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Market Sentiment, Housing Prices and Housing Policies: A Conceptual Modelling of the Hong Kong High-Rise Properties

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Abstract: *Classical economic theory, grounded in the equilibrium between supply and demand, often overlooks the influence of irrational behaviour and investor sentiment, leading to deviations from housing fundamentals. Through an empirical analysis, this study will try to elucidate the underlying supply-demand imbalances across various classes of high-rise residential properties in Hong Kong, shedding light on the influence of sentiment on market dynamics. The study period encompasses diverse market conditions, including periods of both bullish and bearish sentiment, pre- and post-pandemic. Furthermore, it will underscore the multifaceted nature of housing issues and emphasises the critical role of government intervention in shaping market outcomes. By providing insights into the intricate dynamics of the housing market and the impact of sentiment, this study contributes to the existing literature by offering practical implications for policymakers and stakeholders with the ultimate goal of fostering prosperity and stability in Hong Kong's housing sector.*

Keywords: Hong Kong Housing Market, Sentiment Analysis, NARDL Modeling, Government Intervention

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1. Introduction

The housing problem in Hong Kong is one of the most pressing issues due to land constraints, rapid urbanisation, and speculative investment that led to supply-demand imbalances. Hong Kong is the worst among global cities in providing affordable housing (Leung, Ng, and Tang, 2020). The Urban Reform Institute for the ninth year in a row ranked Hong Kong as the least affordable city in the world. According to Demographia (2023) an apartment in Hong Kong costs 18.8 times the gross median annual income as for 2023 estimates. The issue of housing affordability has aggravated further in recent years due to increasing demand, limited supply, COVID-19 shocks, and property price hikes. Figure 1 shows housing unaffordability in Hong Kong compared to other major housing markets in 2023.

The persistent supply-demand imbalances coupled with speculative investment activities in the property sector exacerbate housing unaffordability and income inequality, particularly given the substantial middle-class demographics in Hong Kong. The widening income gap poses a formidable threat to the socio economic fabric of Hong Kong, a challenge that has persisted despite numerous independent studies and government interventions (Development Bureau, Hong Kong SAR, 2018).

The dynamics of house prices have long captivated the attention of scholars and policymakers. While classical economic theory posits that housing prices are determined by the equilibrium between supply and demand, empirical evidence suggests that market expectations and psychological factors significantly influence housing prices. The irrational behaviours and sentiments of market participants can lead to deviations from market fundamentals (Leung et al., 2020), exerting a profound impact on housing prices, particularly in a dynamic and speculative market like Hong Kong (Hui and Wang, 2014; Freybote and Seagraves, 2017; Lam and Hui, 2018).

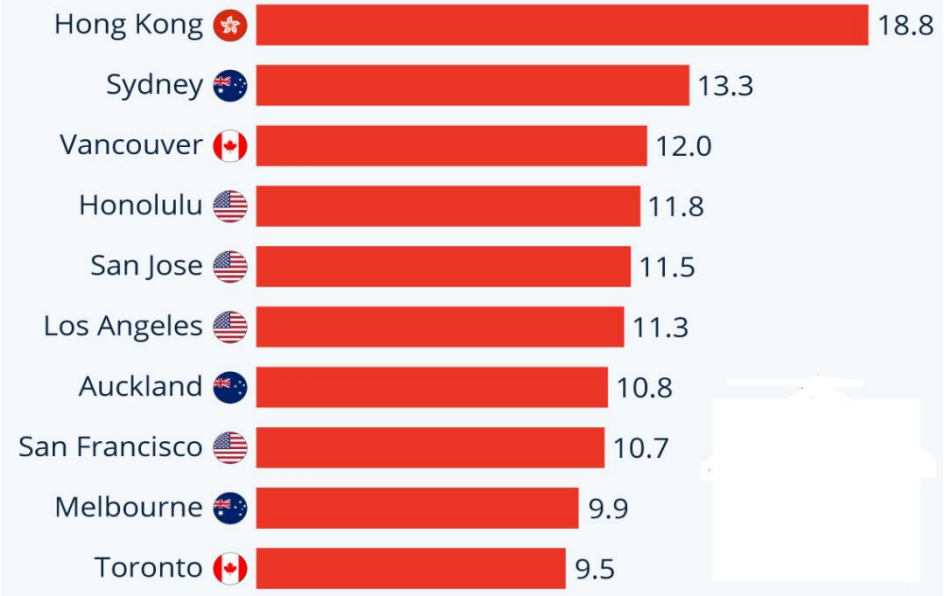

Figure 1: Housing Affordability in Major Housing Markets, 2023
Source: Annual Demographia International Housing Affordability Survey (2023).
Note: The figure shows least affordable international housing markets ranked by house price to annual income ratio (2023). In detail, the ratio is measured by median house price divided by median annual gross income.

