RELATIONSHIP BETWEEN RETURNS OF THE REAL ESTATE
AND STOCK MARKET RETURN IN KENYA

BY:

ANTONINA OYENGA
D63/75963/2012

A RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILMENT
OF THE REQUIREMENT FOR THE AWARD OF MASTER OF
SCIENCE IN FINANCE, UNIVERSITY OF NAIROBI

OCTOBER, 2013
DECLARATION:

I, the undersigned declare that this research project is my original work and affirm to the best of my knowledge that it has not been presented for any academic award in any University.

Signed: ………………………………… Date: …………………………………
Name: ANTONINA OYENGA
Reg. No: D63/75963/2012

This research project has been submitted for examination with my approval as the university supervisor.

Signed: ………………………………… Date: …………………………………
Name: Mr. Josiah Aduda
DEDICATION

This dissertation is dedicated to George Otako and Seline Owino whose selfless love enabled me to be what I am today. Their devotion and dedication towards my education will remain stamped in my heart all the days of my life.
ACKNOWLEDGEMENT

I am gratefully indebted to all those who have contributed to the success of this dissertation. First and foremost I want to thank the Almighty Lord whose power has made me come this far. My sincere gratitude goes to my supervisor, Dr. Josiah Aduda for tirelessly and willingly sharing his scholarly experience and for making this dissertation a success undertaking. He has been available for consultation, his professional guidance and supervision added value to this work.

Many thanks go to the Nairobi Stocks Exchange and Kenya National Bureau of Statistics (KNBS) staff for their support they gave me during data collection. Their assistance to reach them remains the centre around which the success of this study revolves.
ABSTRACT

The stock market performance has been known to be a good indicator of the economic performance of a country. Over time, investors have been making investments in the stock market, but a lot of attention has shifted to the real estate market as it has been growing as a result of the huge housing demand. The objective of the study was to look at the relationship of between real estate and the stock market.

With this objective, we sought to investigate the relationship by comparing the indices for both the stock and real estate markets. Since the analysis covered the periods between 2008 and 2012, we used the NSE 20 share index for the stock market and Hass property index for the real estate.

Relevant literature was analyzed with regards to the study, looking at local and international studies and this enabled the study to come up with a conceptual framework and an analysis model.

Data was collected from the Nairobi Stock Exchange, Kenya National Bureau of Statistics (KNBS) and websites such as www.hassconsult.co.ke. The data collected was then analyzed using regression analysis and Pearson’s correlation coefficient. Control variables that were introduced in the models were inflation rates and interest rates. These tests enabled the study to determine the nature and extent of relationship between the two variables.

The data findings were presented in tables, indicating the mean, standard deviation, correlation coefficient (r), and the coefficient of determination ($R^2$). The descriptive information (mean and standard deviation) characterized the data while regression and correlation tests provided the nature and extent of relationship between the two variables.

The study results showed that there was relationship when there were no control variables in the model, but there was greater impact and relationship when there were controls introduced in the models. This was seen from the R values of 0.464 (with no control variables), 0.785 (with inflation rate control), 0.585 (with interest rate control), and 0.807 (with both interest rate and inflation rate controls).
The study recommended that the country needs a REITs market in order to monitor the real estate market since it is an important segment of the economy and may act as an economic barometer, and also to improve the storage of vital macro-economic information to enable researchers carry out tests that may assist the economy.

A few challenges were encountered during the study and they were mainly in regards to data collection. Some macro-economic measures were not present limiting our study to start from 2009 and not 2008 as the study had planned. Also some of the indices, such as housing index were derived from private institutions of which the study recommended should be provided by government.
TABLE OF CONTENTS

DECLARATION: ..................................................................................................................... ii

DEDICATION ........................................................................................................................ iii

ACKNOWLEDGEMENT ......................................................................................................... iv

ABSTRACT ............................................................................................................................ v

Abbreviations ....................................................................................................................... x

CHAPTER ONE: INTRODUCTION ...................................................................................... 1

1.1 Background of the Study ............................................................................................. 1

1.1.1 Real Estate Market Returns .................................................................................. 1

1.1.2 Stock Market Returns .......................................................................................... 4

1.1.3 The relationship between returns in the Real Estate Market and Stock Market. 4

1.1.4 Real Estate Market and Stock Market in Kenya ...................................................... 6

1.2 Research Problem ....................................................................................................... 8

1.3 Objective of the Study ................................................................................................. 9

1.4 Value of the Study ........................................................................................................ 9

1.4.1 To Investors .......................................................................................................... 9

1.4.2 To Real Estate and Stock Exchange Markets ...................................................... 10

1.4.3 To Government and Policy Makers ..................................................................... 10

1.4.4 To Researchers and Scholars .............................................................................. 10

CHAPTER TWO: LITERATURE REVIEW ........................................................................ 11

2.1 Introduction .................................................................................................................. 11

2.2 Review of Theories ..................................................................................................... 11

2.2.1 Efficient Market Hypothesis .............................................................................. 11

2.2.2 Portfolio Theory .................................................................................................. 12

2.2.3 Wealth versus Credit Price Effects .................................................................... 13
2.3 Theoretical Literature ........................................................................................................... 14
2.4 Review of Empirical Studies ................................................................................................. 17
2.4 Summary of Literature Review ............................................................................................ 18

CHAPTER THREE: RESEARCH METHODOLOGY ..................................................................... 19

3.1 Introduction ............................................................................................................................. 19
3.2 Research Design ..................................................................................................................... 19
3.3 Data Collection ....................................................................................................................... 19
3.4 Data Analysis .......................................................................................................................... 20
3.4.1 Analytical Model ................................................................................................................. 20

