

EFFECT OF MARKET FUNDAMENTAL VARIABLES ON RESIDENTIAL PROPERTY PRICES IN KENYA

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Abstract

The Kenyan real estate market has been experiencing a boom in the past ten years and the latest findings have shown that the trend will continue into the foreseeable future. This study sought to determine the effects of fundamental market variables on residential property prices in Kenya. The residential property price is the dependant variable while inflation, interest rate, money supply, diaspora remittances and exchange rate are the independent variables. Thus, this paper tries to determine whether the above variables do affect residential property prices in Kenya. The study used secondary data for a period of ten years (2006 quarter one to 2015 quarter four). A panel data regression model was used for analysis. The study conclude that there are a strong positive correlation between the market fundamental variables and residential property prices as shown by positive R, and R-Square of 0.986 and 0.972 respectively. Also the study conclude that four out of the five market fundamental variables are statistically significant individually as shown by their corresponding p-values which is less than 0.05 and only foreign exchange rate had a p-value of 0.789 implying it was not significant individually. The study, therefore, recommends that the CBK and other agencies charged with the responsibility of regulation should plan in advance and influence the market fundamental variables in the right direction. The study had some limitations: contextual, methodological and human. These limitations have formed part of the basis for suggestions for further study. Among the suggestions is that further study should be triangulated in terms of data sources to mitigate the weaknesses of secondary data that was used exclusively in this study.

Keywords: *Residential Property Price, Interest Rate, Inflation Rate, Money Supply, Diaspora Remittances, Foreign Exchange Rate*

1. Background of the study

Internal Housing property is a multidimensional commodity that can exert profound influence on socio-economic and psychological well being of individuals, communities and the nation as a whole. For example the nature, quality and quantity of residential property in any territory are considered as a yardstick to benchmark the level of social and economic development. Across the globe, housing property holdings forms the bulk of any individual and national stock of wealth. It happens to be the fundamental and essential needs for every human being because these assets not only provide living space for the human accommodation, but also act as shelter for human being protection. According to the Kenya Constitution 2010, every citizen has a right to decent housing. The housing problem can therefore be viewed from both an economic as well as a social perspective.

The demand for housing in the Kenya is immense and driven by a growing population and urbanization (World bank, 2011). Growing prosperity has also increased the demand for larger and better quality housing. The price of houses however remains a key inhibitor in home ownership since most of the population cannot afford them. Formal sector mortgage financing will only resolve this issue for a fraction of the urban population, but other solutions are needed for the rural population and the urban poor. The factors that determine housing prices need to be critically assessed so that policy makers can have policy targeted towards them in order to lower the prices of houses. The question is what drives property prices? It is believed that it must be related to the fundamental market variables. This is because these variables give an idea about the purchasing power of the people (i.e. inflation rate). In addition, some of the variables directly or indirectly impacted the purchasing power of people by making property prices cheaper or more expensive (i.e. exchange rate and interest rate). Knowing the relationship between market variables and property market performance, and knowing whether these links are consistent or changing over time can provide a useful tool in the decision-making process. Thus, this paper tries to determine whether the above market fundamental variables do affect property price index in Kenya. The first motivating factor of this research is simply because it is unclear whether rising house prices in Kenya is actually due to fundamental reasons and not speculative reasons.

1.2 Statement of the Problem

In the past few years residential property prices in Kenya has been on an upward trend with many questions being raised on whether the bubble is likely to burst, what are economic factors that are holding the law of demand and supply of property market. A number of studies have been done in Kenya on real estate prices. (Kagendo, 2011) carried out a study to identify the determinants of real estate property prices on the case of Kiambu municipality. The study found that location and realtors were key factors affecting real estate prices in Kiambu municipality. (Muthee, 2012) tried study the relationship between economic growth and real estate prices in Kenya. He found out that there is a significant correlation between real estate prices and economic growth. (Makena, 2012) postulates that level of money supply can influence the level of real estate investments as well as real estate property prices. According to (Otwoma, 2013) property prices display a high inverse relationship with interest rates especially when interest rates are high. He adds that this inverse relationship reverses when interest rates are relatively low and stable.