The surge in financial volatility over the past two decades, coupled with the recognition of behavioural finance and economics by Nobel laureates Robert Shiller and Richard Thaler, has prompted scholars to explore the role of investor sentiment in asset pricing (Anusakumar and Wooi, 2017; Chen et al., 2019). Research indicates that investor sentiment, characterised by uncertainty about future cash flows and risk perceptions, influences asset prices beyond market fundamentals, with certain asset classes being more sensitive to sentiment fluctuations (Baker and Wurgler 2007). Understanding the dynamics of investor sentiment holds implications for asset pricing and market stability across different asset classes, particularly those deemed "hard to value" or characterised by limited arbitrage opportunities. Beyond meeting basic shelter needs, housing investments play a crucial role in wealth creation for individuals and the overall economy. However, there is currently no standardised measure of housing sentiment available for Hong Kong.

To address this issue, the current study attempts to construct a specific and valid sentiment index for Hong Kong properties to justify the price movement of Hong Kong residential properties. Sentiment is designed in the spirit of Baker and Wurgler (2007), who highlighted that the investor sentiment effect usually relates to speculative stocks that are difficult to arbitrage. Most previous studies assume that sentiment has a symmetric effect on residential property prices (Das et al., 2020), which is less true in practice and against Loss Aversion Theory (Kahneman and Tversky, 1979). An asymmetric effect emerges when the effect of increasing volatility differs from that of decreasing volatility. This could be due to the attitude

of housing market investors; for example, an investor who chose to increase his investment by 10% in times of higher sentiment may not decrease their investment by the same amount in the case of lower sentiment, and vice versa.

In addition, recent research has increasingly focused on exploring the asymmetric effects of market sentiment on housing prices, recognizing the nuanced and dynamic nature of sentiment-driven behaviour in real estate markets (Choi, 2019; Saydometov et al., 2020; Levy et al., 2020). This line of inquiry has gained prominence because of the recognition that market sentiment can exert disproportionate effects on housing prices, leading to nonlinear and asymmetric price adjustments. For instance, during periods of exuberance or speculative fervour, bullish sentiment may lead to exaggerated price increases, characterised by rapid escalation and unsustainable growth rates. Conversely, bearish sentiment can precipitate sharp declines in housing prices during downturns or periods of pessimism, reflecting heightened risk aversion and market corrections.

Hence, this study delves into the assessment of asymmetric effects of sentiment on housing prices, a relatively unexplored dimension in real estate markets. While studies of stock markets have shown that negative sentiment changes can have a more pronounced effect on asset prices than positive changes, limited and inconclusive evidence exists for real estate markets. In this study, we hypothesise an asymmetric effect of housing sentiment on residential property prices in Hong Kong and investigate whether the positive and negative sentiments impact housing prices differently.

Our study will focus on four types of high-rise properties categorised by size, ranging from 40 sqm to 160 sqm. We propose to construct a sentiment index using a comprehensive set of 11 economic and financial variables through Factor Analysis (FA) and Principal Component Analysis (PCA). We then examine the relationship between housing sentiment and prices within the Nonlinear Autoregressive Distributed Lag (NARDL) framework, considering both long- and short-term dynamics. Shin et al. (2014) developed NARDL based on the ARDL procedures of Pesaran et al. (2001), where cointegration estimation is possible when the explanatory variables are endogenous, irrespective of whether the regressors of the model are purely I (0), purely I (1), or cointegrated (Baharumshah et al., 2008; Yeap and Lean, 2017). NARDL is also advantageous for time series analyses. It allows us to simultaneously examine the asymmetry and nonlinear relationship between market sentiment and housing prices for both the long and short run. Although NARDL does not directly model asymmetric error correction, the asymmetric adjustment patterns of the disequilibrium between house prices and market sentiments (e.g., pessimistic, optimistic) can still be observed through dynamic multipliers. In addition, the study period will cover the booming and busting periods since the new millennium (2002Q1 to 2024Q2), which include the SARS epidemic (2003), Global Financial Crisis (2008), stock disaster (2016), political instability (2019), and the recent Covid-19 pandemic. In summary, this study is a pioneering effort using the NARDL approach to examine the asymmetric impact of self-constructed sentiment on housing prices in Hong Kong, during the bulls and bearish environments.