CHAPTER 4: DATA ANALYSIS AND PRESENTATION OF FINDINGS ................................. 22

4.1 Introduction ............................................................................................................................. 22
4.2 Demographic Characteristics ................................................................................................. 22
4.3 Regression Analysis ............................................................................................................... 23
4.3.1 Regression with no control variable .................................................................................. 23
4.3.2 Regression with interest rate as control variable ............................................................... 24
4.3.3 Regression with inflation rate as control variable ............................................................... 25
4.3.4 NSE share index on housing index with interest rate and inflation rate controls ................. 26
4.4 Correlation Analysis .............................................................................................................. 27
4.5 Summary and Interpretation of findings ............................................................................... 28

CHAPTER 5: SUMMARY, CONCLUSION AND POLICY RECOMMENDATIONS .................. 31

5.1 Summary ............................................................................................................................... 31
5.2 Conclusion .............................................................................................................................. 32
5.3 Policy Recommendations ...................................................................................................... 33
5.4 Limitations of the study ....................................................................................................... 34
**ABBREVIATIONS**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMEX</td>
<td>American Stock Exchange</td>
</tr>
<tr>
<td>CRSP</td>
<td>Centre for Research and Securities Prices</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>KNBS</td>
<td>Kenya National Bureau of Statistics</td>
</tr>
<tr>
<td>NYSE</td>
<td>New York Stocks Exchange</td>
</tr>
<tr>
<td>NCREIF</td>
<td>National Council of Real Estate Investment Fiduciaries</td>
</tr>
<tr>
<td>REIT</td>
<td>Real Estate Investment Trust</td>
</tr>
<tr>
<td>NSE</td>
<td>Nairobi Securities Exchange</td>
</tr>
<tr>
<td>KPDA</td>
<td>Kenya Property Developers Association</td>
</tr>
</tbody>
</table>
CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

The real estate and stock markets have been used by many countries to measure the strength of an economy. People and institutions have invested in these markets to grow their investments and wealth. This study looks at the trends in the real estate market and in the stock market and what implications this can have for both practitioners and policymakers with regards to the measure of economic growth.

The increased presence of real estate and foreign stocks in the portfolios of institutions may have been motivated in part by academic studies that suggest that co-variances between stocks - both local and foreign - and commercial real estate are quite low, indicating that the latter asset classes provide diversification to portfolios invested primarily in stocks. Investors worldwide always look to diversify their investments and have a portfolio that has minimal variation in the returns, hence reducing their risks. Whether they are within the stock market itself where investment is done from stocks of different companies or investment is done from different markets, portfolios are created by investment managers and individuals to minimize risk.

Over the past years investors have invested heavily in these two markets and we shall look at the price indices of these markets and try to see if and how they are related. The stock market is seen as a liquid market where cash flows can be generated quickly as compared to the real estate market.

1.1.1 Real Estate Market Returns

Real estate by definition represents capital investments in concrete and fixed assets. It includes land plus anything permanently fixed to it, including buildings and other items attached to the structure (Brown and Matysiak, 2000). Real estate investments offer to forms of return; first is capital gain which is realized from appreciation of the asset, and rental income from the users of the real estate. Real estate investment can also provide investors with greater returns through financial leverage; it is also an inflation hedge and its value keeps appreciating into the future (Yang and Ye, 2010)
The real estate price measurement is usually based on the indices of the market. Measurement of real estate indices is important as it shows the housing prices which indicate the gains made in the sector, and also to investors who confront choices among portfolios composed of housing securities and other investment assets, (Shiller, 1993). While stocks are priced primarily on market or beta risk, and bonds are priced primarily on interest rate and default risk, the real estate pricing mechanism includes residual risk and non-risk factors such as taxes, marketability costs and information costs.

Though a big one, the real estate market does not have a centralized exchange for its prices. This has led to estimations of the risks and returns for the sector. Indices for real estate sector have been used globally to estimate growth in the sector through property prices. According to Miles (1990) valuing the total real estate stock at any point in time is difficult. Statistics however have been made for new constructions in an economy. Shiller, (1993) stated that the accurate measurement of housing prices is also of enormous practical importance. Applications range from the estimation of regional variation in the cost of living to the computation of transfer payments to the indigent. More recently, as primary housing markets have become more integrated with secondary markets, the computation of housing prices has become of great practical importance to investors who confront choices among portfolios composed of housing securities and other investment assets.

Two basic techniques for measuring and analyzing the structure of housing prices have been developed. The hedonic models (Kain and Quigley, 1970) and repeat sales models (Bailey et al. 1963) have been used to analyze market prices. Hedonic models relate the selling prices (or monthly rent) of dwellings to measures of their physical and vocational characteristics and to some representation of time. Hedonic models are routinely estimated from repeated cross-sectional samples of samples of dwellings. However, neither the functional form of the relationship nor the set of variables is known with certainty hence limiting the generality of the procedure when applied across markets or time periods. Repeat sales models avoid these difficulties by measuring the price of the same house at several points in time. This obviates the need to measure the characteristics of houses. It also limits the samples available for sampling. Repeat sales models typically
specify a random walk in housing prices (Case and Shiller, 1987; Abraham and Schauman, 1991). These models are used to estimate the housing prices and we shall identify information that uses any of this model.

Prices for real estate markets are known to be greatly influenced by demand and supply forces. The higher the demand for the houses and building, the higher the prices will be, for example, in U.S, the prices of houses largely dependent on how many households wish to own units and how many units are available for such ownership.

