

## Factors affecting Real Estate House Price in Asia Region: A study on Russia, China and India

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### Abstract

The study mainly focused on to the macroeconomic factors to determine the house price of three giant countries in Asia: Russia, China and India. The paper based on linear regression model, to understand the problem area and conclude the result. The observed macroeconomic factors are Gross Domestic Product, Interest Rate, Consumer Price Inflation, Population Density per square (KM) and Unemployment which are significantly associated with property prices in relation to the different cultural environments of the three countries. The study shows that a statistically significant relationship reflects on Population Density for all three countries. All of the three countries have a large number of populations but still house price in Russia is declining and on the other hand consumer price inflation rate is affecting house price of India. The study showed among all of the country only Russia has declined house annual basis, between the observed cultural environments in the observed time interval which may cause by inflation rate and population declining very rapidly.

**Key words:** Real Estate House Price, Asia Region, Russia, China and India.

### Introduction

In higher dependency to real estate industry makes a country's economy weak and high chance to fall in economic crisis (Renaud 2003). It happened previously when Asian financial crisis occur in 1997. The crisis occur for lack of high caliber banking system, weak stock exchange, fringe attitude and various other causes will present (Mera and Renaud, 2000). For the densely population, the demand of real estate house in capital or city/sub city area is increasing day by day and it is happening in China, India, Russia, Japan, Malaysia, Bangladesh. Beside developing countries population also creating housing demand in some develops countries. The housing price is based on prediction phases which are widely debatable and the housing bubble depends on the economic bubble which burst early in 2000. If there is a rapid increase in valuations of global real estate market which influenced for occurring the economic bubble .These housing bubble can be identified in advance. Some leading indicator helps to identify and warn the property cycle development and will also forecast the of the property cycle with proving that the appropriate utility for leading indicator (Witkiewicz 2002, Matysiak and Tsolacos 2003, Krystalogianni et al. 2004 and Lee et al. 2013). The indicator also determine the direction of economy in real estate market short run where act as a tools for investment analysis of a country. So the House Price (HPI) is very important for forecasting future real estate industry movement and development for a specific country, so that the investor can be preconscious for future circumstances. In a study by Wang, 2003 it shows that the real estate and real estate housing prices have a close linkup.

According to Hong-Yu and Kuentai (2011) the prices of real estate in the capitals differed considerably from the prices of real estate in other smaller cities and that it was the prices of real estate in the capitals, which created the real estate market. As in other observed countries, the most expensive real estate can be found in bigger cities (Mavrodiy 2005, Himmel berget al., 2005).

### **Problem Statement**

Based on World Bank 2010 Tyson's, Hassconsult (2013) have shown that increase on house prices is effect to decreasing in interest rates, especially the rates on interbank exchanges, inflation and treasury bills. Many people assume that to decide the real estate valuation, the only factor is mortgage rate. The study identified that determine the macroeconomic factors that affect real estate market in Russia, China and India contribute to other studies by ascertaining if the selected variables affect Asia Real Estate Industry. Moreover the factors only risk management, property evaluation or investment strategy is not enough to understand the Real estate pricing strategy. To understand the reason behind for house price value fluctuation study should focus on the single unit of economic factor. There is still more research needed which is not possible to cover in one research. Still the report shows the main indicator, possible opportunity and encourage for further research.

