DOI : 10.18843/ijms/v5i2(6)/10
DOI URL :http://dx.doi.org/10.18843/ijms/v5i2(6)/10

Is the Real Estate Stock Index a Reflection of Direct Real Estate? Empirical Evidence from India

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ABSTRACT

The study examines the dynamic relationship between direct real estate prices and real estate stock index in India for the period 2010-18. The real estate prices in India have grown out of proportion in major cities making it unaffordable to a large section of population. On the other hand the real estate stock index, which captures the behavior of real estate industry has reported a CAGR of -13.42% from 2007-17. The correlation coefficient is negative and the Granger causality shows no causality, indicating the variables are independent of each other. Using the co-integration test and vector error correction model (VECM) the study explains the long run association however the model fails to show short run association among the variables under study using the Wald approach. Long term investment in direct real estate appears to be lucrative however the constant over valuation in housing prices is a matter of concern from the point of financial stability of a nation.

Keywords: Housing Prices, Real Estate Stock Index, Co-Integration, Vector-Error Correction Model.

INTRODUCTION:

In the recent years there has been a drastic surge in the real estate prices all over India. The real estate prices have risen out of proportion making investment in real estate unaffordable to large section of population. The present study aims to examine the dynamic linkages between direct real estate returns and real estate stock index. The study attempts to examine whether the realty stock index reflects the returns of the direct real estate.
Most of the research work focuses on establishing linkages between the overall stock market and the direct real estate market to ascertain the presence of "wealth effect" or the "credit price" effect. The "wealth effect theory" claims that households who have got substantial returns from share market will eventually increase their consumption as well investment portfolio. This results in increase in the demand for houses causing real estate prices to move upward. On the other hand the "credit price theory" claims that as the value of real estate rises, the households can diversify their investment portfolio thereby leading to increase in stock prices.
Theoretically as the demand increases, the prices of the underlying asset also tend to increase. The House Price Index (HPI) as tracked by the Reserve Bank of India shows a steady rise. The Real Estate Investment Trust (REIT) is an important step towards securitization of Indian real estate. However the two asset classes i.e. direct real estate and REIT are not easily comparable. The direct real estate investments are associated with low liquidity, whereas the investment through REIT can promotes easy liquidity but the participation of REIT in India is at an embryonic stage.
The present study attempts to empirically analyze the existence of relationship between direct real estate (House Price Index) (HPI) with indirect real estate. The proxy chosen for the indirect real estate is the Real Estate Stock Index (RESI), it is an index designed to reflect the behavior and performance of the real estate companies.

LITERATURE REVIEW:

In their research, (Batayneh & Al-Malki, 2015) explained the relationship between house prices and stock prices in Saudi Arabia between1985-2012. According to the results there is association of income to house prices, however no association between house prices and income to stock prices. (Pandey & Mary, 2016) investigated the long run and short run causality between house price index and stock market in India using Johansen co-integration and VECM. The findings suggested the need for segmentation and the two assets can be held in portfolio to maximize the expected returns and to reduce the risk. (Hooi, 2012) examined the presence of wealth effects or the credit price effects in Malaysia and the findings showed more of wealth effects in developed states and the credit-price effects is prominent for specific types of housing.
(Joshi, 2006), (Mahalik & Mallick, 2011) examined the house price dynamic with respect to determinants such as income, interest rates, inflation, and credit. (Joshi, 2006) employed variance decomposition for structural VAR for period 2001 to 2005. It concluded that income played a minor role in determining housing prices and as result the over-valuation and housing price bubble can significantly affect financial stability in the nation.(Ashvin Ahuja, 2010) investigated into the misalignment of housing prices with the market fundamentals in China using panel regression method linking housing prices with long term-fundamentals and factors such rent and ownership. The study concluded in mass markets and luxury cities sign of over-valuation exists which poses is a matter concern in terms of financial stability. (Mahalik & Mallick, 2011) studies concluded that housing prices itself explain its own variability to a large extent and followed by easy credit availability using the variance decomposition method

DATA AND METHODOLOGY:

To study the behavior of direct real estate in India it uses quarterly House Price Index (HPI) data published by RBI on the Database of Indian Economy. The data on real estate stock indices is based on the closing prices of S&P BSE Realty index. The monthly closing price of Real Estate Stock Index (RESI) is then converted into quarterly data. The data period selected for the study is from 2010-11Q1 to 2017-18Q2.
Before testing for the stationarity, the time series data of HPI and RESI were converted into logarithmic series to maintain uniformity. Theoretically, it is expected that as the demand rises, the prices of the underlying assets also tend to rise. The HPI has grown over the years supporting the argument in favour of demand for real estates. This study attempts to examine the linkages between HPI and RESI using econometric tools.