In most countries, changes in the real estate market are a large and significant part of the future trend of the overall economic activity. The number and quality of investments in the real estate market has a tendency to affect the economic development of the entire economy. The real estate market is therefore very critical for the future of an economy in terms of productivity, employment and income growth.

In Kenya, the property market has grown rapidly and has maintained a hold as a leading real estate market globally. The Kenyan real estate market has delivered greater price stability than all of international markets surveyed – US, UK, UAE, Hong Kong, India, Australia as well as South Africa. The most outstanding feature is that the Kenyan market remained resilient and maintained price stability during global recession (Global Markets Special Report – Hass Consult). This analysis of real estate markets worldwide adds further support to the belief that the Kenyan market is an unusually solid investment, subject to few swings, and achieving mid-term returns that are amongst the highest in the world (Farhana Hassanali).

In a study by Muthee (2012), where she looked at the relationship between economic growth and real estate prices in Kenya, data was retrieved from different sources but aligned in equal time and periods, reviewed and subjected to regression analysis and tested for significance. The results indicate that there is a relationship between the variables revealing that a quarterly change in housing prices yields a quarterly change in GDP. The data collected and analyzed indicates that property is a strong asset class which has been under exploited in portfolios.
1.1.2 Stock Market Returns

The stock market is an entity where companies’ shares, bonds and derivatives are traded. The stocks listed in the exchange have a trading price which represents the value of the company. When shares, bonds or derivatives are traded on the stock exchange, the price represents the buyers’ value of the company. An organization’s value is comprised of both tangible and intangible values and the share prices traded are expected to follow market fundamentals when being traded. At times, stock prices are traded on speculation about an event that may occur in the company. When stock prices deviate from market fundamentals, imperfections take place and a market correction takes place. Various models have been used to estimate the share prices but the most commonly used model is the Gordon Growth Model, where stocks prices are based on the discounted present value of future expected dividend payment.

A stock price, considering an efficient market contains past, present and future information about a company. Various factors affect the movement of a share price. These include the profitability of a company, the change of company management, general demand for the stock, and expected major announcement by the company. These together with speculative factors affect stock price movement. Macroeconomic performance affect the level of investment in the stock market since in a growing economy more people are likely to invest in the market while an ailing economy will have people shy away from stock market investment. The discounted dividend model is a widely used model to estimate the share price. In this model, it is assumed that the value of the company is through summation of the discounted future dividends.

1.1.3 The relationship between returns in the Real Estate Market and Stock Market.

Both the real estate markets and the stock markets are affected by similar economic factors such as interest rates, inflation and deflation rates, demographics, GDP, and Government policies. The degree of integration of these markets will indicate the extent to which these markets are driven by the similar economic factors. The degree of integration will also indicate the extent of substitutability between the two markets.

Credit price effect identifies that changes in the price of real estate will lead to changes in corporate profitability and thus to the stock prices of those corporations because these
changes in the prices will tend to affect the asset side of the corporate balances. Secondly these changes in the price of real estate reflect analogous changes to the credit capacity of corporations or individuals and hence increase the capacity of these entities to use their fixed assets as collateral in obtaining more bank loans. As a result, the book value of the corporation changes lead to volatile stock markets.

Okunev et al. (2000) in a study stated that disturbances in market fundamentals in a market segment generate movement of capital into and out of the affected market. If various markets are well integrated then it is expected that a higher degree of asset substitution will take place, such substitution having a significant impact on price fluctuations in the relevant markets. They observed that on the other hand, if markets are not integrated then this has significant implications for portfolio investment where managers seek to develop well diversified portfolios. This shows how markets are interrelated, but the extent of co-variation is not known. The degree of integration of various markets in an economy is important as it will assist researchers in estimating the degree of causality, and in this case

While arguments can be presented for expecting securitized real estate and stock markets to be either integrated or segmented, Gyourko or Keim (1992) present a compelling argument as to why securitized real estate and stock markets would be expected to be correlated. In western companies, a large part of a company’s value is tied up in real estate. In these circumstances, it would appear reasonable to suppose that part of the risk in stock market returns should be related to changes in the value of company owned land and structures. While a portion of this property market risk may be uncorrelated with the firm’s core business risk, it is assumed that some is almost certainly correlated with that risk. Therefore, part of the real estate market risk associated with the general health of the economy should result in a positive correlation between property returns and returns on the stock market. The outcome is that there are common economic factors that may be expected to have some bearing on the returns in both markets.

Correlation shows the extent of relationship in which one market affects the other market. It may either be positive or negative relation. High correlation values shows that fluctuation movements in either of the markets will affect the other significantly. Co-
variation is a measure showing how much two variables change together. Therefore, if two variables are independent of each other, then there will be no co-variation between them. The different models taken by researchers on this study include development of structural models of demand and supply as part of a simultaneous system or the development of reduced form equation models that combine demand and supply factors (Abraham and Hendershott, 1992).

Quan, D.C. and Titman, S (1996) observed that real estate prices and stock prices are both affected by the level of economic activity, by interest rates and by the cost of labor. It would be expected that the level of economic activity would have a positive effect on both real estate and stock prices, causing the two time-series to move together. However, other factors can conceivably cause the two time-series to be negatively correlated. They continued to argue that the factors that induce a negative relation between real estate values and stock prices are more relevant for the larger more developed economies in Europe, North America and Japan. For example, analysts have argued that one of the contributors to the recent bull markets in the U.S. was reductions in real wage rates caused by technological changes and foreign competition. One might also argue that factors that contribute to a positive relation between stock and real estate values are less important in countries with largely developed economies where individuals are relatively mobile. Increased economic activity in the U.S. may have a relatively small effect on the U.S. office market both because of supply responses and because firms can relocate to less expensive areas if prices in New York and other major cities become too expensive. In the smaller Asian countries, like Singapore and Hong Kong, the factors inducing a negative relation between stock returns and real estate prices may be less important.