### **Literature Review**

For the large amount of price the consumer are considering small apartments and buildings which cause the tremendous emerge grow in real estate sector. The findings are very promising as the economic environment becoming more appealing day by day for the investors and consumers which is favorable. As the capital flows increasingly higher the confidence of the investor's has risen, The real estate market of England now situated in recovery phase as the movement of government is encouraging, the prices are rising and the mortgage applications are increasing day by day so that the real estate market regaining its performance and will be stable in near future. In the research the analysis show that the real estate market will be stable rather than dazzling growth if the government could keep the inflation and the unemployment rate low and also stable the economic growth in constant position. A very well develop Norwegian country Netherland have a study on macro and micro drivers which related with house price. Gabriele Galati, Federica Teppa and Rob Alessie (2011) have done the study (Macro and micro drivers of house price dynamics: An application to Dutch data) to identify the relational determinants of house price. The author analysed DNB Household Survey which consists of Accommodation and Mortgages questionnaire for 4,536 different households. The conclusion have showed that house price have relation on year of construction, cohort, education level factors which influence by education level, income and wealth. Macroeconomics factors like mortgage and long term interest also support the household's value. Another article by Theodore Panagiotidis and Panagiotis Printzis (2015) also focused on macroeconomics in their study (On the macroeconomic determinants of the housing market in Greece: A VECM approach) by using VECM model to examine the role of housing market in Greece. They selected the variables GDP, Taxation, Loans, Interest and Urban population. In an Analysis of Potential "Bubble" on Russia's Real Estate Market working papers, Drobyshevsky and Elena Pikulina (2009) had more concern about the very fast growing real estate market in Russia as in the capital Moscow which has a very high price index around 3-3.5 from 2005 to till 2008. The housing price getting in high peak because limited housing supply, prolonged periods of construction and projects cost recovery, shortage of plots for the development or lack of infrastructure facilities such as plots of land. As a result the researchers concluded by identifying two types

of demand (a) demand on the part of households and (b) demand on the part of the investors. A stressful statement have been concluded the article that, Russia might be face the housing market obstacles if the price fall on its crisis time and stability will be no more in near future. A research on China by Xiao Qiao (A Review of the Chinese Real Estate Market) mentioned that real estate prices growing much higher in Beijing, Shanghai, and Shenzhen than the disposable annual income of China. The analyse shows that the expendable growth of income is different according to the overall real estate growth. The reason behind of the higher property rate is to china have some interesting investment opportunities for real estate market which attract investment by foreign investor. In a large scale of research for real estate as considering the macro economy for enclosing real estate against inflation. According to Hartzell et al. (1987), Wurtzebach et al. (1991) and Bond and Seiler (1998) inflation enclosing over the property sectors which findings was confirmed by Liu, Hartzell, and Hoesli (1997) as well as Huang and Hudson-Wilson (2007) that United States real estate market having good hedging abilities. In the research they also found that the property sectors individually and found that office and residential by far outperformed retail and industrial regarding inflation hedge affect. In another developing country Kenya have facing balancing problem between real estate industry and macroeconomics factors. Mati Mugendi Loyford and Makori Moronge (2014) have done a study, (Effects of Economic Factors on Performance of Real Estate in Kenya) where the economic factors impacting on the performance of real estate in Kenya. They review on interest rate, inflation, transaction cost and demand for housing to measure the performance of real estate industry. The study focused on some of the theoretical aspect like: theories of interest rates, the liquidity prediction theory of interest rate, and the loanable funds theory of interest rates, and study on the performance of real estate. Verma Madan, Rahul Shukla (2015) mentioned in their research that the real estate sector in India is growing at an incredible rate of 30% per year which is now worth about USD15 billion. This sector is attracting investments, especially to FDI (Foreign Direct Investment) because real estate market contributing a large share to the India's GDP. They have identified that the different real estate development phase, some important legislative issues of government and demand of housing in India. In the findings they mentioned that in real estate development sector as the unreliability is booming over the developed and developing nations, India is still struggling regain their growth momentum and expecting to grow in reasonably high rate. The opportunities of emerging India market will attract the more investor which will helps the industry more to be transparent, mature and helps to adopt more advanced construction craftsmanship. Bhartendu, Kr. Chaturvedi, Ayush Sharma in 2015 stated that not only investment and opportunities will be show the actual figure of real estate development but also have to understand the demand drivers and determinant affecting pricing policy of real estate industry. According to the study before investing new investor have to understand clearly and identify the regulatory environment, existing opportunities, and the market players as now India have the opacity of the market, rampant speculation, procedural and infrastructural deficiencies. The study was based on secondary data of different drivers like Different Property, Hospitality, FDI, REIT, Transparency and Regulations.

