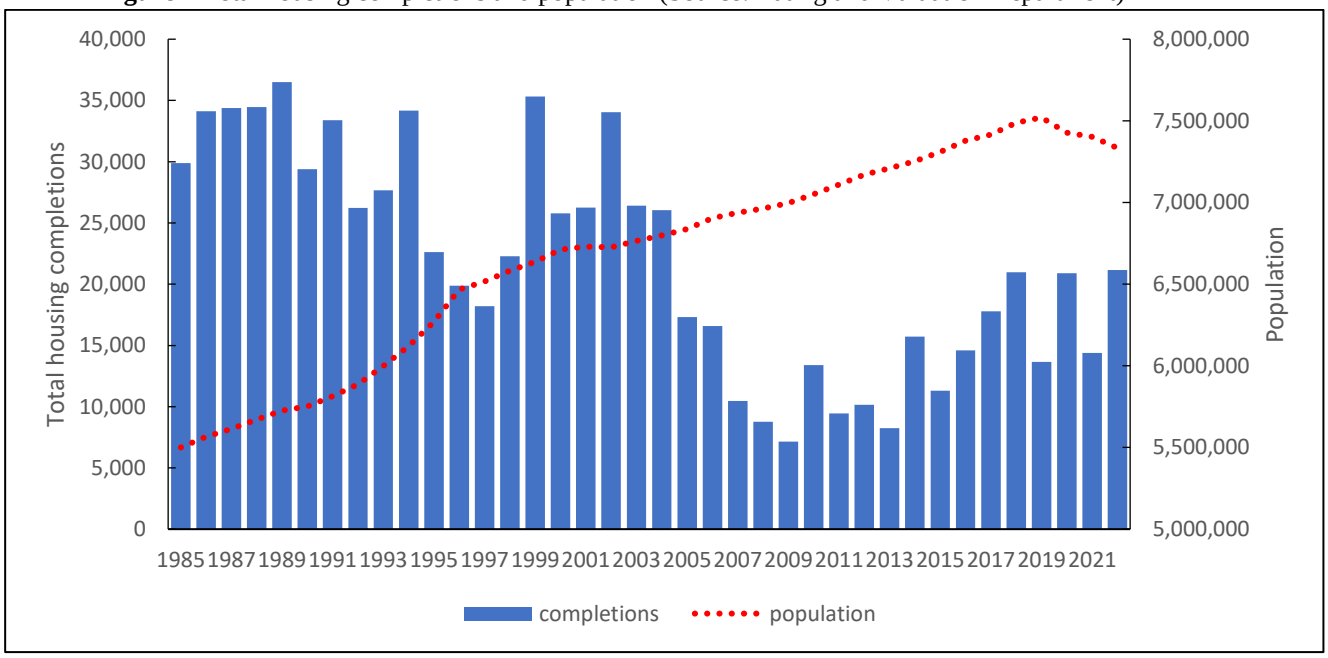
[1] According to Demograhpia (2023), Hong Kong housing is the least affordable for 13th straight years.
[2] See Leung, et al. (2020a, 2020b) and Leung and Tang (2023) for more discussion.

Figure 1. Best lending rate (Source: Census and Statistics Department)



Note: This is the monthly data for 1980M1-2022M12.

Figure 2 Total housing completions and population (Source: Rating and Valuation Department)



Note: This is the annual data for 1985-2022.

Although the government introduced countercyclical housing policies in 2012, house prices have increased continuously, as supported by Gyourko and Molloy (2015). Meanwhile, speculative behavior in the housing market remained strong. Yiu, et al. (2013) found that the bubble primarily originated in the mass market. As a result, a societal belief emerged that housing is a sound investment due to rising prices, further motivating new homebuyers to use high leverage in their purchases[3]. Consequently, the housing bubble has been accompanied by high trading volumes (Barberis, et al., 2018), generating a self-fulfilling cycle that poses additional risks to the financial

[3] Under the current Mortgage Insurance Programme, for eligible properties with a property value up to HK$10 million (which is usually regarded as a "starter home"), the maximum loan-to-value ratio is 90%.

system (Anundsen, et al., 2016). Furthermore, prior studies have examined the effectiveness of macroprudential policies in bubble-creating economies. Luangaram and Thepmongkol (2022) find that restrictive policies tend to be more effective in dampening asset-price bubbles in economies with a high degree of financial depth. Wong, et al. (2021) show that credit-tightening policies in Hong Kong could curb house price growth in the high-price segment. In contrast, transaction taxes could have been more effective, as homebuyers often found ways to avoid the extraordinary stamp duties. Similarly, Deng, et al. (2024) discovered that mortgage-tightening measures in Hong Kong effectively cooled the overheated market, while tax-driven policies suppressed trading activity and triggered price volatility across submarkets.