The remainder of this paper is organised as follows. A literature review of market sentiment in the Hong Kong residential property market is provided in Section 2, followed by the methodological setting in Section 3. Section 4 discusses the Policy Implications while Section 5 concludes.

2. Literature Review and Hypotheses Development

Since the literature on market sentiment is relatively new, most past studies examine the effect of sentiment on stock markets. However, real estate markets received less attention than stock markets, even though a large part of the uncertainty in the real estate market cannot be explained by rational behaviours and market fundamentals. Therefore, the influence of irrational behaviours and the related psychology of investors in the real estate market warrant further investigation.

The real estate market, characterised by heterogeneity, illiquidity, high transaction costs, market segmentation, and information asymmetries, presents a unique environment in which market sentiment can exert a significant influence. Unlike the stock market, real estate lacks short selling mechanisms that limit arbitrage opportunities. Consequently, it operates with reduced efficiency because the Efficient Market Hypothesis (EMH) assumes that all information is reflected in asset prices, unaffected by investor psychology or sentiment (Clayton et al., 2009; Lam and Hui, 2018; Saydometov et al., 2020). Contrary to EMH, recent empirical evidence suggests that market fundamentals alone cannot account for fluctuations in asset prices. Investor psychology and sentiment play pivotal roles in driving the real estate market dynamics (Hui et al., 2017; Lam and Hui, 2018).

Sentiment is an investor's belief regarding future price movements, and market sentiment is the aggregate attitude of investors. This investor sentiment is an important driver of property prices (Clayton et al., 2009). Hui and Wang (2014) argued that housing demand is also partially dependent on investor sentiment, but the limited housing literature has acknowledged this fact. The sentiment plays a more persistent role in the private market to take away the price from market fundamentals (Ling, Naranjo, and Scheick, 2014). Where the market of interest, Hong Kong, is mainly dominated by the private sector, market sentiment is expected to play a more persistent role. Freybote and Seagraves (2017) find that institutional investors generally refer their investment decisions to the sentiments of specialised real estate investors. Moreover, as the housing market rides the cycle, the changes in house price cannot be fully explained by the market fundamentals (Jin, Soydemir, and Tidwell, 2014), and some models appeal to exhibit an autoregressive pattern (Wang and Hui, 2017).

Few studies have used different indicators to construct sentiment indices for the real estate market (Hui and Wang, 2014; Wang and Hui, 2017; Lam and Hui, 2018). For instance, Hui and Wang (2014) developed a sentiment index from approximately two million market transactions recorded from 1991 to 2011. As it is impossible to predict or even guess such a large set of registrations of market transactions for the future (or even for the near future), this method cannot predict future investor sentiment and hence future price movements. On the other hand, Wang and Hui (2017) examine the predictive power of investor sentiment on three market indicators: price, rent, and volume of Hong Kong properties. Nonetheless, price, rent, sales volume, and rental alone are insufficient representations of the housing market. Lam and Hui (2018) construct a new measure of investor sentiment in the Hong Kong property market. However, these sentimental measures have limitations. First, the large number of 13 independent variables used would easily cause a multicollinearity problem. Second, they included two property price indices (University of Hong Kong HKUREIS and Centa-City Index CCI) as explanatory variables in sentiment index construction. These two independent variables indicate and measure the same varying factor and cause a multicollinearity problem. All the aforementioned studies focused on classical measures of investor sentiment; however,

we constructed a sentiment index from a group of financial and economic variables using principal component analysis to capture aggregate market demand.

The housing sentiment index is designed to represent aggregate investor behaviour. Some previous studies have examined the effect of investor sentiment on the price and return of the property market. For instance, Clayton et al. (2008) suggest a significant linkage between investor sentiment and real estate transactions. They also opine that, as there is no short selling in the property market, sophisticated participants cannot eliminate mispricing. Hui, Zheng, and Wang (2013) reported that sentiments are responsible for some mispricing in the property market. Hence, investor sentiment is expected to play a dominant role because of the absence of short selling in the real estate market.