Correlation Analysis:

Correlation is a statistical technique which shows how two variables behave. The correlation coefficient ® can range between -1 to +1, where 1 is total positive linear correlation, 0 is no linear correlation, and −1 is total negative linear correlation.

Unit root analysis:

Augmented Dickey Fuller (ADF) unit root test has been employed to examine the stationarity in the time series data. When the variables are not stationary its mean, variance and covariance are not constant over time. Therefore, it is crucial to test data for stationary. Further difference- stationary process has been employed to transform non stationary to stationary series.

Hypothesis statement:

H0: variable has a unit root (variable is not stationary)
H1: variable does not have a unit root (variable is stationary)

Granger causality test:

Although the correlation analysis is used, the correlation coefficient only indicates presence of positive, negative or no correlation. However, it does not imply causation i.e. whether X causes Y or Y causes X.
The Granger Causality (1969) indicates that one time series is useful in forecasting another, in other words that current value of one variable is caused by past values of another.

Johansen Co-integration:

Johansen (1998) co-integration is used to study the presence of long run association. The prerequisite to run the Johansen test for co-integration is the variables are non stationary at level and becomes stationary at its first

difference. Johansen test uses two test viz trace statistics and Maximum Eigen test. The study uses optimum lag length according to Akaike Information Criterion (AIC) and Schwarz Information Criterion (SIC).

Hypothesis statement:
H0: there is no co-integration among variables in the long run.
H1: there is co-integration among variables in the long run

Vector Error Correction Model (VECM):
VECM has been developed to study the dynamic linkages between variable House Price Index and Real Estate Stock Index. The VECM ascertains the presence of long run and the short run association among variables under study. A VECM or co-integrated VAR is required to be estimated by including vector of co-integrating residuals in estimation.

EMPIRICAL RESULTS:

Figure 1: All India House Price Index

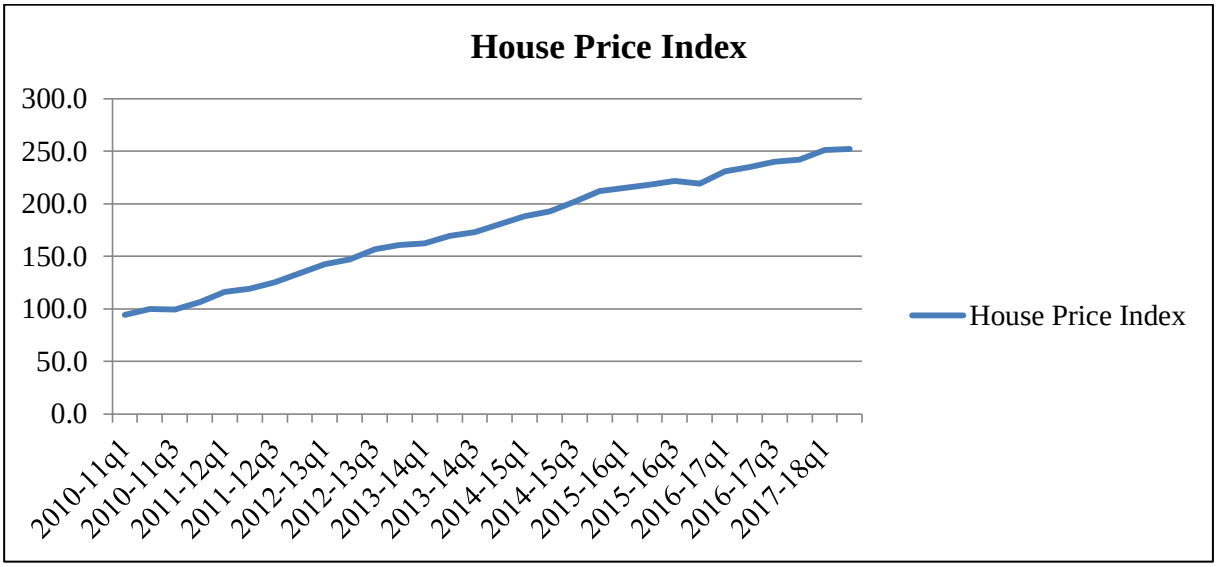
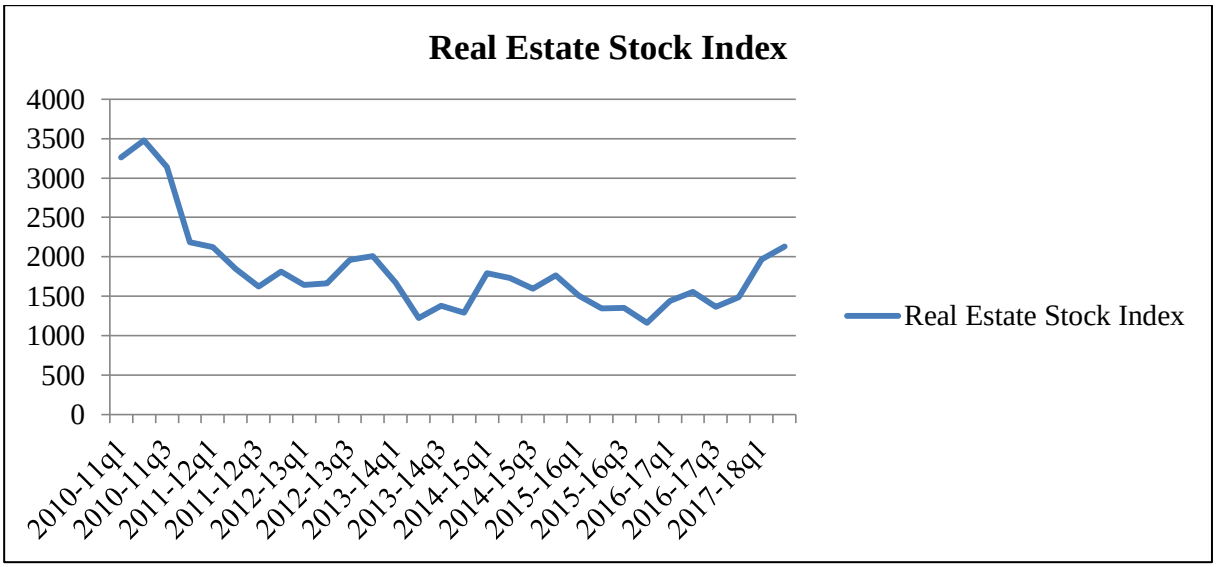