1.1.4 Real Estate Market and Stock Market in Kenya

Due to conflict, political instability and low investment, the Kenyan market has been quite stagnant. However this has changed over the recent years, with Kenya’s property market becoming vibrant and experiencing major change and high growth rates. This has followed a growth in the GDP of the country, which is leading to expansion that is creating a middle class which has led to need for urban centers to come up. The market
has been driven with a high GDP growth as well as a high demand for high end real estate.

The stock market in Kenya has grown rapidly since its emergence. It is not difficult to observe that the size of the stock market has expanded gradually both in terms of the firms that are listed as well as the amount on investor accounts. Furthermore the stock market has also shown an increasing level of liquidity, which is verified by the rising amount of total turnover during the given period.

Still looking at the stock market over the last years between 2000 to 2011, those who have invested in real estate earned higher returns compared to individuals investing their monies in the stock market – Nairobi Stock Exchange, showing that for profitable long term investments, the property sector holds key (Jivanjee, 2010). This showed that there was a missed opportunity for those who relied only on investments in the stock market during this period.

Because of such decisions to be made by the investors, each one needs to adopt a strategic asset allocation decision. Asset allocation is the process through which an investor decides how to distribute his/her wealth amongst different asset classes (Reilly et al, 1997). By diversifying into different asset classes, the investor is able to minimize risk and therefore yield a higher return. The investor therefore needs to examine in depth how the two markets work and establish their relationship based on the correlation of the assets. According to Wade (2008), widening the pool of potential assets can potentially increase returns while even reduce risks through the selection of complementary assets with low correlations among one another.

The focus of this research will therefore be to determine the correlation between asset returns of the Kenyan real estate market and the stock market. Looking at the two variables, real estate continues to provide asset characteristics that can enhance the risk/return performance of a diversified investment portfolio. Fisher and Sirmans (2005) in their study stated that real estate investments can serve to provide; relatively predictable cash flow, a hedge against price instability and reduced volatility of returns.
Looking at these characteristics, Yang and Ye (2010) concluded that real estate is potentially better positioned in today’s investment environment.

Stocks on the other hand, though unpredictable, can deliver superior returns over the long haul. Investing in stock alongside real estate assets can be beneficial to an investor in the following ways; Liquidity preference, availability of information and tax benefits (Heaton, Curcuru, Lucas and Moore 2006).

Yang et al. (2010) in their study stated that “Due to lack of knowledge on these two markets and investors are not well sophisticated with diversifying their investment portfolios they can suffer huge losses in one market and miss the opportunity to invest in the other market.”

1.2 Research Problem

Activity on both real estate and stock markets form significant elements in business cycle fluctuations. A common approach in trying to analyze and understand the impact of these markets has been to study the separate influences of each on business cycle activity. Heaton et al. (2006) stated that majority of households’ hold neither common stock nor other risky financial securities. Others invest in stocks almost exclusively or invest in real estate markets alone. The idea of holding a portfolio rather than a single asset has been the focus of financial theory since its introduction by Markowitz in 1952.

The problem therefore we seek to address with this research is the asset allocation decision based on the returns relation of the stock and real estate market. It also seeks to clarify whether the performance of stock market is at all influenced by the real estate boom and the effect of consolidating the two assets in a mix portfolio. The study of price volatility on the stock market has a rich history with research tending to focus on identification of speculative bubbles (Diba et al., 1988, Cameron, 1989) On the other hand; research on real estate price fluctuations is less extensive than that of stock markets.

A research by Hass Consult Kenya comparing returns in the real estate markets on the Nairobi Stock Exchange in the final quarter of 2010 came to the conclusion that the property prices still continued to rise while those of Stocks on the NSE continued to fall,
showing a negative relationship. Ochuka (2003) conducted a study to assess the relationship between stock market returns and real economic activity in the economy. Data was collected from the Nairobi Stock Exchange and from the Central Bureau of Statistics. The study covered the period 1998 to 2004. The stock market returns were regressed against production figures and empirically tested. The analysis revealed that there was positive correlation between stock returns and real activity, and that future production can explain present returns.

Minimal studies have been done in the Kenyan market with regards to empirical relationship between real estate and stock market so as to ascertain whether there is co-variation. Even though the studies might table different findings with regards to presence of co-variation, what needs to be ascertained is whether it is there and to what extent. This study seeks to establish exactly how these two variables co-relate as well as find clarify how strong the correlation is if it does exist. The study will therefore seek to answer “Is there a relationship between real estate and stock market in Kenya?”

1.3 Objective of the Study
To determine whether there is a direct relationship between returns in the real estate market and stock markets in Kenya

1.4 Value of the Study
The study seeks to be important to the following stakeholders:

1.4.1 To Investors
The study will be useful to investors who want to know how returns from the two markets are related to each other so that they can make proper investment decisions. The rate of substitution can enable the investors know whether it is due to market fundamentals or because of substitution. This would help in allaying fears or frenzy in the market due to index variability. Speculative investors will also be able to know from trends whether there is a potential future bubble in the market.
1.4.2 To Real Estate and Stock Exchange Markets
The study will be of use to the two markets in study as they will know how they relate to each other in the economy. This will enable them to make correct decisions when there are changes in their market indices and they would be able to forecast well in case there are changes in the other market.