Recently, skyrocketing but volatile housing prices in Hong Kong have gained great attention among scholars. Wang and Hui (2017) discovered that market sentiment is the key driver of Hong Kong housing prices and liquidity (volume), and its lagged term has an important bearing on housing rent. Lam and Hui (2018) find a significant but negative association between investor sentiment and future returns on Hong Kong residential property, where sentiments have a stronger effect on more speculative or hard-to-value assets. However, property prices have been increasing since the last 10 years (after the 2008 world financial crisis), irrespective of the warnings from different economists, academicians, and other organisations such as the Hong Kong Monetary Authority (Lam and Hui, 2018). In addition, Leung, Ng, and Tang (2020) argued that Hong Kong real housing rent and prices display patterns that decouple from economic fundamentals. In this context, we hypothesise that market sentiment significantly affects four residential housing prices in Hong Kong. In more detail, the current study examines the effect of non-fundamental factors (sentiments) and past values (sentiment lag effects) that contain the information content that explains the non-fundamental movement of housing prices in four classes of high-rise residential properties.

Hypothesis 1a: There is significant influence of market sentiment on housing price index (≤40sm).
Hypothesis 1b: There is significant influence of market sentiment on housing price index (≤70sm).
Hypothesis 1c: There is significant influence of market sentiment on housing price index (≤100sm).
Hypothesis 1d: There is significant influence of market sentiment on housing price index (≤160sm).

An important theory of market sentiment is the Loss Aversion Theory. Kahneman and Tversky (1979) originally used the term loss aversion in 1979 in a paper on subjective probability. In Kahneman's definition of loss aversion, "The response to losses is stronger than the response to corresponding gains". "Losses loom larger than gains" meaning that people by nature are aversive to losses. Loss aversion becomes stronger as the stakes of a gamble or choice increase. Prospect Theory and Utility Theory follow and allow the person to feel regret and anticipated disappointment for that, for example, in gambling. This helps explain the asymmetry of market transactions and market sentiment effects in housing markets as well.

To address the asymmetry effect, Hui and Wang (2014) and Wang and Hui (2017) constructed a sentiment index with positive and negative values. They appear as choppy-positive and-negative values, such as the volatility of market prices. These values could not be related to the market price for people's reference, for example, for the government to set the housing policy

and for home purchasers' price prediction and determination. The estimates are derived from massive past market transaction data of over two million registrations (Hui and Wang, 2014), which is cumbersome and difficult to use for forecasting or any other practical price evaluation. Beracha and Wintoki (2013), on the other hand, look at two keywords "real estate" and "rent." They propose that "real estate" reflects positive sentiment whereas "rent" reflects negative sentiment. They find that the search volume for "real estate" is predictive of future home prices but not for "rent." They concluded that a change in positive sentiment is associated with home prices, but a change in negative sentiment is not.

Moreover, research has highlighted the presence of asymmetries in the transmission of sentiment shocks to housing prices, with evidence suggesting that negative sentiment shocks tend to have more pronounced and persistent effects than positive ones (Hui and Wang, 2014; Saydometov et al., 2020). Saydometov, et al. (2020) further noting a stronger response during recessionary periods. This asymmetry may reflect behavioural biases such as loss aversion, in which individuals are more sensitive to losses than gains, leading to stronger reactions to negative news or sentiment signals. Choi (2019) and Levy, et al. (2020) add to this by demonstrating the asymmetric nature of these effects, with Choi (2019) finding that different cities react differently to positive and negative information using the GJR-GARCH (1,1) model, and Levy, et al. (2020) showing that framing effects can exacerbate these asymmetries. By acknowledging the nonlinear and asymmetric nature of sentiment-driven price dynamics, researchers and policymakers can enhance their understanding of housing market dynamics and develop more robust risk-management strategies to promote market stability and resilience. The following shows the hypotheses on the asymmetric effect of market sentiment on housing prices in Hong Kong.

Hypothesis 2a: Asymmetric Sentiment effects on housing price index (≤40sm) are significant.
Hypothesis 2b: Asymmetric Sentiment effects on housing price index (≤70sm) are significant.
Hypothesis 2c: Asymmetric Sentiment effects on housing price index (≤100sm) are significant.
Hypothesis 2d: Asymmetric Sentiment effects on housing price index (≤160sm) are significant.