Figure 2: Real Estate Stock Index



The figure 1 depicts the all India house price index and its shows an uptrend. Figure 2 shows the real estate stock index have been volatile by and large reports a down trend.

Table 1: Descriptive Statistics of Log Series

	Lhouse_price_index	LReal_estate_index
Mean	5.132701	7.466004
Median	5.173933	7.418861
Maximum	5.529930	8.153977
Minimum	4.545420	7.058578
Std. Dev.	0.306991	0.271673
Skewness	-0.468281	1.015205
Kurtosis	1.984897	3.735155

Source: Author's compilations

Table 1 shows the descriptive statistics of total returns. The mean is the expected returns. The standard deviation is the measure of risk, it is a measure used by investors to determine risk in a portfolio. The HPI has a higher standard deviation than Real Estate stock Index. The skewness is negative for HPI and kurtosis measures the likelihood of occurrence of extreme returns.

Table 2: Correlation analysis

Variables	Lhouse_Price_Index	LReal_Estate_Index
Lhouse_price_index	1	-0.682042111
Lreal_estate_index	-0.682042111	1

Source: Author's compilations

The correlation structure is the simplest indicator of relationship between House Price Index and Real Estate Stock Index. Table 2 above presents a high negative correlation between House Price Index and Real Estate Stock Index (-0.68). Negative correlation indicates as the House Price Index increases there is a fall in the Real Estate Stock Index and vice versa.

Unit root analysis (Augmented Dickey Fuller):

Insert Table 3: Unit root analysis

Variables	ADF (at Level)		At First Difference
	Intercept	Trend and intercept	
House Price Index	-3.1301	-0.8217	-4.8763
	0.0353	0.9517	0.000
Real Estate Stock Index	-2.5467	-1.7088	-4.9816
	0.1154	0.7214	0.000

Source: Author's compilations

The results of stationary test are given in table 3. All the variables are found to be non-stationary at its level at 1% level of significance, since the p-value is more than 0.01%. However both the series are found to be stationary at the first differences. So this data can be used to find the Johansen (1998) and Johansen and Juselius (1990) co-integration for long term relationship.