### **Methodology**

The study have used linear regression model to determine the connection between the independent and dependent variables. The study is basically based on the three giant countries in Asia continent: Russia, China and India. The multiple linear regression will helps to identify the ratio between regression coefficients and independent variables. Many factors affect the real estate house price. Among them some factors have been chosen for this study

as it is impossible to consider all of them in one study. People usually purchase real estate through mortgage loans, so interest rate (IR) is bound to be the factor affecting price

fluctuations. For the demand factors, the population density (PD) is strongly correlated with the demands of house purchasing (Mishkin 2007). CPI is introduced because it is normally considered as an indicator of Inflation or deflation which can lead to rising costs of workers or construction materials, indirectly

Variable	Notation
House Price (2003-2017)	HPI
Gross Domestic Product	GDP
Interest Rate	IR
Consumer Price Inflation	CPI
Population Density per square (KM)	PD
Unemployment	UP

affecting housing costs (Mishkin and Schmidt Hebbel, 2001). According to Zull Kepili Izati and Masron (2011) Gross Domestic Product has a significant affect with the real estate house pricing as if a country has monetary value of all the finished goods and services produced within a country's borders in a specific time period. Last factor is unemployment which may affect the housing price as this the main reason to decrease or increase the price and demand in a country real estate industry. The study has examined the annual times series data from the year 1993 to 2017 for 15 years of observation. This report focused on the secondary data which is based on real estate Annual report, various Articles on real estate development and demand, Journal and various books.

The analysis based on the financial report of property construction and macroeconomics indicators which also focused on the demographic and finance determinants that are linked with the house price. For error free data its being constantly check through, update and edit for analysis. Even the data places on GRETl, the figures are checked on a few times to make it Error free. This is how it further improves the accuracy of the data before the conduction of the analysing step. GRETl will be used for measuring the variables and also Microsoft Excel will be used to make the graph. Regression analysis will be used to identify the significant value of the variables

### Multiple Linear Regressions

Multiple linear regressions model is used to ensure that the estimated result does not divert from the actual results. There are five variables have been considered in the estimated model and economic model will be formed as:

$$HP = \beta_0 + \beta_1 GDP + \beta_2 IR + \beta_3 CPI + \beta_4 PD + \beta_5 UP + \varepsilon$$

$\beta_0$	Initial Value Of Price Changes
$\beta_1 - \beta_5$	Regression Coefficients
$\varepsilon$	Residual

### Hypotheses and Conceptual Framework

The independent variables and dependent variable are used to investigate the relationship and affecting determinants among macroeconomic factors which influence real estate house price most. The independent variables will be used to explain the behavior of dependent variable of Russia, China and India in which the study is focused on. In view of this literature review, the hypotheses and conceptual framework are formulated in this section.

H1: Gross Domestic Product has a significant positive relationship with the House Price.

H2: Interest Rate has a significant positive relationship with the House Price.

H3: Consumer Price Inflation has a significant positive relationship with the House Price.

H4: Population Density has a positive relationship with the House Price.

H5: Unemployment has a significant relationship with the House Price.

The framework will show the proposed model to explore the study of the Variables - GDP per capita, Inflation rate, Consumer price Population Density and Unemployment. The study examines the determinants effect of house price in Russia, China and India to enlighten the cause of demand and supply if it increase or decrease.