While the above research findings forms the foundation for understanding the nature and characteristics of the residential property sector in Kenya and this study, most of the previous studies in the Kenyan property markets have used a single variable to determine movement's in real estate prices creating a gap that needs to be filled. Thus, this study aims to look at the effects of five market fundamental variables on residential housing price in Kenya.

1.3 Research objectives

1.3.1 General objective

To determine the effects of market fundamental variables on residential property prices in Kenya.

1.3.2 Specific objectives

- i. To establish the effect of interest rate on residential property prices in Kenya.
- ii. To determine the influence of inflation on residential property prices in Kenya
- iii. To determine the influence Diaspora remittances on residential property prices in Kenya
- iv. To determine the influence of money supply on residential property prices in Kenya.

- v. To establish the effect of exchange rates on residential property prices in Kenya.

1.4 Significance of the study

The study would be important not only to investor in the property market but also to the government and other policy making bodies as a guideline in formulation and development of policies that are concerned with real estate sector of the economy. The government as the regulator of real estate sector would benefit with the findings of this study as it would be enlightened on the various approaches that real estate firms can adopt to determine the prices of properties. Information gathered through this study would help the government to formulate policies beneficial in the best approaches in the real estate sector in Kenya. The results of this study would also be invaluable to researchers, scholars and investors, as it forms a basis for further research.

LITERATURE REVIEW

Theories that were used to explain the variables of this study are;

2.2.1 Game Theory

Game theory is built upon the assumption that the decision making of players is always interdependent. Consequently, players have to think ahead and devise a strategy based on expected countermoves of the other player(s). Basically, game theory deals with the modeling of situations of conflict and cooperation, together with the analysis of these models using mathematical techniques.

established a three-party dynamic game model with incomplete information and concluded that policies have been determining the basic direction of China's real estate market. (Zhenguo & Li, 2006) Using game theory demonstrated it's the individuals' rational behaviors that resulted in the arising, transmission, and burst of bubbles in the China real estate market.

2.2.2 Decision Theory

Decision theory is a theory about people's actions. It has both a prescriptive and a descriptive version. The prescriptive version says that a person should choose the action that maximizes expected utility. The description version says that a person does choose the action that maximizes expected utility. Residential real estate decisions are made by a variety of actors pursuing a broad range of objectives. (Roberts & Henneberry, 2007) explore the decision making processes of property investors. The study finds that the actual decision-making process is much simpler than the normative model suggested. Both the UK and German models are found to follow a broadly similar path, with investors setting a strategy, searching for properties, undertaking an analysis of market conditions and purchasing properties that fulfill that strategy.

2.2.3 Asset Pricing Theory

This theory is concerned with explaining the price of financial assets in an uncertain world. Ideally it seeks to answer the questions as to why certain assets have higher expected returns than others and what causes variations in the expected returns at different points in time (Post *et al.*, 2005). Real estate forms a sub set of the collective portfolio of any individual or corporate investor just like equities do. Currently real estate market competes with other asset classes for the available capital. There is need therefore for correct valuations to be carried on real estate like any other asset class so that current financial values and estimated future cash flows are determined with certainty.

2.2.4 Classical theory of interest rate

This theory concerns the determinants of the pure or risk-free interest rate. It was elaborated further by (Irving Fisher, 1930 and Neely Christopher, 2001). It argues that the rate of interest is determined by two forces; the supply of savings, derived mainly from household. Classical theory considers the payment of interest a reward for waiting-the postponement of current consumption in of greater future consumption. Higher interest increases the attractiveness of saving relative to consumption spending, encouraging more individuals to substitute current saving (and future consumption) for some quality of current consumption. This is called substitution effect calls for a positive relationship between interest rates and the volume of savings (Marquis, 2002).

2.3 Empirical Review

Theoretical (or conceptual) definitions give the meaning of a word in terms of the theories of a specific discipline. Empirical foundation on the other hand gives meanings of phenomenon through findings based on the verification via experiments, experiences and observations. This section provides the empirical evidence on the concepts of the study topic.