1.4.3 To Government and Policy Makers
The government will be able to use the information to plan for the economy. Changes in the real estate and stock markets affect the general economy of the country. The changes in these markets indices indicate the general direction of the economy and the government would be able to forecast the trend of the economy as they would be able to know the true extent of growth as a result of co-variation, if it exists.

1.4.4 To Researchers and Scholars
The study would be of importance to scholars to further the study and also serve as a literature in other studies related to it. This will help to increase the general knowledge of the subject and also provide useful reference to future studies.
CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter reviews both theoretical and empirical literature both on the real estate market and stock as well as the extent of relationship in returns of the two markets in Kenya. It aims at comparing and contrasting different authors’ views on the relations between the two markets, relating this research finding to these findings.

2.2 Review of Theories

2.2.1 Efficient Market Hypothesis.

An efficient capital market is one in which security prices adjust rapidly to the arrival of new information and therefore the current prices of the securities reflect all the information about the security. What this means is that the price for which the investor will be paying for the financial asset truly reflects fair or true information about the intrinsic value of this specific asset. In this paper we assume that both the stock market and the real estate market are informationally efficient markets. This is reinforced by the fact that first, these markets have a large number of profit maximizing participants who each analyze and value the securities independent of each other. Secondly, information enters the market in a random manner and the timings of one announcement is generally independent of the other. Finally, investors in both the markets adjust the asset prices rapidly to reflect the effect of new information. Security prices are able to adjust rapidly because of the many investors who compete against each other (Brealey, et al., 2001).

There are three forms of efficiency under the efficient market hypothesis. First is the weak form of efficiency where stock prices are assumed to reflect information that may be contained in the past history of the stock prices. Therefore, if a market is characterized by weak form of efficiency, then no one investor or group of investors should be able to earn over the defined period of time abnormal returns using information about historical prices or by technical analysis.

Second is the semi-strong form of efficiency where all publicly information is reflected in the stocks prices. Publicly available information includes the firm’s financial reports,
reports of competing firms’ e.t.c. Finally is the strong form efficiency which asserts that stock prices fully reflect all information including private or inside information as well as that which is publicly available. Prices under this efficiency adjust rapidly to both private and public information hence no investor will be able to earn abnormal rates of return.

Studies have shown that the Nairobi Stock Exchange is In this paper, we take the assumption that we are operating under a strong form of efficient capital market, and therefore the stock prices are well adjusted to both public and private information. This will enable us to relate the returns in the stock market to the performance of the market rather than any efforts by individuals to make above normal profits.

2.2.2 Portfolio Theory

The portfolio theory was developed by Markowitz (1952), who derived the expected return for a portfolio of assets and an expected risk measure. According to this theory a portfolio of assets is considered efficient if no other assets or portfolio of assets offers a higher expected return with the same risk, or lower risk with the same expected return. This is achieved through diversification of the portfolio.

The correlation coefficient between two financial assets plays a major role in determining the effectiveness of diversifying a portfolio. Portfolios are diversified to protect against the risk of single securities or class of securities (Markowitz, 1952). Hence, portfolio analysis consists of analyzing the portfolio as a whole rather than relying exclusively on security analysis (Markowitz, 1952). Portfolio theory tells us that if you manage to combine assets whose returns show low correlation with each other, you may be able to minimize risk while maximizing returns. This means that it is possible to be a “prudent investor” even if one’s portfolio includes riskier assets, as long as those riskier yet higher yielding investments are balanced with others in a well-diversified portfolio.

Where there is positive correlation, the value of correlation coefficient between a stock and a real estate asset is +1 hence it shows that two assets will move in the same direction and there is a positive linear relationship between return and risk. The risk and return of the portfolio of the two assets is a weighted average of the risk and return of each asset
(Elton, et al, 2007). The risk of this two assets portfolio cannot be reduced by diversifying across the two assets that have a positive correlation.

On the other hand, where there is negative correlation, the correlation coefficient between a stock and a real estate asset is \(-1\), which means the good and bad outcomes of two assets will move exactly opposite to one another and there is a negative linear relationship between return and risk. If this happens, we can construct a portfolio of two assets without risk. To compare to case 1, when the correlation coefficient is \(-1\), the portfolio of a stock and a real estate asset is less risky than the portfolio when the correlation coefficient is \(+1\) (Elton, et al, 2007).

In the case where no correlation exists, the correlation coefficient is zero. It indicates that there is no relationship between returns on a stock and a real estate asset. The portfolio of two assets has less risk than every single asset (Elton, et al, 2007).

In short, in the general case in which correlation is less than perfectly positive, we can conclude that the risk on the portfolio can be reduced by combining two assets which don’t have a perfect positive correlation and the benefits of diversification can be arose. The lower the correlation between the assets’ returns, the greater the benefit from diversification (Ogden, Jen, & O’Connor, 2003).

2.2.3 Wealth versus Credit Price Effects
Jud and Winkler (2002) and Benjamin et. Al. (2004), there exist two theoretical views to explain the relationship between stock and real estate prices. First is the well-known wealth effect which stresses a transmission channel from stock to housing. Since real estate is considered consumption goods as well as investment goods whereas financial assets such as stocks do not involve direct consumption, households with unexpected gains in the stock market are likely to distribute their portfolios to favor the real estate market. Put differently, households holding stocks often rebalance their portfolios by selling stocks and investing in other assets such as houses when stock returns rise. One thus sees the wealth effect on consumption via the transmission from stock.