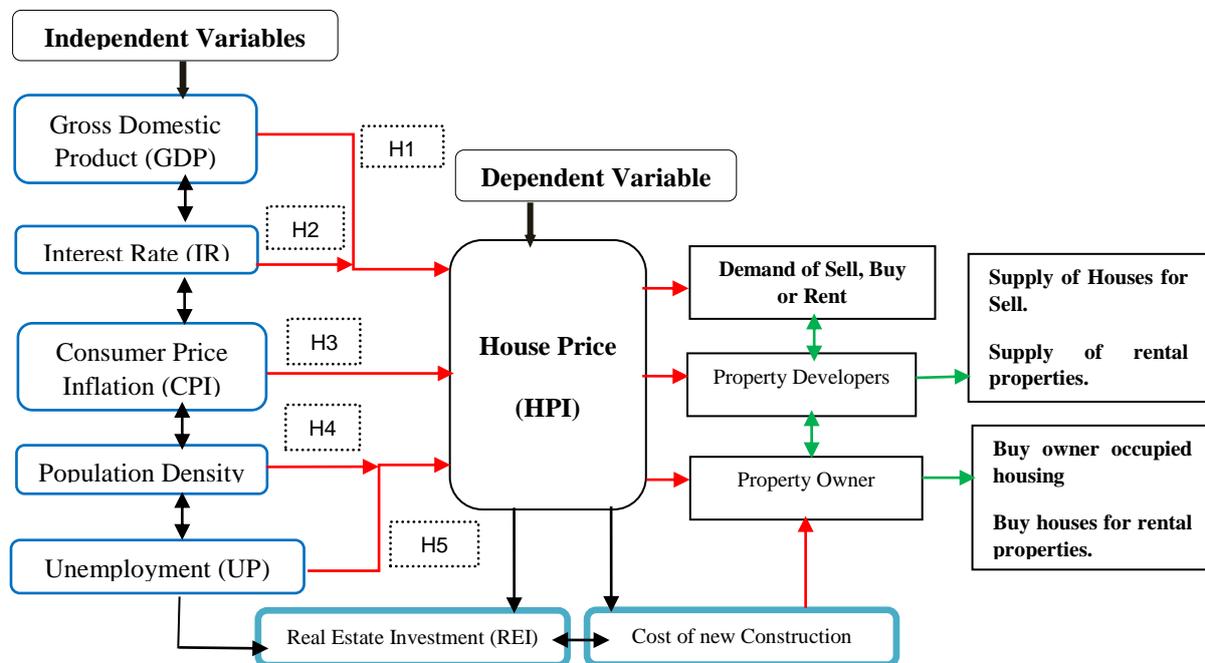


Figure 1: Conceptual Framework of Independent and Dependent Variables

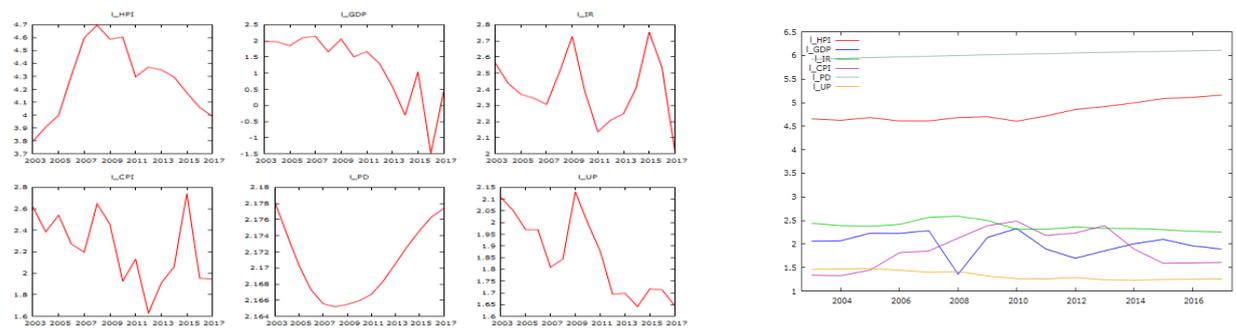
### Data Analysis

According to the Figure: 1 it will be stated that the variables based on the time series plot for Russia, China and India can be identified as the category of Constant with trend. It is showing that there is a significant trend with the observation of the variables tremendously from 2003 to 2017 in time series plot. Here the time series plot categorized as HPI, GDP, IR, CPI, PD and UN for the largest three Asian country as the constant with trend which have a relation to the presence of an intercept on the vertical axis beside the attended of the trend.