(Bilozor & Wisniewski, 2012) used Italy and Poland to determine the impact of macroeconomic factors on residential property and prices indices in Europe. Quarterly time series data constituted the material for testing and empirical results. The developed models show that the economic and financial situation of European countries affects residential property markets. Residential property markets are connected, despite the fact that they are situated in different parts of Europe. The economic and financial crisis of countries has variable influence on prices of real estate.

(Apergis, 2011) analyzed the dynamic effects of specific macroeconomic variables (i.e. housing loan rates, inflation and employment) on the price of new houses sold in Greece. An error correction vector autoregressive (ECVAR) model is used to model the impact of the macroeconomic variables on real housing prices. Variance decompositions showed that the housing loan rate is the variable with the highest explanatory power over the variation of real housing prices, followed by inflation and employment.

(Terrones & Otrok, 2004) confirmed the existence of a great degree of co-movement in macroeconomic aggregates (namely, real output, consumption, and residential investment), they found little evidence that macroeconomic aggregates are important sources of house price movements. They discovered a strong but delayed impact of US monetary shocks on housing price growth both in the US and internationally.

(Wenzel, 2012) trended 30-year fixed mortgages during the boom period and when rates were collapsing in the United States against housing prices based on the Case-Shiller Index. He observed that during the boom period, housing prices went up while interest rates climbed whereas during the period when interest rates collapsed, housing prices also collapsed. He concluded that that there is no direct correlation between interest rates and housing prices. That one needs to look at the interest rate on relative terms, i.e. relative to price inflation.

(Egert & Mihaljek, 2007) used panel technique in their study of determinants of house price dynamics in eight transition economies of Central and Eastern Europe and 19 OECD countries. They analyzed fundamentals such as real income, real interest rates and demographic factors. They established that GDP, real interest rates and housing credit are significant factors affecting house prices in both CEE and OECD countries.

(Muli, 2011), using quantitative research design on a study of Assessment of the Factors Affecting the Growth in Real Estate Investment in Kenya, concluded that GDP, interest rates and inflation rates were the major determinants of real estate investment at the 0.05 level as per the SPSS fitted model. Besides GDP growth

contributed the most to the growth in real estate in Kenya. Population growth had a statistically insignificant negative impact on real estate investment.

(Kagongo, 2013) sought to establish the Relationship between Inflation Rates and Real Estate Prices in Nairobi, Kenya. Simple linear regression model was used to determine the nature of the relationship. The findings of this study show that there is no clear relationship between the property price and the inflation rate.

In assessing the determinants of real estate prices in Kenya, (Karoki, 2013) identified that there are significant negative relationship between residential real estate prices and interest rates, and positive relationships with GDP inflation rates. (Otwoma, 2013) analyzed data from Kenya from the year 2000 to 2013 to understand the relationship between interest rates and residential housing prices. He observed that property prices displayed a high inverse relationship with interest rates in the period December 2000 to May 2003 and November 2011 to June 2013 when interest rates were high. That trend reversed in the period June 2003 to October 2011, a period when interest rates were relatively low and stable. He attributed the inconsistency observed to buyer's expectations about the movement in interest rates.

3.0 RESEARCH METHODOLOGY

The study used quantitative and descriptive design was used to examine the relationship between fundamental market variables and residential property prices. The study used secondary data for a period of ten years (2006 quarter one to 2015 quarter four). The choice of period is purely based on the availability of data series while the quarterly aspect not only helps in understanding short run effects of the variables but offers the study substantial frequency to investigate for the much needed reliability. The data was sourced from the published statistics of the Central Bank of Kenya, Kenya National Bureau of statistics (KNBS) and the World Bank Reports on all the market fundamental variables: exchange rate, money supply, Diasporas remittances, inflation, and interest rates while Residential property price index data was obtained from Hass Consult reports.