The outbreak of COVID-19 introduced a new phase in the financial market and attracted the interest of many researchers to study the effect of the pandemic on the macroeconomy. Anundsen, et al. (2023) demonstrated that COVID-19 decreases the confidence of house sellers and exploits the bidding. In the case of Hong Kong, the prolonged quarantine rules and strict preventive measures reduce Hong Kong investors' sentiments. Therefore, it is interesting to determine if the market exuberance persists in driving the housing bubble. By revisiting the Hong Kong housing bubble, this study aims to complement existing literature and assess whether countercyclical housing policies should be sustained. To address this, the current study employs the right-tailed ADF test to revisit the housing bubble in Hong Kong.

This study contributes in several ways. First, this research examines the potential housing bubble burst risks. As noted by Glaeser and Nathanson (2015), the Hong Kong housing market is largely dominated by amateur investors, who are particularly susceptible to market adjustments. Despite downturns in the market, these investors often refrain from selling properties to avoid financial losses, further exacerbating their financial instability. The findings provide the starting and ending months of the bubble, emphasizing the risks of purchasing properties at peak prices and drawing attention to the broader implications for financial security. Second, the study investigates developers' strategies for constructing and selling properties. During housing booms, developers are more willing to bid for land at high prices and sell completed properties slowly, signaling positive market conditions and encouraging further price increases. However, when the housing market is downturned, financially constrained developers rush to sell completed properties, accelerating the decline in housing prices. The study discusses these dynamics using a recent example and considers the implications of purchasing properties through highly leveraged mortgages. Third, this study formulates housing policies in response to these market fluctuations. Over the past decade, the government has introduced several countercyclical housing policies, including double, special, and buyer stamp duty, to cool the overheated market. With the housing market reversing, debates emerge about the appropriate timing for removing these extraordinary measures. The study's findings contribute to ongoing policy discussions by providing empirical evidence to make informed decisions.

The main objective of this study is to complement the existing literature by checking if the recent housing bubble burst during the COVID-19 pandemic. If so, it further explains the risks and consequences associated with a bubble burst by answering three research questions. First, will the burst of the housing bubble result in a surge in negative equity cases? Second, how does the housing

bubble burst change developers' strategies in house selling and land bidding? Third, what are the considerations for using a "Stage Payment Plan" to purchase a flat in the primary market?

The rest of the chapter is organized as follows: Section 2 presents the literature review, Section 3 outlines the data and methodology, Section 4 discusses the empirical results, Section 5 presents the robustness checks, and the final section explores the risk considerations of housing investments.

2. Literature Review

Asset bubbles, treated as mispricing in the market, have been extensively studied in previous literature. Fama (1965) mentioned that "bubbles are typically defined as periods in which asset prices run well above or below the intrinsic value," and Case and Shiller (2003) suggested that "excessive public expectations of future price increase causes prices to be temporarily elevated." When the asset bubble bursts, it leads to a sharp decline in asset prices and significant losses to investors. Credit tightens as lenders and banks are unwilling to lend out the money. The whole economy quickly turns into a recession as a result.

Bubbles can exist in various investment assets and commodities, and the reasons for bubble formation differ. Take the Dutch tulip mania that happened in the 1630s as an indicative example to illustrate asset bubbles (Garber, 2000). By then, it had attracted much speculation about tulips because they were new to Europe. People were purchasing the tulip bulbs at a higher price and reselling them at an even higher price to make a profit. The costs were exacerbated to an unsustainable level. When the asset bubble burst, no one was willing to pay such a high price, causing a sharp fall in tulip prices. Another example is the Dot.com bubble in the late 1990s[4]. The market viewed the internet or technology industries as having a very high earnings potential, and therefore, the bubble was fueled by a surge in investment in internet companies. However, these internet companies were immature and did not have a comprising business model. In some of the worst cases, companies pretended to engage in internet business by only setting up a website. In the end, many companies failed to generate revenue or launch a product successfully. Investors were losing confidence in investing in technology companies, which caused a significant drop in share prices and further translated into economic recession.

More importantly, as the financial markets get more integrated, the negative consequences of a burst of asset bubble can quickly spread to other markets. One typical example is related to the Global Financial Crisis in 2008[5]. The starting point of this crisis came from credit exuberance (Jorda, et al., 2016), where lenders were very loose in processing mortgage applications. Homebuyers with poor credit histories were still successful in obtaining mortgages. The mortgages were then packaged together and sold to investors as mortgage-backed securities (MBS), allowing the lenders to receive the cash for initiating the mortgage business again. As the lenders failed to perform due diligence in the mortgage approval process, many borrowers found difficulties repaying mortgages when the interest rate increased from 1% to 6.25% during 2004-2006. MBS investors, misrepresented by the bankers and believing that the investment was relatively "safe" at first, suffered tremendous losses.

[4] Interested readers can refer to McAleer, et al. (2016) and Bai, et al. (2015).
[5] See Lean, et al. (2015), Leung and Tang (2011), and Zhu, et al. (2019) for more discussion.

In 2009, the worldwide economy slumped quickly. U.S. GDP was reduced by 2.8%, whereas Europe's counterpart was shrunk by 4.5%. Farmer (2015) finds that “the stock market crash of 2008 did cause the Great Recession”.

