Determinants of Residential Property Prices in Japan: An Analysis of Different Monetary Policy Regimes

Takayasu Ito

Meiji University, School of Commerce

Abstract

Residential property prices in three regions in Japan are influenced by stock price, but not by interest rate, in the first period of sample period, from April 2008 to March 2014. Financial crises, such as the Lehman shock, cause stagnation in asset markets, but the wealth effect from stock to the real estate market holds. The sensitivity of interest rates to residential property markets is not confirmed. Furthermore, the monetary policy adopted by the Bank of Japan (BOJ) is not as strong in the second period. Residential property prices are influenced both by stock price and interest rate in the second period, from April 2014 to August 2019. The wealth effect from stock to the real estate market holds. The aggressive non-traditional monetary policy enacted by the BOJ flattens the yield curve of long-term interest rates. Comparing the impact of stock price and interest rate in the three regions under study, Tokyo enjoys the greatest effects. The strong non-traditional monetary policy contributes to the mitigation of asset deflation in the form of increasing residential property prices.

Keywords: Interest Rate, Property Price, Monetary Policy, Stock Price.

1. Introduction

This paper focuses on the real estate market in Japan under different monetary policy regimes. The purpose of this paper is to investigate the impact of stock price and interest rate on the real estate market in Japan. The real estate market under analysis entails real residential property prices in three major regions in Japan: Tokyo, Nagoya, and Osaka.[1] The entire sample period is divided into two. The first period is prior to the introduction of a weak non-traditional monetary policy.

[1] The regions of Tokyo, Nagoya, and Osaka are at the prefectural level. Nagoya is the capital city of the Aichi prefecture.

The Bank of Japan (BOJ) adopts a comprehensive easing policy in this period. The second period is after the introduction of a strong non-traditional monetary policy. The BOJ introduces "quantitative and qualitative easing (QQE) " on April 4, 2013. After winning a majority in the Lower House election on December 16, 2012, Mr. Shinzo Abe was elected to a second term as the prime minister of Japan. He advocates Abenomics, a portmanteau of "Abe" and "economics", which is based upon three pillars: fiscal stimulus, aggressive monetary easing, and structural reform. QQE is introduced in accordance with Abenomics.

The BOJ introduce a "negative interest rate policy (NIRP)" on January 29, 2016. They introduce "yield curve control (YCC)" on September 21, 2016, while maintaining the NIRP. They indicate that the "target of the 10-year Japanese Government Bond (JGB) yield is around 0%" and strengthen the framework for continuous powerful monetary easing while maintaining the NIRP and YCC.[2]

Two important issues are examined in this paper. First, what is the relationship between the residential property market and stock price? Investors are supposed to hold real estate and stock as risk assets. Kapopoulos and Siokis (2005) suggest that one of the mechanisms for interpreting the relationship between investment in real estate and in stock is the wealth effect. Investors who make unanticipated gains in share prices will invest in real estate. Hence, the stock market will lead the housing market.

Second, what is the relationship between the residential property market and interest rate? Results obtained by Akimov et al. (2015) and Chaney and Hoesli (2010) show that returns from real estate and real estate investment trusts (REITs) are influenced by interest rate movements. This is mainly because purchasers borrow money from banks for the aquisition of real estate. Thus, higher interest rates increase the costs of obtaining real estate.

This paper makes four original contributions to the extant literature. First, Lin and Lin (2011) cover a sample period of weak non-traditional monetary policies. This paper covers the sample period from April 2010 to August 2019. Second, the entire sample period is divided into two. The latter half includes strong non-traditional monetary policies, such as QQE and the NIRP. Third, this paper analyzes residential property prices in three major regions: Tokyo, Nagoya, and Osaka.

[2] For the details of the monetary policy, see BOJ(2010), BOJ (2013), BOJ (2016a), BOJ (2016b), and BOJ (2018).

Fourth, this paper is the first to use the Residential Property Price Index, compiled by the Ministry of Land, Infrastructure, Transport and Tourism, for the analysis of determinants of residential property prices in Japan.

The remainder of this paper is structured as follows. Section 2 contains a literature review. Section 3 describes the data and provides summary statistics. Section 4 discusses the methodology and the results. Section 5 presents the conclusion to this study.