3. Data and Methodology

The proposed methodology section consists of two sections. The first section discusses the construction of the Sentiment Index and provides the data description and sources. The second section then covers the NARDL method for assessing the asymmetric effect of the sentiment index on housing prices. The research framework of this study is summarised in Figure 2.

Housing Sentiment Index and Data Description

We will construct the sentiment index for the Hong Kong Housing Market from a set of 11 financial and global variables using the Factor Analysis (FA) - Principal Component Analysis (PCA) method. These financial variables have the potential to affect investor sentiment, as indicated in previous studies and industry reports. The set of eleven financial variables, as shown in Figure 2, is derived from the housing market (4), the financial (5), and global markets (2). This method of composing the sentiment index has been used in previous studies (Chen et al., 2014; Hui et al., 2017; Lam and Hui, 2018).

Chen et al. (2014) constructed the sentiment index for an Asian market i.e., the PRC stock market. They developed a measure of investor sentiment by using six variables of market turnover, the number of new accounts, changes in industrial production, change in money supply, interest rate, and exchange rate. First, the six variables were standardised. Then the

eigenvalue and eigenvector of their covariance matrix were obtained. Then the sentiment index was evaluated by using a linear combination of the six variables by using the eigenvector associated with the largest eigenvalue as the corresponding weight. We follow a similar procedure but with different market and housing variables (see Figure 2) which relate to the present study.

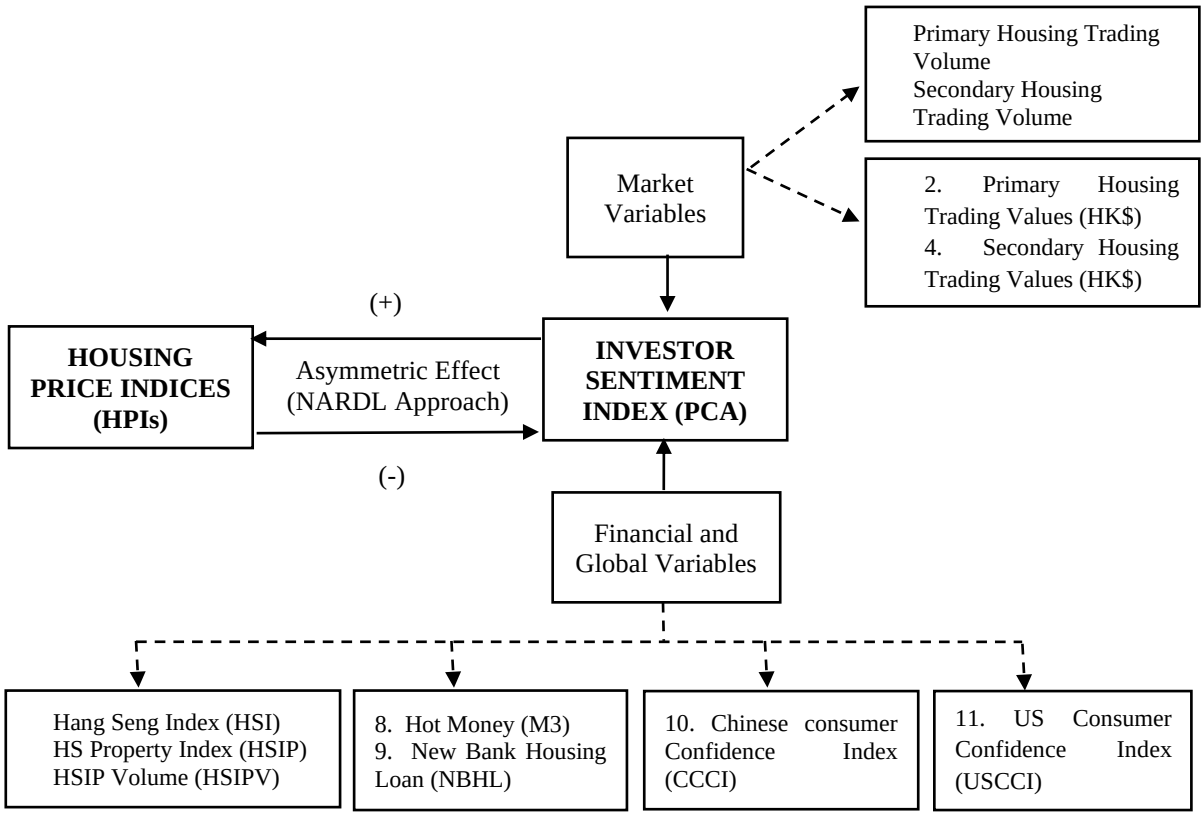

Figure 2: Research Framework
Source: Authors' own work.