After the emergence of the Global Financial Crisis, a large body of literature exists to discuss the detection of bubbles. Phillips, et al. (2011) provides a recursive test procedure for testing explosive behavior, and Homm and Breitung (2012) propose several tests (supADF, supDFC, supK, supBT and supB) for rational bubbles. Also, some studies are devoted to comparing the housing bubble in different areas. For example, Hui, et al. (2012) adopted a time-varying risk model to investigate the housing bubble in Guangzhou and Shenzhen, while Teng, et al. (2013) used the state-space model to estate the sizes of the housing bubble in Taipei and Hong Kong. Lai and Van Order (2020) find that “the experience of boom-bubble-bust in the US market cannot be directly applied to China”. Our paper will be based on the work by Phillips, et al. (2015), which provides econometric detection mechanisms for identifying the dates of the bubble. This piece of work is widely cited in housing bubble-related research, such as Bangura and Lee (2020), Li, et al. (2021), Andre, et al. (2022), and Tang (2017), among others.

Recently, much attention has been paid to the effect of the COVID-19 pandemic on the economic and financial environment. For example, Ulku, et al. (2023) argue that COVID-19 formed a negative bubble in the stock market and led to substantial wealth transfers among investor types, Ji, et al. (2022) found that the global stock markets performed poorly during the pandemic, Gharib, et al. (2021) discovered that a bilateral contagion effect of bubbles in oil and gold markets during COVID-19, Ding, et al. (2022) studied how COVID-19 affects the corporate sector at different stages of COVID-19 outbreak, and Chong, et al. (2020) proposed that “the slow growth, the sluggish recovery of trade and the cross-country transmission of the unemployment rate are three significant risk factors that ASEAN economies are faced with”. Besides, researchers are working on models to predict the confirmed cases (Tajmouati, et al., 2022; Tuan, et al., 2022), as well as macro indicators (Safi, et al., 2022; Foroni, et al., 2020). Regarding the investors’ behavior, Bourdeau-Brien and Kryzanowski (2020) found that “natural disasters cause a statistically and economically significant increase in risk aversion at the local level”, Brown, et al. (2018) show that “being struck by an extreme event substantially changed individuals’ risk perceptions as well as their beliefs about the frequency and magnitude of future shocks”, and Sun, et al. (2021) studied if investor sentiment, driven by coronavirus-related news and economic-related announcements, is priced in the medical portfolios.

Our paper will complement the existing literature, arguing that COVID-19 is a systematic risk that led to the housing bubble's burst in Hong Kong. It also calls for the attention of market participants to the issue of an asset bubble. A thorough understanding of asset bubbles allows people to make informed investment decisions. It helps the government take appropriate measures to cool the overheated market, thus promoting a more stable economic and financial environment.

3. Data and Methodology

3.1 Data

Our paper collects the real housing price, *RHP*, deflated by the consumer price index (A) from 1983Q4 (the starting quarter of the linked exchange rate system in Hong Kong) to 2023Q1. Altogether, there are 158 quarterly observations covering essential events such as the Asian Financial Crisis, the outbreak of SARS, the Global Financial Crisis, and the COVID-19 pandemic. Compared to the prior studies on bubble testing, using real variables in our paper provides a more accurate picture of economic activity and allows meaningful comparisons over time[6].

3.2 Methodology

This paper aims to study the housing bubble in Hong Kong. It stems from the theoretical background that controlling the information set, Ω_t, the housing price, P_t, should be equal to the sum of the rent, R_t, at current period *t* and the expected present value, $E\left(\frac{P_{t+1}}{D_t}|\Omega_t\right)$, of its price in the next period *t+1*. The mathematical formula is:

$$P_t = E(R_t|\Omega_t) + E\left(\frac{P_{t+1}}{D_t}|\Omega_t\right), \tag{1}$$

where D_t is the discount factor.

Through replacing P_{t+1} on the right, it gives

$$P_t = E(R_t|\Omega_t) + E\left(\frac{R_{t+1}}{D_t}|\Omega_t\right) + E\left(\frac{P_{t+2}}{D_t D_{t+1}}|\Omega_t\right). \tag{2}$$

Therefore, by iteration, the housing price at time t can be decomposed into two parts, including the "fundamental" value and the transversality condition:

$$P_t = \sum_{i=0}^{\infty} E\left(\frac{R_{t+i}}{D_{t+i}^i}|\Omega_t\right) + \lim_{i\to\infty} E\left(\frac{P_{t+1+i}}{D_{t+1+i}^i}|\Omega_t\right). \tag{3}$$

When the transversality condition approaches zero, the observed housing price equals the fundamental value, represented by the present value of the perpetual stream of rents received from the house. In contrast, if the housing bubbles exist, it suggests that homebuyers are paying a price higher than the fundamental value, and they expect to be compensated for overpayment by the expected appreciation of the bubble component. So, bubble testing is, in fact, a test of the transversality condition.