The second theory explaining the existence of this relationship between stock and real estate prices is the so-called credit-price effect. This view regards a change in real estate
value as an important factor for the balance-sheet position of a firm. For example, credit-constrained firms holding a certain amount of real estate or land benefit when real estate prices rise. This is because an increase in the collateral value stemming from a rise in real estate prices reduces the cost of borrowing and gives the firms or households easier access to financing. The equity value of the firm will then, in turn, rise if the expected profits from the firm’s resulting investments are realized. Firms will then need even more real estate or land for the purpose of expanded investment, and will end up with a spiraling upturn in both prices. This transmission mechanism thus illustrates why an exogenous shock results in a persistent effect (Sim & Chang)

2.3 Theoretical Literature

The main focus of the study is on the interactions between real estate and stock markets in terms of returns. A search of literature reveals that although numerous research studies have been devoted to the relationship between real estate markets and local markets, the conclusions from prior research are mixed. On one hand research studies such as Zeckhauser and Silverman (1983), Brueggeman et al (1984), Liu and Mei (1992), Gyourko and Keim (1992), Li and Wang (1995) and Ling and Naranjo (1999) have found the two asset markets connected. The results for Gordon and Canter (1999) that examined the cross-sectional and time series differences in correlation coefficients between property stocks and their broader equity indices was that the correlation coefficients tend to vary over time and there is a clear trend towards integration and segmentation of the real estate securities market with stock markets in several of the countries studies. In contrast, other studies such as Ibbotson and Siegel (1984), Geltner (1990) and Ross and Zisler (1991) have argued that the two asset markets are largely segmented and consequently little relationship exists between them.

Quan, and Titman, (1996) in their study stated that real estate prices and stock prices are both affected by the level of economic activity, by interest rates and by the cost of labor. We would expect that the level of economic activity would have a positive effect on both real estate and stock prices, causing the two time-series to move together. However, other factors can conceivably cause the two time-series to be negatively correlated.
There are different approaches to research on the real estate price fluctuations and stock market, such as development of structural models of demand and supply and demand as part of a simultaneous system (Topel and Rosen, (1988), Di Pasquale and Wheaton, (1990)), or the development of reduced form equation models that combine demand and supply forces (Abraham and Hendershot, (1992), Peek and Wilcox, (1991)). The study will focus on literature of model that tries to explain price movements in terms of deviation from market fundamentals or in terms of asset substitution or in terms of asset substitution between real estate and financial markets.

Okunev (1995) did a study to ascertain the relationship between real estate markets and stock exchange. He created a model of the relationship between real estate and equity market returns by adopting an approach which is consistent with the techniques employed in modeling mean reversion of stock prices. To operationalize the process, he specified the return generating process of the stock variable index. They initially tested whether the various real estate indices were co-integrated with the equity market using traditional unit root tests and the data employed were monthly observations of the REIT, hybrid REIT, equity REIT, and mortgage REIT which reflected different aspects of the real estate market. The Dow Jones Index was used to reflect movements in the equity market. From the results in their study, the results showed there was a relationship between the REIT and equity indices. The coefficient $\gamma_1$ represented an estimate of $\beta$ and indicated that $\beta = .54$ and is significantly different from zero and one at the 5% level of significance. This value of $\beta$ indicated that there is a non-linear relationship between the REIT index and the equity market. Also, there was a non-linear relationship between hybrid REITS and equity markets. The estimate of $\beta = .59$ is significantly different from zero and one at the 5% level. The study also showed that there is a weak evidence of mean reversion. It showed that the mean reversion occurred at the rate of 2% per period which means that movements of the real estate market towards the equity market are very slow and hence divergence between the two markets may be very quite large and prolonged.

Studies have been done to support the notion that the two markets are segmented. Schnare and Struyke, (1976), Goodman, (1978, 1981), Richardson and Thalheimer (1982), Miles et al. (1990), Liu et al. (1990), and Geltner, (1991) have documented the
existence of segmentation within various real estate markets and equity markets. However, studies by Liu et al. (1990) and Ambrose et al. (1992) showed that mortgage and equity REITs displayed similar return generating characteristics to the equity market and they concluded the real estate and equity markets were integrated.

Gyourko, J. (1992) conducted a study that examined investment trust stocks that are run by firms that own and operate real properties. The equity REIT portfolio was composed of all qualifying firms with stock trading on the NYSE and AMEX. The number of stocks in the portfolio ranges from a low of 15 in 1978 to a high of 47 in 1989 and 1990. For comparison with the Russell-NCREIF series, quarterly returns are created by compounding the monthly returns from the CRSP files. A real estate series that was examined was the NAR’s monthly existing home price series obtained from the WEFA group and the data ran from January 1966 to December 1990. This series was solely based on appreciation rate and does not represent the total return. Quarterly appreciation rates are created by compounding the monthly observations.

The findings of the study showed that equity REIT returns are significantly negatively correlated with the housing appreciation index ($\rho = .41$), providing evidence of a contemporaneous linkage between the two transaction-based real estate series. Also, equity REITs displayed a high correlation with stock market returns, especially the small stocks ($\rho = .82$), a finding that may reflect the fact that equity REITs themselves are small stocks. The small stocks were also significantly related to the housing returns ($\rho = .48$). Such strong contemporaneous co-movement between the small stocks and residential housing suggests a common factor in their returns.