Our analysis will span from 2002Q1 to 2024Q2, which covers the booming era and declining periods of the SARS epidemic (2003), Global Financial Crisis (2008), Stock disaster (2016), Political instability (2019), and the recent Covid-19 Pandemic. In the current study, we will select four classes of high-rise residential property indices by house area. These four different classes of residential properties (see Table 1) are with floor areas of up to ≤ 40 sqm (HPI40); 40sqm – 69.9sqm (HPI70); 70sqm – 99.9sqm (HPI100); and 100sqm – 159.9sqm (HPI160).

Table 1: Price Indices of four Classes of Residential Properties in Sq. meters

Classes of Residential Properties in sq. m	Up to ≤40sm	40sm<<70sm	70sm<<100sm	100sm<≤ 160sm
Price Indices	HPI40	HPI70	HPI100	HPI160

However, we will not use the residential properties indices covering a land area of more than 160 square metres. The unit price of this class of residential properties could vary tremendously because many of these properties are luxurious properties in various prestigious, scenic, and choicest locations; and could have unique styles, designs, and historical values. Thus, it is less accurate or not meaningful to evaluate these luxury properties with the average market values as indicated by the Hong Kong Government Statistics and Census Department.

Other than housing indices, a comprehensive set of eleven financial and global variables were used to construct the sentimental index. The respective data description and sources of the collection are provided in Table 2. Market proxies consider the market factors that influence the Hong Kong housing market directly, such as trading volume and market price. Phan et al. (2015) advocated that certain industry characteristics such as trading volume can predict stock or housing returns (or prices). While the financial variables (e.g., hot money supply, new bank loan) and global variables (e.g., China consumer confidence index, and the US consumer confidence index) are selected because they would substantially affect the market sentiments and trading of the housing market.

Table 2: Sentiment Index Proxies, Categories, and Symbols

Category	Symbol	Description	Data Sources
Housing Prices	HPI40, HPI70, HPI100, HPI160	Four classes of high-rise residential property indices	Hong Kong Rating and Valuation Department
Sentiment Index Construction			
Housing Market	HPU	Housing Primary Trading Volume Units	The Land Registry, The Government of the Hong Kong Special Administrative Region
	HPV	Housing Primary Trading Value (HK$)	
	HSU	Housing Secondary Trading Volume Units	
	HSV	Housing Secondary Trading Value (HK$)	
Stock Market	HSI	Hang Seng Index	Investing.com
	HSIP	Hang Seng Property Index	SandP Global
	HSIPV	Hang Seng Property Index Volume	Yahoo Finance
Capital Market	M3	Hot Money	Hong Kong Monetary Authority
	NBHL	New Bank Housing Loan	Hong Kong Monetary Authority
Global Market	CCCI	Chinese Consumer Confidence Index	OECD database
	USCCI	US Consumer Confidence Index	OECD database

We do not apply control variables in the study, as had done by Huang et al. (2015). Instead, we include the economic variables directly in building the sentiment index, because a strong correlation between sentiment indices and macroeconomics indicators has been witnessed in past studies, such as (Chen et al., 2014).

Since the housing market is correlated strongly with the local stock market, three indices were selected from the Hong Kong stock market to represent housing market investor sentiments. Further, as changes in the capital market highly influence investor sentiments, hence we adopted two proxies from the Capital Market of Hong Kong. Lastly, as the small open economy of Hong Kong is integrated highly with the Chinese market and the international market, therefore, the Chinese Consumer Index (PRCCCI) was adopted as a proxy for the Chinese market and the US Consumer Index (USCCI) for the international market. Finally, different proxies from the Hong Kong housing market, stock market, capital market, and global market were considered to capture a complete picture of investor sentiments. To summarise, the sentiment index constructed is as:

$$SENT_t = W1Y1 + W2Y2 + \cdots W_N Y_N \quad (1)$$

where Ws are the factors weights and Ys are the principal component scores generated by the factor analysis and PCA based on the eleven financial series mentioned in Figure 2. These

series were gleaned from DataStream, OECD, Hong Kong Monetary Authority, and Hong Kong Rating and Valuation Department. The data are then cross-checked with different sources e.g., various government and commercial institute statistical records of Hong Kong, PRC, and the USA, and other online sources.