The empirical model of this study was specified as:

$$\ln HPI = \beta_0 + \beta_1 \ln INT + \beta_2 \ln INF + \beta_3 \ln MS + \beta_4 \ln DR + \beta_5 \ln EXR + \varepsilon$$

Where

$\ln HPI$ - Natural logarithm of Residential Property Price index. [Hass composite sale index]

$\ln INT$ - Natural logarithm of Interest rates. [Average quarterly commercial bank lending rate]

$\ln INF$ – Natural logarithm of Inflation, [Average quarterly consumer price index]

$\ln MS$ - Natural logarithm of Money Supply. [Average quarterly monetary base (M3)]

$\ln DR$ - Natural logarithm of Diaspora Remittances. [Average quarterly diaspora remittances]

$\ln EXR$ - Natural logarithm of exchange rate, [Average quarterly Kenyan currency exchange]

β_0 - is the intercept of the regression model or Regression constant

$\beta_{(1,2,3,4,5)}$ - Represent the slope of coefficient or the coefficients of the variation to determine the volatility of each variable to residential property price index in regression model

ε - Error terms.

4.0 RESULTS AND DISCUSSION

Data were analyzed and the results of descriptive statistics and the distribution of the variables were presented in Table 1 and Table 2. The tables presents the Mean, Median, Standard deviation, Kurtosis, Skewness, range, Minimum, Maximum of LN HPI, LN INT, LN INF, LN MS, LN DR ,LN EXR.

Table 1 Descriptive statistics

	LN HPI	LN INT	LN INF	LN MS	LN DR	LN EXR
Mean	5.1679	2.7321	2.0196	14.0397	11.1489	4.3906
Median	5.2437	2.6933	1.9095	14.0650	11.0473	4.4062
Std Deviation	0.2944	0.1227	0.4312	0.4642	0.4479	0.1275
Range	0.9430	0.4366	1.4294	1.5197	1.4370	0.5088
Minimum	4.6052	2.5696	1.3938	13.2527	10.3682	4.1479
Maximum	5.5482	3.0062	2.8232	14.7724	11.8053	4.6567

Results in table 1 give the summary statistics of the main variables.

Table 2 Normality tests

	LN HPI	LN INT	LN INF	LN MS	LN DR	LN EXR
Kurtosis	-1.0728	-0.4048	-0.8774	-1.2400	-1.3743	-0.4535
Skewness	-0.5270	0.7439	0.5356	-0.0588	-0.0265	-0.1135
Count	40	40	40	40	40	40

The findings of the normality test conducted shows that the skewness of the data is negative for four variables apart from natural logarithm on interest rate and inflation which has a positive coefficient. The skewness coefficients were within accepted range of between -1 to +1.

The kurtosis value of the data is negative for all the variables and the kurtosis is within the normal range of between -3 to +3.

4.1 Inferential Statistics

The study first carried out correlation analysis, using Pearson correlation to establish whether there was any relationship between the independent variables and the dependent variable. The results were recorded in table 3.

Table 3 Pearson Correlations Analysis

Correlations		LN HPI	LN INT	LN INF	LN MS	LN DR	LN EXR
Pearson Correlation	LN HPI	1.000					
	LN INT	.716	1.000				
	LN INF	.062	.411	1.000			
	LN MS	.978	.708	-.019	1.000		
	LN DR	.922	.749	-.013	.965	1.000	
	LN EXR	.889	.592	.080	.888	.807	1.000

Table 3 above gives a summary of the correlation between the dependent variables and the variables. The study found there was a strong positive relationship between real estate prices (ln HPI) and the interest rates (ln INT) as shown by a correlation coefficient of 0.716. The study found there was a weak positive relationship between real estate prices (ln HPI) and (ln INF) inflation as shown by a correlation coefficient of 0.062. The study further found there was a strong positive relationship between real estate prices (ln HPI) and the level of money (ln MS) as shown by a correlation coefficient of 0.978. The study further found there was a strong positive

relationship between real estate prices (ln HPI) and the diaspora remittances (ln DR) as shown by a correlation coefficient of 0.922. Finally the study found out there was a strong positive relationship between real estate prices (ln HPI) and exchange rate (ln EXR) as shown by a correlation coefficient of 0.889.

4.3 Regression Analysis

Multiple linear regression was then carried out on the dependent variable natural logarithm of Residential Property price index against natural logarithms of five predictor variables. The criteria for comparing whether the predictor variables were significant in the model was done by relating the corresponding probability value obtained and $\alpha = 0.05$. If the probability value was less than α then the predictor variable was significant; otherwise it was not. Also, F-critical was compared with the F-computed.