To begin our analysis, the paper conducts a Johansen cointegration test between real housing prices and rent. This test mainly examines the π matrix in the vector error correction model:

$$\Delta y_t = \pi y_{t-k} + \Gamma_1 \Delta y_{t-1} + \Gamma_2 \Delta y_{t-2} + \cdots + \Gamma_{k-1} \Delta y_{t-(k-1)} + u_t, \tag{4}$$

[6] See Leung, et al. (2006) for more discussion.

where $\pi = \left(\sum_{i=1}^{k} \beta_i\right) - I_g$ and $\Gamma_i = \left(\sum_{j=1}^{i} \beta_j\right) - I_g$. If the rank of the π matrix, *r*, is significantly different zero, it implies that real housing price and real rent are cointegrated and hence precludes the formation of a housing bubble (Abraham & Hendershott, 1996; Bangura & Lee, 2020; Meen, 2002). The test is conducted in the following sequence:

$$H_0: r = 0 \; versus \; H_1: 0 < \; r \; \leq 2 \, ,$$

$$H_0: r = 1 \; versus \; H_1: r = 2 \, .$$

After confirming that no cointegration exists, it proceeds to detect whether the bubble exists in the Hong Kong housing market. It adopts the bubble testing technique Phillips, et al. (2015) proposed. Referring to the following equation,

$$RHP_t = \mu + \delta RHP_{t-1} + \sum_{i=1}^{p} \phi_i \Delta RHP_{t-i} + \varepsilon_t, \tag{5}$$

the core idea of this technique is to test the null hypothesis of a unit root (δ = 1) against the alternative hypothesis of a mildly explosive autoregressive coefficient (δ > 1). Formally, we test

$$H_0: \delta \; = \; 1,$$

$$H_1: \delta > \; 1.$$

There are four different methods of testing the bubble. The simplest method is to set the window size, r_0, to 1 and hence make use of the full normalized sample $[r_1, r_2]$ for estimating δ. This will be the right-tailed version of the standard ADF unit root test. When the ADF statistic is greater than the critical value, it suggests a housing bubble is present in the market.

The second method is the rolling window approach. It specifies a fixed window size when calculating the ADF statistic. When it moves one step forward, the window's starting and ending points are incremented by one observation, producing a new ADF statistic. The rolling ADF statistic, denoted by RADF, will be defined as the supremum ADF statistic among all possible windows.

The third one will be the recursive approach. The estimation procedure comes with a fixed starting point and an expanding window. When the regression is recursively estimated, the starting point stays the same while the ending point is incremented by one observation, producing a series of ADF statistics. The SADF statistic is defined as the supremum of the ADF statistic among all windows:

$$SADF(r_0) = \sup_{r_2 \in [r_0, 1]} \{ADF_{r_2}\}. \tag{6}$$

The last method is the generalized SADF, which GSADF denotes. The approach is flexible because the starting point and the estimated windows can vary. The GSADF statistic is defined as:

$$GSADF(r_0) = \sup_{\substack{r_2 \in [r_0, 1] \\ r_1 \in [0, r_2 - r_0]}} \{ADF_{r_1}^{r_2}\}. \tag{7}$$

Another benefit of using the last two methods is that they allow us to determine the start and end of bubbles. The idea is to compare the sequence of ADF statistics with the critical value. When the ADF statistic first crosses the critical value from below, it represents the start of the bubble. Conversely, when the ADF statistic first crosses the critical value from above, it suggests the end of the bubble.

4. Empirical Analysis

The main variable used in this paper is the real housing price. Its summary statistics are found in Table 1. Before conducting bubble testing, it is important to determine whether a long-run relationship exists between real housing prices and real rent. Table 2 shows that the trace statistic and max-eigenvalue statistic are smaller than the corresponding 5% critical value, suggesting that the null hypothesis of no cointegration is accepted. In other words, real house price increases are not accompanied by the real rent.

Table 1 Summary statistics for the real housing price

Mean	Standard deviation	Skewness	Kurtosis
1.955	1.016	0.645	2.151

Note: The sampling period is 1983Q4 – 2023Q1. (Source: Author's calculations)

Table 2 Results of Johansen cointegration test

Null hypothesis	Trace statistic	5% critical value (Trace test)	Max-eigenvalue statistic	5% critical value (Max-eigenvalue test)
r = 0	13.43	15.49	12.23	14.26
r = 1	1.40	3.84	1.40	3.84

Note: The sampling period is 1983Q4 – 2023Q1. (Source: Author's calculations)

After that, the paper uses four different methods to check the existence of the housing bubble (Table 3). The first method estimates the entire sample. The ADF statistic is 10% significant, suggesting the occurrence of the housing bubble. The paper follows Tang (2017) using a window size of 0.3 for the other three methods. All results reject the null hypothesis at a 5% level and confirm that δ is a mildly explosive autoregressive coefficient.