Nonlinear ARDL Modeling

With the constructed investor sentiment index, we then proceed to assess the sentiment effect on the Hong Kong housing market. Based on past studies, the asymmetric effects of investor sentiment are generally observed in financial markets (Dhaoui and Bacha, 2017; Li, 2015; Ni et al., 2015). This effect indicates that the positive sentiment and negative sentiment may not cause the same effect on a particular financial asset, trading volume, price movement, and the financial market return (e.g., stocks). Conventional econometric procedures would not work efficiently to capture such effects directly in both the long-run and short-run (Pesaran, Shin, and Smith, 2001).

A convenient way is to employ the Non-Linear Autoregressive Distributed Lag (NARDL) approach advocated by Shin and Greenwood-Nimmo (2014). NARDL can capture the asymmetry of the long run relationship among the variables. All the response variables should be I (1) and the explanatory variables could be the combination of I (0) and I (1), but no I (2) variable allowed. This is the extension of the well-known ARDL approach of Pesaran et al. (2001) based on the bound test and unrestricted error correction modelling. When deviation or economic shocks happen, the variables may have different speeds of adjustment to reach the equilibrium state. The NARDL can evaluate such phenomena even under asymmetric conditions. The basic model specification is first presented as:

$$HPI_{i,t} = \alpha_0 + \alpha_1 SENT_t + \alpha_3 CRISES_t + \varepsilon_t \qquad (2)$$

In Equation (2), HPI_t is the housing price index i at time t. The value of i changes between HPI40, HPI70, HPI100, and HPI160. $SENT_t$ is the sentiment index that is constructed based on Factor Analysis – Principal Component Analysis. $CRISES_t$ is a dummy variable that captures the past financial turmoil, including Asia Financial Crises (1997), the Dot-com crisis (2001), the SARS epidemic (2003) and Global Financial crisis (2008). Further, α_0 is the equation intercept and ε_t is the white noise term without contemporaneous correlation. Then, the dynamic adjustment mechanism is introduced in Equation (3) to differentiate the short-run effects from the long-run effects. The new specification is presented below:

$$\Delta HPI_{i,t} = \sigma_1 + \Sigma\sigma_2 \Delta LnHPI_{t-1} + \Sigma\sigma_3 \Delta LnSENT_{t-j} + \Sigma\sigma_4 \Delta CRISES_{t-j} + \Theta_1 LnHPI_{t-1} + \Theta_2 LnSENT^{+}_{t-1} + \Theta_3 \Delta LnSENT_{t-1} + \Theta_4 LnCRISES_{t-1} + \varepsilon_t \qquad (3)$$

In Equation (3), the first difference operator is Δ, equation constant term σ_1, and the error term ε_t. The short-run effects are captured by the first difference operators. While the long-run effects are obtained through the estimates of (Θ_2 *to* Θ_4), these long-run estimates are normalised on Θ_1. For the long-run effects to be valid, the variables should be cointegrated in the long-run. Basically, in a two-stage process, first, the long-term cointegration is established, supported by the Pesaran et al., (2001) bound test (F-stat.) and error correction (ECM_{t-1}) with joint significance of lagged level variables. Second, the long-term parameters are estimated in the autoregressive distributed lag framework.

Since our objective is to examine the asymmetric effect of investor sentiment on housing prices. Therefore, using the partial sum concept of Shin and Greenwood-Nimmo (2014), we decomposed the sentiment variable into its positive and negative changes. Where the total changes in the sentiment index are equal to the sum of negative changes and positive changes as indicated in Equation (4):

$$LnSENT_t = \sum_{j-1}^{t} \Delta LnSENT_t^+ + \sum_{j-1}^{t} \Delta LnSENT_t^- \quad (4)$$

The positive changes and negative changes in the sentiment index are captured via Equation (5) and Equation (6), respectively.