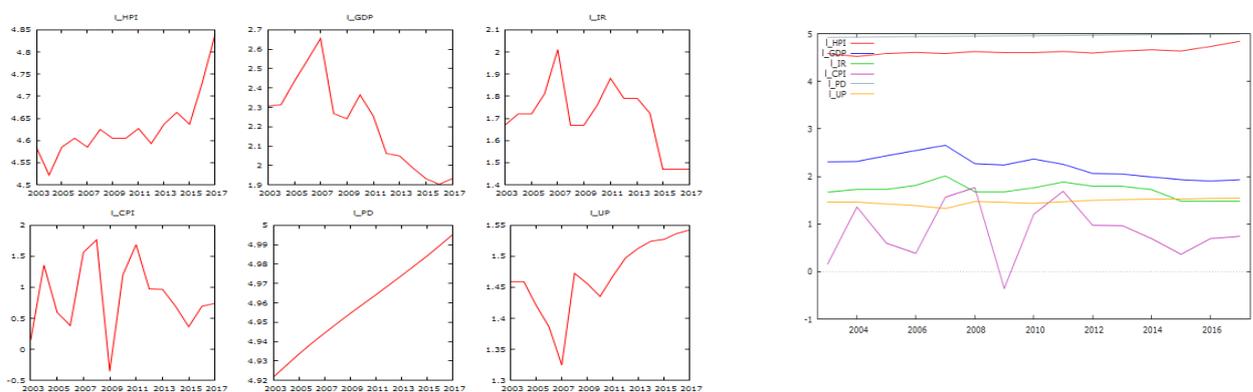
### Stationarity test – Time-series

A test for factors which measure properties, for example, mean, change, and autocorrelation are steady after some time, named to be stationary test (Von and Hain 2012). A stationary time arrangement would ordinarily be made on the supposition that the factual properties of the factors would be accept to be the same later on as the past. The direct of the stationarity test is acquire a significant example insights alongside different factors as the portrayal of such measurements later on might be valuable if the arrangement is stationary. Time series is an important practice for fitting in a model in or to incorporate times to times list autonomous variable under those relapse model (Shalit 2012).

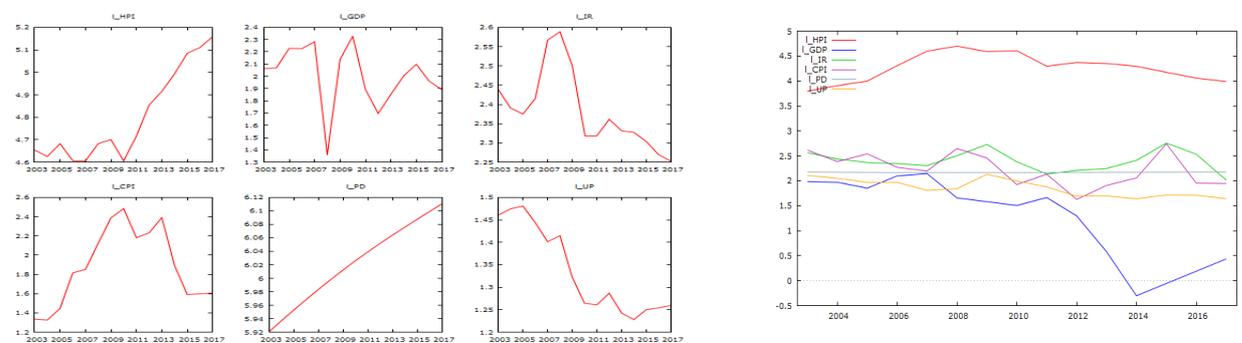
**1. Russia Time Series Plot:**



**China Time Series Plot:**



**India Time Series Plot:**



**Figure 2: Time Series Plot for House price, Gross Domestic, Product, Interest Rate, Consumer Price Inflation, Population per square and Unemployment (2003-2017)**

For the testing of stationarity of the variables time series plot should be consider to analysed each variables times series data. This test is based on the observation of the trend of the graph which will show the informal result of variable’s stationary or not stationarity. The method have conducted to test informal stationarity with the use of first difference data. According to Figure: 2, the study stated that the variable based on the time series plot can be identified as the category of Constant with trend.