Table 3 Empirical results of right-tailed ADF test

	ADF statistic	H_0: Real housing price has a unit root
Method 1: RTADF	1.197 *	Rejected
Method 2: RADF (window size = 0.3)	3.001 **	Rejected
Method 3: SADF (window size = 0.3)	3.050 **	Rejected
Method 4: GSADF (window size = 0.3)	3.223 **	Rejected

Note: ** and * denote 5% and 10% statistical significance, respectively. (Source: Author's calculations)

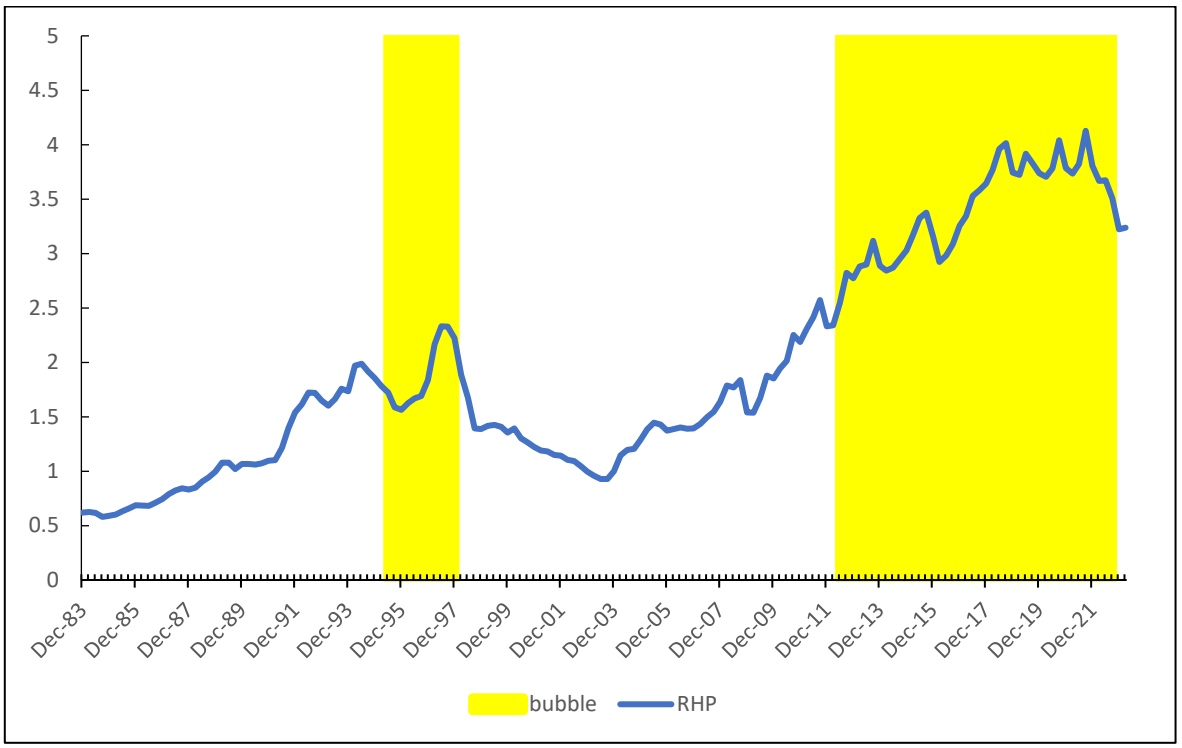
Next, our paper uses SADF and GSADF to detect the bubble period. This is followed by Tang (2017), who states that when the ADF statistic exceeds the critical value for more than two quarters ($\approx \log(158)$), we would identify it as a housing bubble. Figure 3a presents the results of SADF, where two housing bubbles (denoted by the shaded area) are found during the sampling period. The first housing bubble occurred during the first three quarters of 1997 when speculation in the pre-sale

market and lenient borrowing standards were widespread. Upon the arrival of the Asian Financial Crisis in 1998, the real housing price exhibited a significant drop of 38.5%. The situation continued to worsen with the outbreak of SARS in 2003. The next housing bubble appeared in 2012Q2, mainly due to the quantitative ease in the United States. As Hong Kong's best lending rate is kept at a low level of 5%, it lessens the borrowing cost and attracts investors to the housing market, causing market exuberance. The success stories of housing investing and the low-interest rate environment further attract followers to invest in the market, making herding behavior another important reason for the formation of the housing bubble. Our empirical result shows that the bubble ended in 2022Q3, clearly the COVID-19 pandemic. Figure 3b presents the graphical results of GSADF. The result differs slightly from SADF, in which three bubbles occurred during the sampling period: 1995Q2 – 1997Q4; 2011Q1 – 2011Q3; 2012Q2 – 2022Q1 (Table 4). Nevertheless, both SADF and GSADF suggest the recent housing bubble burst during the COVID-19 pandemic.