$$LnSENT_t = \sum_{j-1}^{t} \Delta LnSENT_t^+ = \sum_{j-1}^{t} max\left(\Delta LnSENT_j, 0\right) \quad (5)$$

$$LnSENT_t = \sum_{j-1}^{t} \Delta LnSENT_t^- = \sum_{j-1}^{t} min\left(\Delta LnSENT_j, 0\right) \quad (6)$$

With Eq (5) and Eq (6) considered, the new model specification is shown below as Eq (7):

$$\Delta HPI_{i,t} = \gamma_1 + \Sigma^{n1}\gamma_2 \Delta LnHPI_{t-1} + \Sigma^{n2}\gamma_3 \Delta LnSENT_{t-j}^+ + \Sigma^{n3}\gamma_4 \Delta LnSENT_{t-j}^- + \Sigma^{n4}\gamma_5 \Delta CRISES_{t-j} + \rho_1 LnHPI_{t-1} + \rho_2 LnSENT_{t-1}^+ + \rho_3 LnSENT_{t-1}^- + \rho_4 LnCRISES_{t-1} + \varepsilon_t \quad (7)$$

Shin and Greenwood-Nimmo (2014) argued that while testing for the long-term cointegration, irrespective of one additional variable in the nonlinear model, the Pesaran, Shin and Smith (2001) bound test is applicable with the same critical values. Once the nonlinear models are tested and long-term cointegration is established, a few of the asymmetric effects can be calculated. First, the alternate hypothesis of long-run asymmetric effect ($\frac{\rho_2}{-\rho_1} \neq \frac{\rho_3}{\rho_1}$) is tested. Second, the short-run effect will be considered asymmetric, if at the same lag either size or sign of the coefficient attached to $SENT^+$ is different from $SENT^-(\gamma_3 \neq \gamma_4)$. Short-run impact asymmetric will be true if the sum of the coefficients attached to $SENT^-$ are different from the same sum attached to $SENT^+$ ($\Sigma\gamma_3 \neq \Sigma\gamma_4$). The long-run and short-run asymmetric effects are tested via Wald tests (Wald-L and Wald-S).

4. Policy Implications

The Hong Kong property market has long been mired in a paradoxical scenario characterised by a confluence of limited housing supply, government policies, speculative demand, and lucrative profits for property developers. This dichotomy has exacerbated the challenges faced by over half of Hong Kong families struggling with home ownership while simultaneously fostering significant wealth accumulation for developers. Moreover, this division widened the income gap between the business elite and the general public, consolidating the dominance of various business conglomerates across essential market sectors vital for the livelihoods of average citizens.

In light of the study's insights into the predictive power of sentiment and its asymmetric effects, which align with Loss Aversion Theory, it is imperative for policymakers and market participants to leverage this understanding in shaping interventions. By integrating investor sentiment knowledge into decision-making processes, policymakers can better anticipate market movements and design effective interventions to address housing affordability

challenges. This necessitates a flexible approach that combines regulatory measures and incentives to foster a balanced and sustainable housing market in Hong Kong.

To this end, policymakers should prioritise the ongoing monitoring and evaluation of implemented policies to gauge their effectiveness and adapt them as necessary. Data-driven decision-making and the continuous assessment of policy outcomes are essential for maintaining market stability and proactively addressing emerging challenges. By remaining vigilant and responsive to evolving market dynamics, policymakers can strive to achieve greater equity and accessibility in the Hong Kong housing market.

5. Conclusion

This study aims to address the research gap by investigating the interplay between fundamental and non-fundamental (market sentiment) factors in determining property prices of Hong Kong's high rise residential market. We propose the construction of a sentiment index tailored to Hong Kong properties, aiming to justify housing price movements and provide a comprehensive measure of market sentiment. Spanning from 2002Q1 to 2024Q2, the study period encompasses diverse market conditions, including periods of both bullish and bearish sentiment, pre- and post-pandemic. The index is designed to capture the complexities of sentiment-driven behaviour in real estate markets. This study further delves into the relatively unexplored dimension of the asymmetric effects of market sentiment on housing prices. By hypothesising and investigating the differential impacts of positive and negative sentiments on housing prices, this study contributes to a nuanced understanding of market dynamics and, hence, the assessment of the Loss Aversion Theory. In conclusion, this study contributes to a deeper understanding of the complex interplay between market sentiment and housing prices in Hong Kong, offering valuable insights into market dynamics, predictive capabilities, and policy implications for addressing housing affordability challenges.

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