2. Literature Review

So far, the number of related studies analyzing the impact of stock prices and interest rates on the real estate market in Japan is very small. Lin and Lin (2011) show that stock markets are integrated with real estate markets in Japan. The stock market and real estate market will reach equilibrium in the long run.

Except for Lin and Lin (2011), related studies tend to analyze the effects of the relationship between stock price and interest rate on real estate markets other than that in Japan. Akimov et al. (2015) examine the sensitivity of real estate securities in six key global markets to unexpected changes in the level, slope, and curvature of the yield curve. They confirm the time-sensitive nature of exposure and sensitivity to interest rates and highlight the importance of considering the entire term structure of interest rates.

Coskun (2018) explores the connection between wealth effects, arising from stock and housing market channels, and final household consumption for 11 advanced countries over the period from 1970 Q1 to 2015 Q4. Chan et al. (2010) conclude that the crisis regime is characterized by higher levels of volatility and sharply negative stock returns, along with evidence of contagion between stocks, oil, and real estate in the US.

Chaney and Hoesli (2010) find that the risk premium, the state of the macroeconomic environment, the degree of rotation of the interest curve, and the remaining lifetime of property are the prime determinants of interest rate sensitivity. The results of Gokmenoglu and Hesami (2019) indicate a long-term relationship between stock prices and real estate prices, which suggests that there are no diversification benefits from allocating stock and real estate assets in a portfolio.

Heaney and Sriananthakumar (2012) conclude that a multivariate analysis of Australian real

estate and share market quarterly returns, spanning the period from the third quarter of 1986 to the third quarter of 2009, suggests that the correlation between real estate returns and share market returns is time-varying. Kakes and Van den End (2004), by comparing different segments of the Dutch housing market, posit that the relationship between stock prices and house prices is strongest for the most expensive segment, and is also related to homeowners' stock market exposure.

The findings of Kapopoulos and Siokis (2005) are in favor of the wealth effect hypothesis for Athens real estate prices, but not for other urban real estate prices. Since real estate in the Athens Metropolitan area could be considered as an investment vehicle, it is reasonable to argue that higher stock prices increase the share of households' portfolios in the stock market

Liow and Ye (2018) conclude that, during high-volatility periods in securitized property markets, stock market returns and, to some extent, changes to foreign exchange market rates impose a strong and positive impact on securitized real estate market returns in 10 economies. Liu and Chen (2016) investigate the nonlinear relationships and volatility spillovers among house prices, interest rates, and stock market prices in Taiwan using monthly data from January 1985 to March 2009.

The results of Martins' (2016) study indicate that bank stocks are sensitive to real estate market conditions and there is a positive relationship between bank stock returns and real estate returns after controlling for general market conditions and interest rate changes.

Lean and Smyth (2014) examine the dynamic connections between house price indices, interest rates, and stock prices in Malaysia using cointegration and Granger causality testing. They find that house prices, stock prices, and interest rates are not cointegrated. Wen and Hao (2013) imply that Chinese investors would prefer to channel their funds into stock markets and high-interest-rate-bearing bank deposits in order to maintain a balance between risk and high returns on investment, while higher interest rates also increase the cost of borrowing for property buyers.

3. Data

The data used for the analysis in this study are on a monthly basis. The Residential Property Price Index is used for real estate prices. According to the Ministry of Land, Infrastructure, Transport and Tourism, it is an index of prices of residential properties (residential plots of land

and unit ownership buildings) nationwide that is calculated based on the data accumulated through the System to Provide Real Estate Transaction Price Data (Land General Information System), operated by the MLIT, with the quality of each property adjusted using a hedonic approach. The regions chosen for the analysis of this paper are Tokyo, Nagoya, and Osaka.

The TOPIX (Tokyo Stock Price) Index is used for stock prices. According to the Japan Exchange Group (2019), "TOPIX is a free-floating, adjusted, market capitalization-weighted index calculated on the basis of all the domestic common stocks listed on the TSE First Section". TOPIX shows the measure of current market capitalization, assuming that the market capitalization as of the base date (January 4, 1968) is 100 points. Swap rates of 20 years are used as interest rates because they are closely related to the long-term fixed interest rate for housing loans. These data are provided at the end of each month by Datastream.