Our empirical results have important practical implications. First, during the bubble period, developers built more studio flats, which require a smaller lump sum of downpayment, to target singles or young families. However, the studio flat market's liquidity is comparatively low, making it harder to resell the property in the market after the housing bubble bursts (Table 5). Second, the pandemic changes the landscape of the macroeconomy dramatically. As Hong Kong experienced SARS in 2003, people responded quickly when COVID-19 was confirmed to be spread around Hong Kong, such as wearing masks, using sterilizers, and maintaining social distancing. Unexpectedly, COVID-19 lasted much longer and disrupted the financial markets. It causes widespread disruption to businesses and results in job losses. The reduction in income means people are less able to make home-purchasing decisions. Overall, this systematic risk caused significant market volatility. Investors became pessimistic in their investment behavior. Third, the occurrence of the housing bubble led to homebuyers' heavy reliance on high-leveraged mortgage loans (with an LTV ratio of 60%-90%). Its ratio increased sharply from 7% in December 2018 to 29.5% in December 2020.

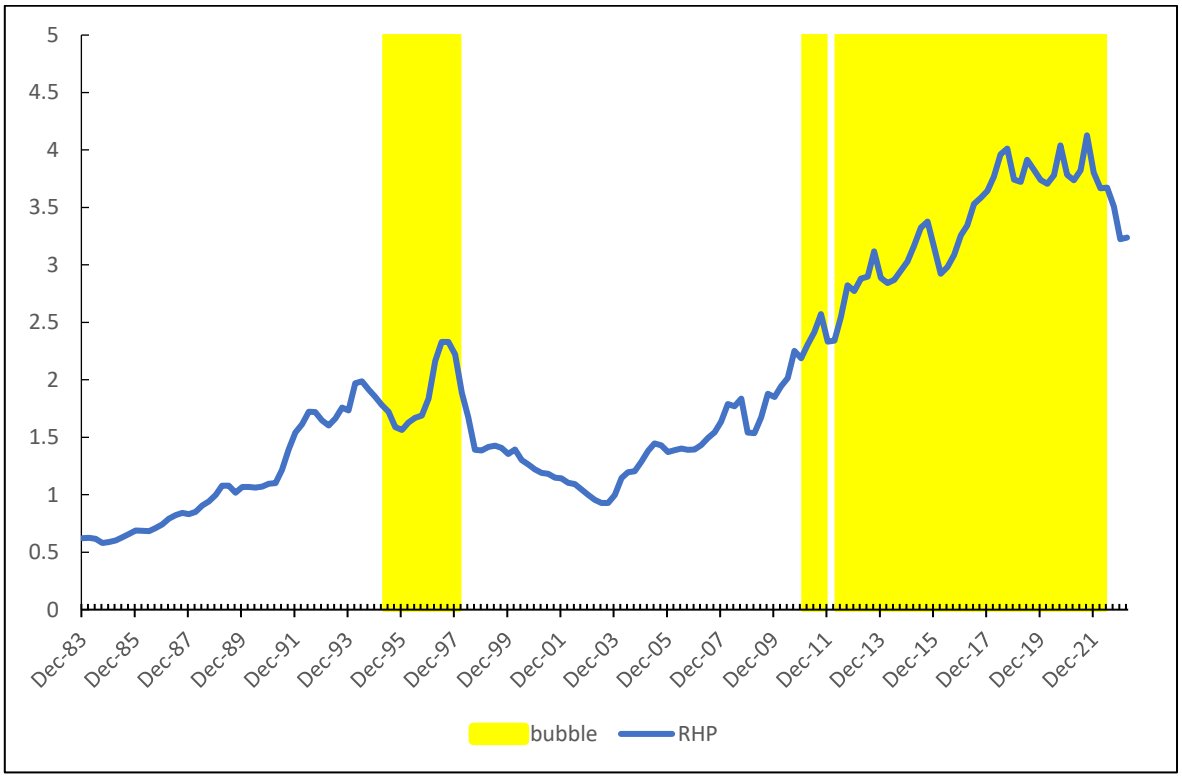
The housing bubble burst resulted in a subsequent rise in negative equity cases, which is clearly shown in Figure 4. After three-quarters of the bubble burst, the real housing price dropped by 12%. If families use a "10% downpayment plan" to purchase a house at the hike, they will fall into the negative equity trap. While Christopher Hui, Secretary for Financial Services and the Treasury, replied to Legislative Council members that "banks, in general, will not request early repayments so long as the borrowers can make payment on their residential loans accordingly to schedule" (The Standard, 23 November 2023), it is worthy to note that negative equity is a necessary but not sufficient condition for mortgage default (Foote, et al., 2008). If the borrowers cannot repay the entire loan at the end, banks may have to write off a portion of the loan balance as a loss. Therefore, for financial stability, financial institutions are recommended to monitor the credit quality of the mortgage portfolio and exercise caution when extending new mortgage loans. Last but not least, it brings to our attention that the policy lag may reduce the effectiveness of countercyclical housing policies in stabilizing the housing market. Notably, after the burst of the housing bubble in 2022, the guidelines may over-correct the market and introduce unnecessary volatility. Therefore, the government needs to reconsider the continuation of countercyclical housing policies promptly.