The study first obtained an Analysis of Variance in order to test the significance of the model. The findings were as shown in table 4 below.

Table 4 Analysis of Variance (ANOVA)

ANOVA						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.286	5	.657	237.636	.000
	Residual	.094	34	.003		
	Total	3.380	39			

Predictors: (Constant), LN INT, LN INF, LN MS, LN DR , LN EXR

Dependent Variable: LN HPI

Analysis of variances in the regression model is presented in Table 5. The f-value was 237.636 which were significant at 5% level of significance. The overall model was significant as F-computed > F-critical, indicating that the five market fundamental variables above can be used significantly to predict residential housing prices in Kenya.

The study conducted a multi linear regression analysis so as to determine the relationship between residential property prices and the five independent variables. Results are presented in Table 5

Table 5 Coefficients of significance

Model		Unstandardized Coefficients	Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Beta			Lower Bound	Upper Bound
5	(Constant)	-4.109		-13.260	.000	-4.739	-3.480
	LN INT	.092	.038	2.555	.018	-.184	.369
	LN INF	-.191	-.280	-2.390	.022	-.353	-.029
	LN MS	.853	1.345	8.537	.000	.650	1.056
	LN DR	.255	.389	3.004	.005	.428	.803
	LN EXR	.044	.019	.270	.789	.378	.689

The regression equation can now be expressed as

$$\ln HPI = -4.109 + 0.092 \ln INT - 0.191 \ln INF + 0.853 \ln MS + 0.255 \ln DR + 0.044 \ln EXR + \epsilon$$

The table showed that holding interest rates, inflation rate, money supply, diaspora remittances and foreign exchange rate at a constant, residential housing price would be -4.109. A unit increase in interest rates would lead to increase on residential housing price by 0.092 units. A unit increase in inflation rate would lead to a decrease in residential housing price by 0.191 units, a unit increase in money supply would lead to increase in residential housing price by 0.853 units, a unit increase in Diaspora remittances would lead to increase in residential housing price by 0.255 units and a unit increase in foreign exchange rate would lead to increase in residential housing price by 0.044. All the four variables with $p < 0.05$ were significant while foreign exchange was not significant with p of 0.789.

In order to explain the percentage of variation in the dependent variable (residential housing price index) that is explained by the independent variables, the researcher used coefficient of determination (model statistic summary table) obtained via regression analysis and presented in table 6.

Table 6 Model Summary Statistics

Model Summary										
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					
					R Square Change	F Change	df1	df2	Sig.	F Change
1	.986	.972	.969	.0518846268	.008	9.893	1	34	.003	

Predictors: (Constant), LN INT, LN INF, LN MS, LN DR , LN EXR

The results of the analysis shows that the change in the five market fundamental variables above contributed to an equivalent of 97.2% of a change in residential housing price index as depicted by the R-Square equal to 0.972. Also, the results revealed that there was a strong relationship between the market fundamental variables and the housing price index as shown by the coefficient of determination (R) equal to 0.986.

4.4 Summary of Findings

The study established that each of the individual study variables fluctuated across the study period. Notably the study result shows a great change during 2007/2008 and 2012 /2013 period. This fluctuation can be attributed to effect and anxiety of general election. During this period the gradient of ln HPI curve increased, the ln INF was at peak at 1.855 (16.83%). The commercial bank lending rate rose to the highest level at 3.006 (20.2%).

From the findings the study revealed that there was a strong positive correlation between residential property price and the interest rates ($r = 0.716$;). It also indicate interest rates had a significant positive effect on housing price index ($\beta = 0.092$; $t = 2.555$; $p = 0.018$). The findings agrees with the (Tumberello & Wang, 2010) who found that interest rate has a significant effect on housing price and (Tse, Rodgers, & Nikiewski, 2014) who emphasized that interest rate is a significant variable to determine housing prices.