**Correlation Matrix**

To study the relation between the effects of independent and dependent variables, correlation matrix have been used. Correlation matrix would be used to measure the existence of

relationship between the independent variables via a range of values against the standard average.

**Correlation coefficients, using the observations 2003 - 2017**  
**5% critical value (two-tailed) = 0.5140 for n = 15**

l_HPI	l_GDP	l_IR	l_CPI	l_PD	
1.0000	0.2029	0.0434	-0.1479	-0.8749	l_HPI
	1.0000	0.0466	0.4514	-0.5004	l_GDP
		1.0000	0.6662	0.0714	l_IR
			1.0000	0.0635	l_CPI
				1.0000	l_PD
					l_UP
				-0.0497	l_HPI
				0.7015	l_GDP
				0.3896	l_IR
				0.5031	l_CPI
				-0.2291	l_PD
				1.0000	l_UP

**Correlation coefficients, using the observations 2003 - 2017**  
**5% critical value (two-tailed) = 0.5140 for n = 15**

l_HPI	l_GDP	l_IR	l_CPI	l_PD	
1.0000	-	-	-0.1122	0.7901	l_HPI
	0.6378	0.6001			l_GDP
	1.0000	0.7239	0.2111	-0.8158	l_IR
		1.0000	0.4472	-0.4854	l_CPI
			1.0000	-0.0236	l_PD
				1.0000	l_UP
					l_HPI
				0.5968	l_GDP
				-0.9764	l_IR
				-0.7384	l_CPI
				-0.1805	l_PD
				0.7209	l_UP
				1.0000	l_UP

**Correlation coefficients, using the observations 2003 - 2017**  
**5% critical value (two-tailed) = 0.5140 for n = 15**

l_HPI	l_GDP	l_IR	l_CPI	l_PD	
1.0000	-0.2768	-0.6657	-0.1471	0.8688	l_HPI
	1.0000	-0.1236	-0.2041	-0.2769	l_GDP
		1.0000	0.1234	-0.6182	l_IR
			1.0000	0.3031	l_CPI
				1.0000	l_PD
					l_UP
				-0.7027	l_HPI
				0.1660	l_GDP
				0.6104	l_IR
				-0.4987	l_CPI
				-0.9255	l_PD
				1.0000	l_UP

**Table 1: Correlation Matrix result for Russia (Upper Left), China (Upper Right) and India (Lower Middle)**

**Multicollinearity**

In a regression model presence of Multicollinearity will signify as it cannot be interpret properly the relation and the influences of the independent variables with the dependent variables. To determining the multicollinearity this research paper follow the correlation coefficient method. The test will conduct if there is a multicollinearity present in the correlation coefficient if it will be more than 0.8/80%. In the test Table: 1 it shows that there is no multicollinearity and all the variable is under 0.8/80%.

### Ordinary Least Square Results

Ordinary Least Square used to evaluate the obscure parameters in a multi relapse demonstrate by means of limiting the aggregate of the squares of contrasts between the adjusted information and those created by the direct capacity of an arrangement of logical factors. The p-value would be generally used to decide the importance of the individual factors however to a specific degree depending of cases (Weber and Monarchi 2008). Beside that to examine the robustness, OLS would be conducted for the test.