Figure 3a Real housing price and housing bubble (SADF; window size = 0.3)



Note: The sampling period is 1983Q4 – 2023Q1. (Sources: Rating and Valuation Department and author's calculations)

Figure 3b Real housing price and housing bubble (GSADF; window size = 0.3)



Note: The sampling period is 1983Q4 – 2023Q1. (Sources: Rating and Valuation Department and author's calculations)

Table 4 Bubble periods

	Bubble period
Method 3: SADF (window size = 0.3)	1995Q2 – 1997Q4; 2012Q2 – 2022Q3
Method 4: GSADF (window size = 0.3)	1995Q2 – 1997Q4; 2011Q1 – 2011Q3; 2012Q2 – 2022Q1

Note: The sampling period is 1983Q4 – 2023Q1. (Source: Author's calculations)

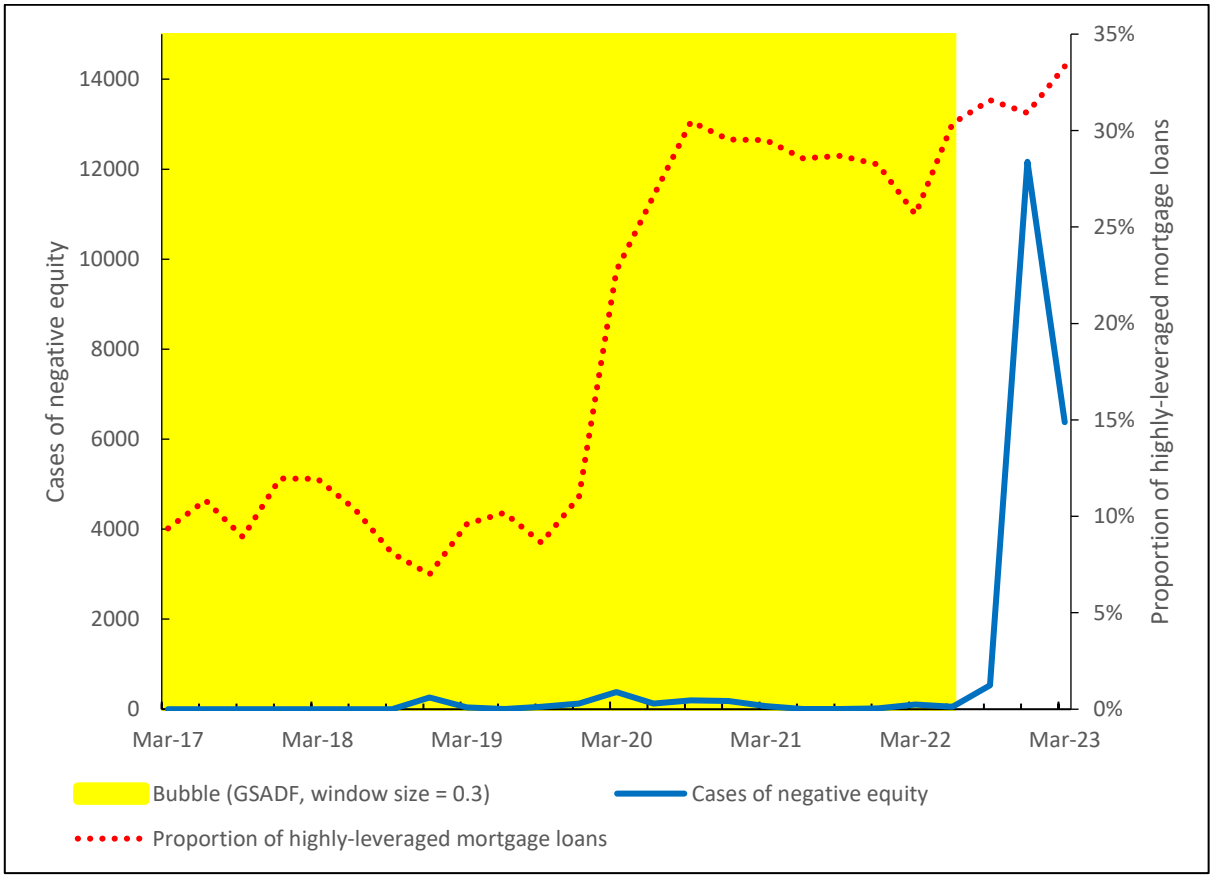
Table 5 Studio flat transactions in Hong Kong

Estate name	Completion date	Number of units	Number of transactions (first half of 2023)
AVA 61	2020Q1	138	4
AVA 262	2017Q2	88	0
Novum East	2019Q2	464	4
One Prestige	2018Q3	128	0
Parker33	2017Q1	234	2
Seven Victory Avenue	2018Q4	250	4
T Plus	2019Q1	356	15

Note: Only transactions with the signing of a Formal Sale and Purchase Agreement will be considered.