Eichholtz, H. and Hartzell, D.J. (1996) examined the international relationship between property share return indices and the stock market; Canada, The United Kingdom, and the United States. They regressed the monthly property share index and stock market returns. The results, even though were different for different for each country, confirmed earlier studies (Mengden and Hartzell, 1986). The results showed that there is a strong positive contemporaneous relation of the property shares with their national stock market. Even though the relationship between property share returns and the stock market is strong for the three countries, the nature of this relationship varies: the stock market betas
differ by country. Gyourko and Keim (1992) argue that a positive relationship exists between the size of the sample of property shares and the level of diversification of that sample, which in turn, is inversely related to the stock market beta of the sample.

2.4 Review of Empirical Studies

There is much disagreement in literature regarding the nature of the relationship between real estate prices and the stock market. The most commonly reported variable is the correlation between real estate returns and stock market returns. There is huge disparity in the size and direction of this variable – ranging from a negative correlation of 0.32 (Miles and McCue, 1984), to a positive correlation of 0.89 (Gyourko and Keim, 1992). Very high correlations are mostly reported for the US (Gyourko and Keim, 1992; Brown and Matysiak, 2000; Clayton and MacKinnon, 2001).

Similarly, significant disparity exists in the findings of studies which estimate the effect of real estate returns on stock market returns. Tse (2001), Qikarinen (2006) and Okunev et al. (2000) find a significant inter-relationship between the two markets while Quan and Titman (1997), Yunus (2008) and Beltaratti and Morana (2010) find a relationship in some countries but not in others.

Liow and Yang (2005) find housing and stock markets to be co-integrated, Chen et al. (2009) finds co-integration in some time periods, while Okunev and Wilson (1995) believe the markets are fractionally co-integrated.

Though most of this research is done in the US, some authors have examined the relationship in an international context, either by analyzing other countries individually or through panel data analysis. By examining a larger set of countries panel data analysis seeks to increase the number of observations hence the reliability of the research.

In Kenya, according to a report published by Hass Consult comparing the returns in the Kenyan Housing market to the returns of Nairobi Stock Exchange in the final quarter of 2010, the property market outperformed the stock market, following the falls on the NSE in November and December even as property prices continued to rise. The Kenyan residential property market has outperformed the Nairobi stock market over the last 10 years.
Michuki, (2010), did a study in which she sought to investigate whether there is a REITs need by institutional investors at the Nairobi Stock Exchange. In a sample of 30 pension fund and unit trust managers, her study showed that investors would invest in REITs if they were to be introduced at the stock exchange. This does not indicate directly the indication of a relationship of the two markets, but for institutional investors this shows that they need to diversify to minimize risk. We can say that the two markets may have a relationship for investors to invest in them for diversification.

2.4 Summary of Literature Review

It is clear that the level of correlation between returns in the real estate market and those from the stock market tend to differ within different countries. Though a lot of research has been conducted on the relationship of returns within the Real Estate markets and the Stock Markets in countries such as the US, UK and China, still, little is known about the same in the Kenyan Scenario.

This study therefore seeks to conduct the study in an emerging market so as to be able to provide information to interest the investors who wish to explore the two markets. Future research is also needed to determine why the relation between real estate and stock prices are significant in some countries but not others.
CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction
This chapter contains the methodology which was used in the study. It covered the overall research design, explained the target population and the sampling procedure, which was be used to arrive at the appropriate sample size. It also presented the procedure and the data collection instrument used in data collection and the justification for the choices. The technique of data analysis was also expounded in section 3.5. This section described data cleaning and preparation for analysis, the appropriateness for the statistical methods used for analysis.

3.2 Research Design
According to Bryman & Bell (2007), research design is a general plan that provides a framework for the choice of data collection techniques and data analysis procedures. Specifically it examines the possible research choices as well as specify time horizon applied to the research.

This study employed a longitudinal descriptive design. A descriptive technique was chosen because it sought to describe the relation between the two markets based on statistical results.

Data from the relevant institutions were analyzed for the past four and half years spanning from January 2009 to June 2013. Quarterly analysis was also done for the data in order to find the trends and try to establish the relationship. This brought a sample size of 22 units. The data collected will be analyzed using Statistical package for Social Sciences, (SPSS) and results presented.

3.3 Data Collection
The study was quantitative in nature and mainly utilized secondary data. In line with examining the relationship between the quarterly returns on Kenyan real estate and stock markets, the principal variables under concern are the property price index and the stock index. The monthly property index were obtained from the Kenya National Bureau of Statistics (KNBS) and the Kenya Property Developers Association (KPDA) ranging from
January 2009 and December 2012 and obtained from the NSE monthly index for the same period.

3.4 Data Analysis
The study used quantitative techniques: a simple regression analysis and correlation coefficient will be the statistical tools for investigating the relationship between the two variables. The analysis used real estate market as the dependent variables and the stock market as the independent variable. The Pearson Correlation coefficient and simple regression models were used to investigate the relationship between the two.