Study results further indicated that inflation has a significant negative influence on residential housing prices ($\beta = -0.191$; $t = -02.39$; $p = 0.022$). This indicates that rise in inflation rate is expected to push prices of residential houses lower and vice versa. The study results also revealed that inflation had a significant positive relationship with residential housing price index ($r = 0.062$). This study also agrees with findings by (Feldstein, 1992) who indicated that increasing inflation serves to reduce people’s incentive to invest in real estate, which in turn lowers housing demand. This reduction in demand leads to a reduction in residential property prices.

The findings also revealed a strong positive correlation between residential property price and level of money supply ($r = 0.978$) and that money supply has a significant positive influence on residential housing prices (β

= 0.853; $t = 8.537$; $p = 0.00$). This is because increase in money supply gives rise to greater inflation uncertainty and this has an adverse impact on residential property price hence increasing the prices. The study conforms to the study of (Barksenius & Rundell, 2012) and (Lastrape, 2002) who found a positive relationship between money supply and housing price returns in Sweden and the UK.

Study results further indicated that Diaspora remittances were a significant predictor of residential housing prices. Diaspora remittances had a significant positive effect on residential housing price index ($\beta = 0.255$; $t = 3.004$; $p = 0.005$). These findings reveal that a rise in diaspora remittances would be expected to lead to higher residential housing prices and vice versa. Further, the results revealed that diaspora remittances had a significant positive relationship with residential housing price index ($r = 0.922$). This result indicates that rise in diaspora remittances is expected to significantly relate with increase in prices of residential houses in Kenya. This agrees with (Mwangi & mwenda, 2015), Findings which revealed that the international remittances indicators are significant factors influencing the economic growth in Kenya.

The study results further revealed that foreign exchange rate is an insignificant variable on residential housing prices in Kenya ($\beta = 0.044$; $t = 0.27$; $p = 0.789$). Though it had a strong positive relationship with residential housing price index ($r = 0.889$). The study disagree with (Meidani, Zabihi, & Ashena, 2011) findings which revealed that residential house price will increase when exchange rate appreciate.

5.0 Conclusion

The study concludes that there is a significant strong positive correlation between residential property price and the interest rates. This is because interest rates affect housing affordability and the cost of borrowing. Thus an increase in interest rate leads to an increase in residential property prices. It further concludes that inflation has a significant negative influence on residential housing prices. This is because an increasing inflation serves to reduce people's incentive to invest in real estate, which in turn lowers housing demand. This reduction in demand leads to a reduction in prices. The study also concludes that there was a strong positive correlation between residential property price and level of money supply. This is because increase in money supply gives rise to greater inflation uncertainty and this has an adverse impact on residential property price hence increasing the prices. Study further concludes that Diaspora remittances had a significant positive effect on residential housing price index. This is because a remittances spent by any given recipient create multiplier effects for national economies thus causing an increase in prices. The study result concludes that foreign exchange rate does not have a significant effect on residential housing prices.

Lastly, there are a strong positive correlation between the five market fundamental variables and residential property prices as shown by positive R, and R-Square of 0.986 and 0.972 respectively. This implies that the change in the five fundamental market variables contributed to an equivalent of 98.6% of a change in residential property price in Kenya.

5.1 Recommendations

The study recommends that the Central Bank of Kenya (CBK) and other regulatory agencies should plan in advance and influence the market fundamental variables in the right direction. For example, the interest rates should be modeled appropriately to steer economic growth of various sectors in the right direction. Also, money supply, exchange rate and inflation should be managed to ensure that property prices are stable, because if investors incur more costs they would pass over the costs to property buyers by increasing property prices. Other policy interventions such as tax concessions can be put in place to influence Diaspora remittances and mortgage uptake. Data on property market is quite minimal, scattered and undetailed. The study further

recommends that the government should engage the housing ministry to have a fully equipped data collection and analysis section. This will enable decision making to improve the future of property market in Kenya.

5.2 Suggestions for Further Studies

The researcher suggests that further readings and research should explore other variables that are external to this study since they could have significant effect on the criterion variable. The researcher also suggests that each of the five independent variables be investigated for relationship with other variables that are external to this study. The researcher finally recommends that further study should be triangulated in terms of data sources: use of both primary and secondary data to mitigate the weaknesses of the secondary data used in this study.

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