The entire sample period from April 2008 to August 2019 is divided into two. The first period, Sample A, is from April 2008 to March 2014. The second period, Sample B, is from April 2014 to August 2019. The monetary policies in Samples A are weak non-traditional policies, such as comprehensive easing. The monetary policies in Sample B are QQE and the NIRP. The descriptive statistics of the data are provided in Table 1. The movements of property price, TOPIX, and swap rate are provided in Figures 1, 2, and 3, respectively.

Table 1

Figure 1

Figure 2

Figure 3

4. Methodology and Results

4.1 Methodology

This section sets out the way in which the effects of the relationship between stock price and interest rate on the real estate market are analyzed. Ordinary Least Squares (OLS) regression is used to estimate equation (1). The serial correlation and heteroscedasticity of ε_t are adjusted using the same method as that used by Newey and West (1987). Lag periods of 12 are used. Equation (1) explains the impact of stock prices and interest rates on the residential property

market. An analysis of each sample period is then conducted.

$$\ln(Property)_t = \alpha + \beta_1 \ln(TOPIX)_t + \beta_2 \ln(Interest\ Rate)_t + \varepsilon_t \quad (1)$$

where Property = Residential Property Price Index; TOPIX = TSE Stock Index; Interest Rate = swap rates of 20 years.

4.2 Interpretation of Regression

Four sets of results using OLS regression are shown in Table 2. The results of Case 2, where all the coefficients of the regressions are statistically significant, enable the conclusion to be drawn that an increase in stock prices (interest rates) has a positive (negative) impact on the property price index.

Table 2

4.3 Results

The results of the regression analysis of Sample A indicate that all the positive coefficients of TOPIX are statistically significant at the 1% level (Tokyo and Osaka) or the 10% level (Nagoya). However, the coefficients (negative – Osaka, positive – Tokyo and Nagoya) of interest rate are not significant at the 10% level. The results of the regression analysis of Sample B indicate that all the positive coefficients of TOPIX are statistically significant at the 1% level. All the negative coefficients of interest rate are significant at the 1% level (Tokyo and Nagoya) or the 5% level (Osaka). Case 2 in Table 2 applies to Sample B. The results are shown in Table 3.

Table 3

5. Conclusion

The purpose of this paper is to investigate the impact of stock price and interest rate on the real estate market in Japan. The real estate market analyzed includes residential property prices in three major regions in Japan: Tokyo, Nagoya, and Osaka. The entire sample period is divided into

two. The first period is prior to the introduction of a strong non-traditional monetary policy. The BOJ adopts a comprehensive easing policy during this period. The second period is after the introduction of strong non-traditional monetary policies, such as QQE and the NIRP.

Residential property prices in the three regions under study are influenced by stock price, but not by interest rate, in the first period, from April 2008 to March 2014. Financial crises, such as the Lehman shock, cause stagnation in asset markets, but the wealth effect from stock to real estate markets holds. The sensitivity of interest rates to residential property markets is not confirmed. Furthermore, monetary policies adopted by the BOJ are not as strong in the second period.

Residential property prices are influenced both by stock prices and interest rates in the second period, from April 2014 to August 2019. The wealth effect from stock markets to real estate markets holds. The aggressive non-traditional monetary policy enacted by the BOJ flattens the yield curve of long-term interest rates. In addition to bullish stock markets, lower interest rates cause price increases for residential properties. Comparing the impact of interest rates in the three regions, Tokyo enjoys the greatest effects. This point coincides with the fact that the increase in residential property prices in Tokyo is higher than in Nagoya and Osaka. Strong non-traditional monetary policies contribute to the mitigation of asset deflation in the form of increasing residential property prices.

This paper analyzes residential property prices in three major cities. There is room to analyze the prices of residential properties in rural areas. There is also a need to focus on commercial properties in future studies.

References

Akimov, A., Stevenson, S., and Zagonov, M. (2015), “Public Real Estate and the Term Structure of Interest Rates: A Cross-Country Study,” *Journal of Real Estate Finance and Economics*, Vol. 51, No. 4, pp. 503-540.

Bank of Japan (2010), http://www.boj.or.jp/en/announcements/release_2010/k101005.pdf.

Bank of Japan (2013), http://www.boj.or.jp/en/announcements/release_2013/ k130404a.pdf.

Bank of Japan (2016a), http://www.boj.or.jp/en/announcements/release_2016/ k160129a.pdf.