Johansen's Co-integration Test:

The Johansen's co-integration test is used to ascertain the presence of long term relationship between HPI and RESI.

Table 4: Johansen Test of Co-integration between House Price Index and Real Estate Stock Index

Hypothesized No. of CE (s)	Eigen value	Trace statistics	Critical value (p- value)	Max Eigen statistics	Critical value (p- value)
None	0.470458	24.04991	15.49471 (0.002)	17.80081	14.2646 (0.002)
At the most 1	0.200031	6.249096	3.841466 (0.0124)	6.249096	3.841466 (0.0124)

Source: Author's compilations

Table 4 presents the Johansen Test of Co-integration. The results indicate the presence of co-integration or the long term relationship between HPI and RESI at 5% level of significance. The results have been supported by trace statistics as well as the Max Eigen test. Therefore VAR model in restricted framework, i.e. Vector Error Correction Model (VECM) can be used to examine the dynamic and casual association.

Granger Causality Tests:

The Granger causality test is a statistical hypothesis test for determining whether one time series is useful in forecasting another. So the study helps to determine whether House Price Index helps to determine Real Estate Stock Index.

H0: House Price Index does not granger cause Real Estate Stock Index

H1: House Price Index granger causes Real Estate Stock Index.

Table 5: Granger Causality Tests between HPI and RESI

Null Hypothesis	F statistics	P-value	Decisions	Nature of decision
Real estate stock index does not Granger Cause House Price Index	2.26048	0.127	Accepted	No Causality
House Price Index does not Granger Cause Real estate stock index	1.11103	0.3463	Accepted	No Causality

Source: Author's compilations

Table 5 presents the Granger causality test, it can be concluded that neither Real Estate Stock Index nor House Price Index can granger cause each other. The two variables are independent of each other.

Vector Error Correction Model (VECM):

If the variables are non stationary and co-integrated in the same order, the VECM can be employed, which is VAR (vector auto regression) developed by Sims (1980) at first difference. The VECM checks for the dynamic relationship among variables i.e. House Price Index and Real Estate Stock Index.

Table 6: Vector Error Correction Model (VECM)

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.11418	0.054601	-2.09118	0.0488
C(2)	-0.13004	0.19894	-0.65367	0.5204
C(3)	-0.06102	0.203543	-0.29978	0.7673
C(4)	2.074312	1.451287	1.429291	0.1676
C(5)	-1.25999	1.496853	-0.84176	0.4094
C(6)	-0.04577	0.085338	-0.53634	0.5974

Source: Author's compilations

It is clear from table 6 that there exists a long term association between Real Estate Stock Index and House Price Index. The coefficient C (1) is negative and the p-value is also less than 5%. Johansen co-integration supported long term association which was also confirmed by the VECM test.

To test the short run causality, VEC Granger Causality/ Block Exogeneity Wald Approach was employed to examine the casual relationship of House Price Index on Real Estate Stock Index.

The validity of VECM model was verified with the help of residual tests such as Auto correlation LM, Tests of Normality and Heteroskedasticity. The test confirmed no presence of serial correlation, the residuals are normally distributed and no occurrence of heterosckedasticity; which are all desirable criteria for a good model.

CONCLUSION:

The aim of this study was to analyze the relationship between House Price Index and Real Estate Stock Index for the period 2010 to 2018. The long term investment in direct real estate has been lucrative in India, as the CAGR reported is 14.29% whereas the CAGR of real estate stock index is - 13.42% which shows the under performance of the real estate equities.

The two variables are not moving in tandem. There is high degree of negative correlation, however Granger causality test confirmed no causality existed between variables under study. The two variables i.e. HPI and RESI are independent of each other.

The rise in HPI may be attributed to factors such as ease in credit facility (Mahalik & Mallick, 2011) and speculative investment opportunity (Joshi, 2006). However the fall in the real estate stocks may have driven by macro-economic variables, general stock markets sentiments and excessive debts (leveraged position) on the balance sheets of the real estate companies

The results of the Johansen test for co-integration revealed long term association between the variables examined and the Vector Error Correction model confirmed the association, which means both the series will return to long-term equilibrium.

Thus, the study concluded that Real Estate Stock Index has no reflection of House Price Index at least in the short run. This implies the markets have not well accepted real estate companies. The excessive debts on books and profit erosion have dampened the investor's confidence in real estate stocks. The over valuation in housing prices is a matter of concern for policy makers, as the valuations shrink it can have serious repercussions on financial stability of the nation.

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