#### Model 1: OLS, using observations 2003-2017 (T = 15)

##### Dependent variable: $I\_HPI$

Country		Coefficient	Std. Error	t-ratio	p-value	
Russia	Constant	129.675	18.3978	7.048	6.00e-05	***
	$I\_GDP$	0.00111162	0.0616895	0.01802	0.9860	
	$I\_IR$	0.464813	0.250313	1.857	0.0963	*
	$I\_CPI$	-0.125733	0.166850	-0.7536	0.4704	
	$I\_PD$	-57.6982	8.49999	-6.788	8.01e-05	***
	$I\_UP$	-0.540450	0.293860	-1.839	0.0990	*
China	Constant	-18.3716	8.23141	-2.232	0.0525	*
	$I\_GDP$	0.596753	0.390038	1.530	0.1604	
	$I\_IR$	-0.216934	0.130400	-1.664	0.1306	
	$I\_CPI$	-0.00798289	0.0251325	-0.3176	0.7580	
	$I\_PD$	4.01512	1.23135	3.261	0.0098	***
	$I\_UP$	1.46154	1.25607	1.164	0.2745	
India	Constant	-11.7997	5.90394	-1.999	0.0767	*
	$I\_GDP$	-0.0944592	0.0703589	-1.343	0.2123	
	$I\_IR$	-0.0213474	0.246326	-0.08666	0.9328	
	$I\_CPI$	-0.250049	0.0648394	-3.856	0.0039	***
	$I\_PD$	2.92532	0.842469	3.472	0.0070	***
	$I\_UP$	-0.228141	0.624886	-0.3651	0.7235	

**P value:** P value is compared with the significance value. If the P value is less than the significance level that means the null hypothesis is rejected which is  $\alpha = .05$ . If P Value is greater than or equal to the significance level that means the null hypothesis is not rejected. Among all the variable For Russia Inflation (0.0963), Population Density (8.01e-05) and Unemployment (0.0990) have a significant level with the House price (HPI). In china the study shows only the Population Density (0.0098) and in India Consumer Price Inflation (0.0039) and Population Density (0.0070) have a significant effect on House Price (HPI).

### R-squared:

R-squared shows that how much all of the independent variable together explain dependent variable. In this study the highest R-squared considered for India 95% on the other hand the lowest value is 77% for China. Russia is in the middle secured value 89% in its position.

**Adjusted R-squared:**

Adjusted  $R^2$  showed the percentage of variation explained by only the independent variables that actually affect the dependent variable. According to the study the Adjusted R-squared for Russia, China, and India respectively 84%, 64% and 92%.

**P Value (F):**

P value (f) tests the overall significance level of regression model. The significance level for this study is considered as 5% or .05. After data analyzing, from the table P value (F) has found which is respectively 0.000328, 0.009781 and 0.000013 less than the significance level. So the model is good fit and the null hypothesis is rejected.

	Russia	China	India
Mean dependent var	4.268397	4.629624	4.799273
Sum squared resid	0.112163	0.017387	0.028188
R-squared	0.896955	0.772118	0.950493
F(5, 9)	15.66802	6.098816	34.55872
Log-likelihood	15.43481	29.41640	25.79272
Schwarz criterion	-14.62131	-42.58451	-35.33714
rho	0.223548	-0.028740	-0.025614
S.D. dependent var	0.278835	0.073824	0.201668
S.E. of regression	0.111636	0.043954	0.055964
Adjusted R-squared	0.839707	0.645517	0.922990
P-value(F)	0.000328	0.009781	0.000013
Akaike criterion	-18.86961	-46.83281	-39.58544
Hannan-Quinn	-18.91487	-46.87806	-39.63069
Durbin-Watson	1.410566	1.578556	1.969752