Bank of Japan (2016b), http://www.boj.or.jp/en/announcements/release_2016/ k160921a.pdf.

Bank of Japan (2018), http://www.boj.or.jp/en/announcements/release_2018 /k180731a.pdf.

Chaney, A., and Hoesli, M. (2010), "The Interest Rate Sensitivity of Real Estate," *Journal of Property Research*, Vol. 27, No. 1, pp. 61-85.

Chan, K. F., Treepongkaruna, S., Brooks, R., and Gray, S. (2010), "Asset Market Linkages: Evidence from Financial, Commodity and Real Estate Assets," *Journal of Banking & Finance*, Vol. 35, No. 6, pp. 1415-1426.

Coskun, Y., Atasoy, B.S., Morri, G., and Alp, E. (2018), "Wealth Effects on Household Final Consumption: Stock and Housing Market Channels," *International Journal of Financial Studies*, Vol. 6, No. 2, pp. 1-32.

Gokmenoglu, K., and Hesami, S.(2019), "Real Estate Prices and Stock Market in Germany: Analysis Based on Hedonic Price Index," *International Journal of Housing Markets and Analysis*, Vol. 12, No. 4, 687-707.

Heaney, R., and Sriananthakumar, S. (2012), "Time-varying Correlation between Stock Market Returns and Real Estate Returns," *Journal of Empirical Finance*, Vol. 19, No. 4, pp. 583-594.

Kakes, J., and Van den End, J.W. (2004), "Do Stock Prices Affect House Prices? Evidence for the Netherlands," *Applied Economic Letters*, Vol. 11, No. 12, pp. 741-744.

Kapopoulos, P., and Siokis, F. (2005), "Stock and Real Estate Prices in Greece: Wealth versus 'Credit-Price' Effect," *Applied Economics Letters*, Vol. 12, No. 2, pp. 125-128.

Lean, H.H., and Smyth, R.(2014), "Dynamic Interaction between House Prices and Stock Prices in Malaysia," *International Journal of Strategic Property Management*, Vol. 18, No. 2, pp. 163-177.

Liow, K.H., and Ye, Q. (2018), "Regime-Dependent Linkages between Securitized Real Estate Market and Major Financial Markets: Some International Evidence," *Pacific Rim Property Research Journal*, Vol. 24, No. 3, pp. 225-247.

Lin, T.C., and Lin, Z. (2011), "Are Stock and Real Estate Markets Integrated? An Empirical Study of Six Asian Economies," *Pacific-Basin Finance Journal*, Vol. 19, No. 5, pp. 571-585.

Liu, H.H., and Chen, S.H. (2016), "Nonlinear Relationships and Volatility Spillovers among House Prices, Interest Rates and Stock Market Prices," *International Journal of Strategic Management*, Vol. 20, No. 4, pp. 371-383.

Martins, A.M., Serra, A.P., and Martins, F.V. (2016), "Real Estate Market Risk in Bank Stock

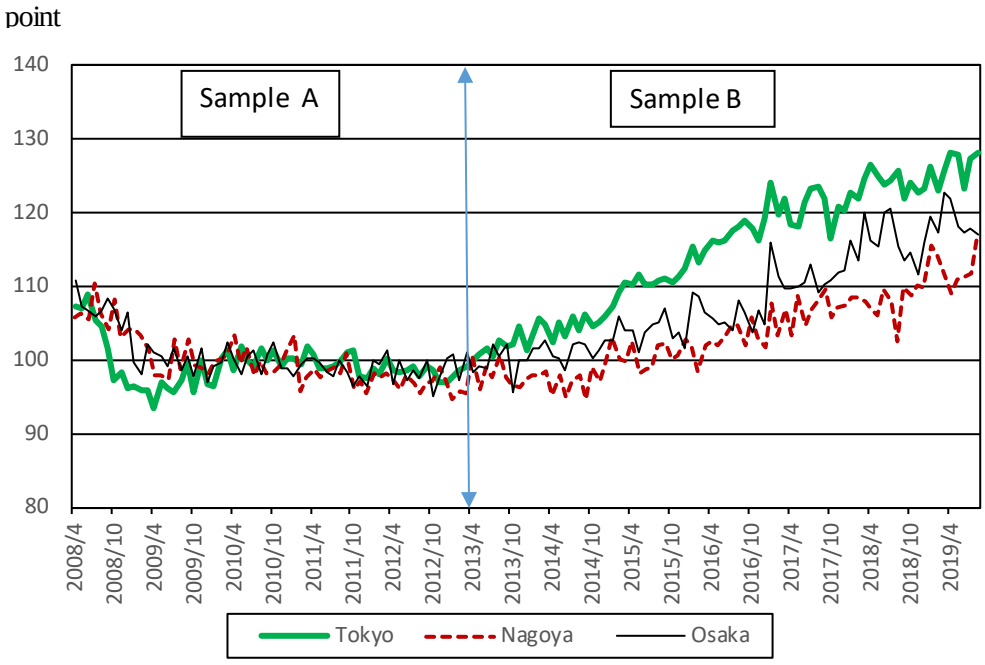
Returns: Evidence for 15 European Countries," *International Journal of Strategic Property Management*, Vol. 20, No. 2, pp. 142-155