(Source: Centaline Agency)

Figure 4 Cases of negative equity and proportion of highly-leveraged mortgage loans



Note: The data for negative equity cases and the proportion of highly leveraged mortgage loans have been available since 2017Q1. (Sources: Hong Kong Monetary Authority, Hong Kong Mortgage Corporation, and author's calculations)

5. Robustness Check

To check the robustness of our findings of the housing bubble test, we set the window size of 0.4 and re-run the right-tailed ADF tests. The empirical results are reported in Table 6. Similar to our baseline findings, the ADF statistics of the three tests are all statistically significant at a 5% level, suggesting the existence of housing bubbles. When we further examine the start and the end of housing bubbles, SADF suggests a bubble period of 2012Q2 – 2022Q3, and GSADF finds a similar bubble period of 2012Q2 – 2022Q2 (Table 7). These robust results support our earlier argument that people's confidence in housing investment is still very strong at the beginning of the pandemic. The severity of COVID-19 brings border closures and quarantine rules that limit the freedom of movement and restrict regional and international cooperation - such economic isolation results in investors' pessimism towards future economic conditions.

Table 6 Robustness check of right-tailed ADF test

	ADF statistic	H_0: Real housing price has a unit root
Method 2: RADF (window size = 0.4)	3.219 **	Rejected
Method 3: SADF (window size = 0.4)	2.980 **	Rejected
Method 4: GSADF (window size = 0.4)	3.219 **	Rejected

Note: ** denotes 5% statistical significance. (Source: Author's calculations)

Table 7 Bubble periods

	Bubble period
Method 3: SADF (window size = 0.4)	2012Q2 – 2022Q3
Method 4: GSADF (window size = 0.4)	2012Q2 – 2022Q2

Note: The sampling period is 1983Q4 – 2023Q1. (Source: Author's calculations)

6. Conclusion

In Hong Kong, house prices rose steadily until 2022, driven by historically low interest rates, limited supply of land and housing, and strong demand from local and foreign investors. However, the implementation of the National Security Law in 2020 brought significant political changes, prompting a new wave of emigration[7]. This net outflow of 60,000 residents in 2022 (South China Morning Post, 16 February 2023) suggests that many properties were sold at 'fire-sale' prices in the secondary market, likely contributing to the decline in overall property values. At the same time, the prolonged effects of COVID-19 and the Federal Reserve's decision to raise interest rates to 5.15% in May 2023 further decreased demand for houses, leading to the bursting of the housing bubble as the market corrected and house prices returned to their fundamental values.

As a result, the Hong Kong housing market has faced three critical challenges since 2022. First, the ongoing decline in housing prices may cause developers to be more conservative in submitting land bids, potentially reducing government revenue from land sales and forcing developers to adjust their investment strategies. Additionally, developers may revise their pricing strategies in the primary market. As Leung, et al. (2020a) highlighted, Hong Kong's housing market operates as an oligopoly, where a few large developers control land and property prices. In this environment, smaller

[7] See Chan, et al. (2022) for discussion.

developers with less financial resilience may act independently, selling their first-hand properties at lower prices to maintain liquidity. This action could attract potential homebuyers who might otherwise purchase from the secondary market, further suppressing housing prices in the secondary market due to reduced demand.

Second, homebuyers could carefully evaluate the risks associated with declining housing prices. During housing bubbles, buyers often use high leverage to magnify returns, but this strategy can backfire during downturns, magnifying losses and even leading to bankruptcy. An illustrative example is the case of Grand Jete, where buyers used a highly leveraged "Stage Payment Plan" in Phase 1 to purchase pre-sale units, with the total amount due upon housing completion. Unfortunately, the developers pre-sold the Phase 2 units at a significant discount of nearly 17%, leading to a decline in the value of Phase 1 properties. This could result in difficulties securing adequate bank financing upon completion, raising the risk that buyers default on the purchases and seek compensation from developers.

Lastly, policymakers need to closely monitor the residential market and implement appropriate measures to ensure that the market is stable. For example, in February 2024, the government canceled several demand-side management measures, including Special Stamp Duty, Buyer’s Stamp Duty, and New Residential Stamp Duty, to stimulate demand for residential flats among local and foreign investors. However, other factors like high interest rates, stricter bank lending policies, and prevailing pessimism impede investment in the property market. If housing prices continue to fall, this could lead to financial distress for families, a loss of confidence from investors, instability in the financial system, and a slowdown in economic activities.

Over the past three decades, Hong Kong has experienced several recurring housing bubbles, during which property prices significantly exceeded their intrinsic values due to low interest rates, limited supply, and speculative investment. During these periods, investors often exhibited overconfidence, purchasing overvalued properties with the expectation of reselling them at even higher prices. However, the disruption caused by COVID-19 has reshaped global markets, contributing to the recent housing bubble burst. Homebuyers who leveraged heavily during the boom are now particularly vulnerable to negative equity or bankruptcy.

To better promote financial stability, the government should monitor overall housing market conditions, particularly mortgage default risk, and strengthen investor education. For future research, comprehensive data analysis could help develop early warning systems for detecting housing bubbles, enabling policymakers to take proactive measures to stabilize the market.

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