**Multiple Regression Model**

$$\text{Russia: HP} = \beta_0 + \beta_1 \text{GDP} + \beta_2 \text{IR} + \beta_3 \text{CPI} + \beta_4 \text{PD} + \beta_5 \text{UP} + \varepsilon$$

$$\text{HP} = \beta_0 129.675 + \beta_1 0.00111162 + \beta_2 0.464813 + \beta_3 -0.125733 + \beta_4 -57.6982 + \beta_5 -0.540450 + \varepsilon$$

$$\text{China: HP} = \beta_0 + \beta_1 \text{GDP} + \beta_2 \text{IR} + \beta_3 \text{CPI} + \beta_4 \text{PD} + \beta_5 \text{UP} + \varepsilon$$

$$\text{HP} = \beta_0 0.596753 + \beta_1 10.596753 + \beta_2 -0.216934 + \beta_3 -0.00798289 + \beta_4 4.01512 + \beta_5 51.46154 + \varepsilon$$

$$\text{India: HP} = \beta_0 + \beta_1 \text{GDP} + \beta_2 \text{IR} + \beta_3 \text{CPI} + \beta_4 \text{PD} + \beta_5 \text{UP} + \varepsilon$$

$$\text{IND\_HP} = \beta_0 -11.7997 + \beta_1 -0.0944592 + \beta_2 -0.0213474 + \beta_3 -0.250049 + \beta_4 2.92532 + \beta_5 -0.228141 + \varepsilon$$

**Findings**

The result shows that Russia, China and India have a common variable to link with the house price. The analysis stated that Population Density has a significant influence to the house price. As the higher lower of population will increase or decrease of the demand of accommodation which will higher or lower the price of a square meter of residential real estate. For Russia if population decreases one unit then the price of a square meter of residential real estate on average decreases at  $-57.6982$  unit. But the scenario is totally different in China and India. If Population increases one unit in China and India then the price of a square meter of residential real estate on average increases at  $4.01512$  and  $2.92532$  unit. Russia has a lower population growth rate then China and India. So the lower population is affecting the real estate industry house demand. The consumer price inflation and Unemployment also have significant impact on house price which shows decreasing at respectively  $-57.6982$  and  $-0.540450$ . CPI is normally considered as an indicator of Inflation

or deflation which can lead to rising costs of workers or construction materials, indirectly affecting housing costs (Mishkin and Schmidt Hebbel, 2001). Lesser population will decrease the level of skill employee, as it will also decrease the unemployment rate and increase cost of infrastructure. The same scenario is also identifying in India, but this time the affecting variables are totally changed. High population is affecting to decrease the CPI as availability of employee is dropping down the costs of workers or construction materials. If CPI decreases in one unit then house price will also decrease in  $-0.250049$  unit. The result is showing that the economic factors are lesser impacting then it was considering in the beginning of the study or from the previous research. The reason behind this stumbling block might be the reason of the length of the observed time period Funke (1996). Attributed to speculation and psychological effects will be another reason (Temeljotov Salaj et al. 2011). Ning and Hoon (2012), the growth of real estate prices linked to speculation. Research has demonstrated that in Beijing in 2007 speculation caused 14.4 percent increase in real estate prices which is twice as high then the GDP.

### Limitations of the Study

There are many limitation have found throughout the process of the study. The first limitation of the study is the sample size of the research which is small with only 15 years as the annual data from 2003 year to 2017 was obtained to run the model. The minimum requirements of model analysis are minimum 30 or more year's observation. The reason to analyze 15 observations as most of the data for indicators is not available and also real estate industry is quiet new concept in Asia region. Also the short time frame to analyze the country's industry is a limitation to process for the research. The research paper only focused on secondary data which were collected from the World Bank website, National statistics and Land Registry ministry. So the data might have been calculated via use of different methods approved by the influence of relevant parties to produce better outcomes, so there have a chance to be the data manipulation.

### Conclusion

The report analyzes the data for Russia, China and India for changes in house price and the affected factors of macroeconomics. This analyze consider secondary data from 2003 to 2017 and five factors which is consider in terms of real estate industry supply, market demand and house price fluctuation . In the observed periods, among the three countries at least one of the selected variables is related to the price of residential real estate in common which is the individual selected and observed environments. Population density is the most common factors that influence the house price. Majority of the factors related to the price of residential real estate remains nevertheless unknown in spite of the implemented research. These factors may be a challenge for further research. For further research all of the variables are more imperative for further understanding explanation, prediction and forecasting of their behavior.

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