Japan Exchange Group (JPX) (2019), https://www.jpx.co.jp/english/markets/indices/topix/

Newey, W.K., and West, K.D. (1987) "A Simple, Positive Semi-Definite, Heteroskedasticity and Autocorrelation Consistent Covariance Matrix," *Econometrica*, Vol. 55, No. 3, pp. 703-708.

Wen, L., and Hao, Q. (2013), "Consumer Investment Preferences and the Chinese Real Estate Market," *International Journal of Housing Markets and Analysis*, Vol. 6, No. 2, pp. 231-243.

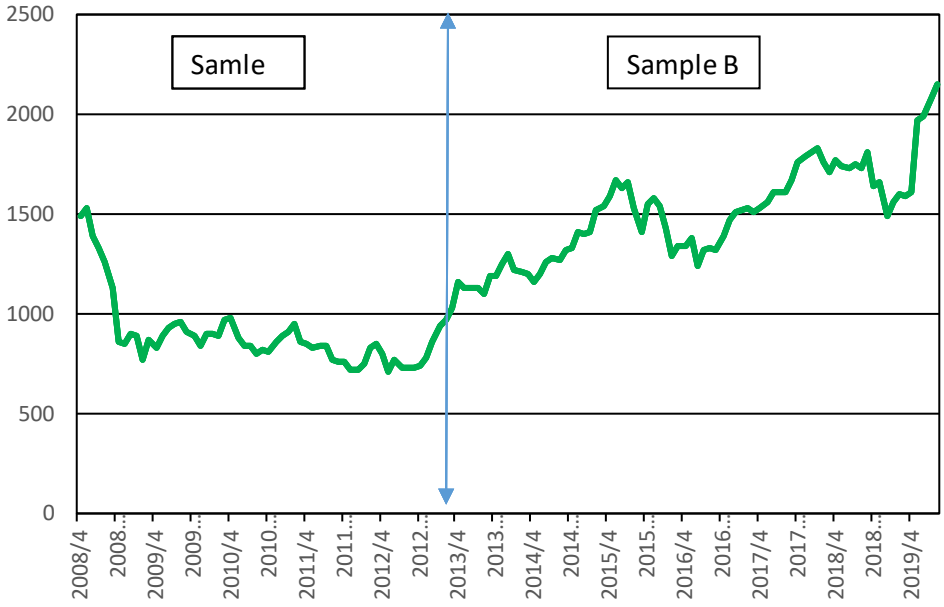
Figure 1Residential Property Price Index



Notes: Data source is Ministry of Land, Infrastructure, Transport and Tourism.
Sample A is from April 2008 to March 2013.
Sample B is from April 2013 to August 2019.

point

Figure2 TOPIX



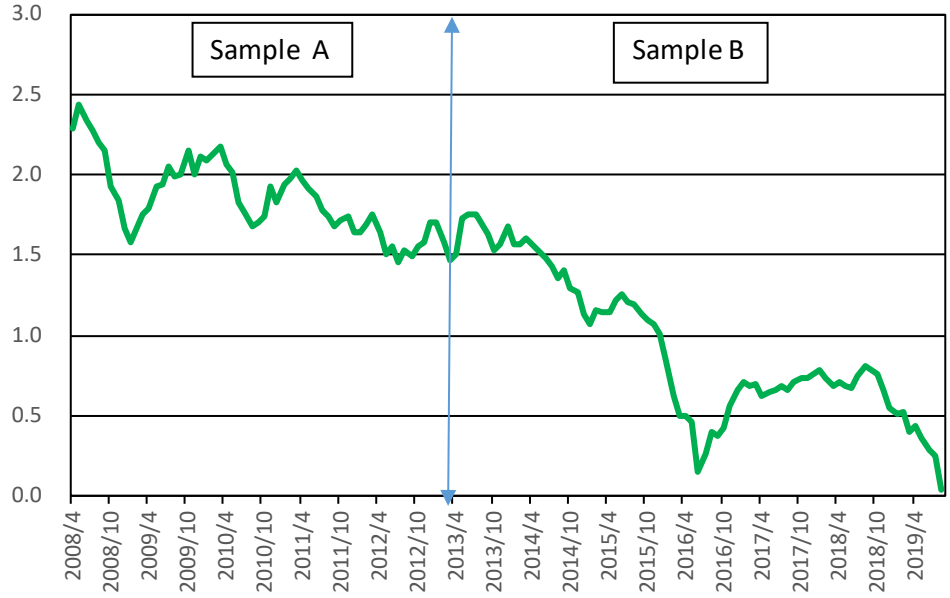
Notes: Data source is Datastream.

Sample A is from April 2008 to March 2013.

Sample B is from April 2013 to August 2019.

Figure 3 Swap Rate of 20 Years

%



Notes: Data source is Datastream.

Sample A is from April 2008 to March 2013.

Sample B is from April 2013 to August 2019.

Table 1 Descriptive statistics of data

Variable	Average	SD	Min	Max	Median
Sample A					
Tokyo	99.30	2.89	93.38	108.96	99.00
Nagoya	99.80	3.47	94.79	110.29	98.81
Osaka	100.41	3.25	95.12	110.78	99.87
TOPIX	902.03	175.52	719.49	1,538.62	860.37
Y20	1.85	0.24	1.46	2.43	1.81
Sample B					
Tokyo	114.82	8.67	99.95	128.11	116.32
Nagoya	103.49	5.30	94.74	116.97	102.63
Osaka	107.94	6.85	95.53	122.62	106.46
TOPIX	1,504.55	238.51	1,106.05	2,151.82	1,523.85
Y20	0.92	0.45	0.05	1.76	0.76

Notes : Sample A is from April 2008 to March 2013.
Sample B is from April 2013 to August 2019.
Tokyo, Nagoya and Osaka are Property Index in each region.
TOPIX = TSE STOCK Index. Interest Rate = Swap Rate 20 Year.

Table 2 Interpretation of regression

Case	β1	β2	Impact of Stock Price	Impact of Interest Rate
1	Positive	Positive	Positive	Positive
2	Positive	Negative	Positive	Negative
3	Negative	Positive	Negative	Positive
4	Negative	Negative	Negative	Negative

Table 3 Result of regression analysis

	α	β1(TOPIX)	β2(Interest Rate)	R^2	SER
Sample A					
Tokyo	3.877	0.106	0.003	0.401	0.023
	(14.782)*	(2.640)*	(-0.933)		
Nagoya	3.948	0.090	0.070	0.435	0.026
	(14.605)*	(1.948)***	(0.320)		
Osaka	3.675	0.144	-0.011	0.539	1.852
	(23.831)*	(5.521)*	(-0.243)		
Sample B					
Tokyo	2.725	0.274	-0.054	0.790	0.035
	(9.285)*	(6.692)*	(-3.178)*		
Nagoya	3.439	0.163	-0.037	0.704	0.028
	(14.168)*	(4.852)*	(-3.907)*		
Osaka	2.869	0.247	-0.028	0.654	0.037
	(8.254)*	(5.068)*	(-2.103)**		

Notes : Sample A is from April 2008 to March 2013.
Sample B is from April 2013 to August 2019.
Values in the parenthesis are t statistics.
* ,**, *** indicate significance at 1 %, 5% and 10% levels respectively.
The serial correlation and heteroscedasticity of errors are adjusted by the method by Newey and West (1987).
TOPIX = TSE STOCK Index. Interest Rate = Swap Rate 20 Year.