3.4.1 Analytical Model
Simple regression analysis shall be used depicted by the below model;

\[ Y_1 = a + \beta_1 X_1 + e \]
\[ Y_2 = a + \beta_1 X_1 + \beta_2 X_2 + e \]
\[ Y_3 = a + \beta_1 X_1 + \beta_3 X_3 + e \]

Where:
\( a \) is the equation constant,
\( b \) is the independent variable coefficient.
\( X_1 \) is the quarterly NSE 20 share index of the stock market.
\( X_2 \) is the quarterly average of the 91-day treasury bill rate.
\( X_2 \) is the quarterly average inflation rate.
\( Y_1 \) is the quarterly return on the real estate market with no control variable.
\( Y_2 \) is the quarterly return on the real estate market with the interest rate as the control variable.
\( Y_3 \) is the quarterly return on the real estate market with the inflation rate as the control variable.
\( e \) is the error term of the study.
This paper proceeded to measure how well this model fitted the collected data by using goodness of fit statistic measures such as $R$ and $R^2$. $R^2$ can be defined as the square of the correlation coefficient between $y$ and $\hat{y}$ and will be expected to lie between 0 and 1. Thus if this correlation is high then the model will have fit the data well, however if the correlation is low, then the model will not be providing a good fit to the data. The reliability of the individual coefficients will be measured using the F Statistic.
CHAPTER 4: DATA ANALYSIS AND PRESENTATION OF FINDINGS

4.1 Introduction

The main purpose of the study was to determine the relationship between real estate returns and stock market returns. This chapter contains the findings and the interpretation of the study results that attempted to answer the research questions as derived from the objectives. It is organized on the basis of research objectives and research questionnaire.

4.2 Demographic Characteristics

The study used the mean and standard deviation to describe the data in use.

Table 1: Statistics

<table>
<thead>
<tr>
<th></th>
<th>NSE Share index</th>
<th>Housing Index</th>
<th>Inflation Rate</th>
<th>Interest Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>N Valid</td>
<td>18</td>
<td>18</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>Missing</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mean</td>
<td>3804.414815</td>
<td>139.505556</td>
<td>9.971852</td>
<td>8.182833</td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>605.9444018</td>
<td>11.1465163</td>
<td>6.9281149</td>
<td>4.6049313</td>
</tr>
</tbody>
</table>

From Table 1 above, the NSE 2 share index had a mean of 3,804.41 and standard deviation of 605.94 between January 2009 and June 2013. The housing index had a mean of 139.50 and a standard deviation of 11.14 in the same period, the inflation rate had a mean of 9.97 percent and a standard deviation of 4.6 percent. The 91-day treasury bill interest rate had a mean of 8.18 and a standard deviation of 4.6 between January 2009 and June 2013. These statistics help in describing the variables used in the analysis.

From the table, it can be seen that the standard deviation of the inflation rate and interest rate is high relative to the mean. It shows that there was a big variation in inflation and interest rates in the period of study.
4.3 Regression Analysis

From the data analysis that was performed, the following results were found:

4.3.1 Regression with no control variable

Table 2: Stock Market index on real estate index

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.464(^a)</td>
<td>.215</td>
<td>.166</td>
<td>10.1774065</td>
</tr>
</tbody>
</table>

\(^{a}\) Predictors: (Constant), NSE Share index

ANOVA\(^b\)

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Regression</td>
<td>454.888</td>
<td>1</td>
<td>454.888</td>
<td>4.392</td>
<td>.052(^b)</td>
</tr>
<tr>
<td>Residual</td>
<td>1657.274</td>
<td>16</td>
<td>103.580</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>2112.162</td>
<td>17</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^{b}\) Predictors: (Constant), NSE Share index

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>B: 107.028</td>
<td>Std. Error: 15.682</td>
<td>Beta: .464</td>
<td>t: 6.825</td>
</tr>
<tr>
<td>NSE Share index</td>
<td>.009</td>
<td>.004</td>
<td>.464</td>
<td>2.096</td>
</tr>
</tbody>
</table>

\(^{a}\) Dependent Variable: Housing Index

\(^{b}\) Dependent Variable: Housing Index

The regression model provides three tables in the output for analysis of the output. \(R\) represents the multiple correlation coefficients, while \(R^2\) represents the proportion of variance in the dependent variable that can be explained by the independent variables. As shown in Table 2, \(R\) shows a value of 0.464 which indicates that the independent variable is an average predictor of housing index, while \(R^2\) shows that the independent variable, NSE 20 share index explains 21.5 percent of the proportion of variance of the dependent variable, housing index.

The ANOVA table tests whether the overall regression model is a good fit for the data. It tests the statistical significance of the test. The ANOVA table shows the F-Value and whether the independent variables statistically significantly predict the dependent
variable. From the table, F (1,16=4.392), p(0.052)>0.05 shows that the regression model is not a good fit of the data at 5 percent significant level.

The coefficients table provided values that were used for the regression model. The model from the output was:

\[ Y = 107 + 0.009(\text{NSE share index}) \]

### 4.3.2 Regression with interest rate as control variable

Table 3: Regression of NSE share index on Housing index with interest rate control

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.785\textsuperscript{a}</td>
<td>.616</td>
<td>.565</td>
<td>7.3493763</td>
</tr>
</tbody>
</table>

\textsuperscript{a} Predictors: (Constant), Interest Rate, NSE Share index

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Regression</td>
<td>1301.962</td>
<td>2</td>
<td>650.981</td>
<td>12.052</td>
</tr>
<tr>
<td></td>
<td>Residual</td>
<td>810.200</td>
<td>15</td>
<td>54.013</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>2112.162</td>
<td>17</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\textsuperscript{a} Predictors: (Constant), Interest Rate, NSE Share index

\textsuperscript{b} Dependent Variable: Housing Index

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unstandardized Coefficients</td>
<td>Standardized Coefficients</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>67.696</td>
<td>15.063</td>
<td>4.494</td>
</tr>
<tr>
<td></td>
<td>NSE Share index</td>
<td>.015</td>
<td>.003</td>
<td>.820</td>
</tr>
<tr>
<td></td>
<td>Interest Rate</td>
<td>1.759</td>
<td>.444</td>
<td>.727</td>
</tr>
</tbody>
</table>

\textsuperscript{a} Dependent Variable: Housing Index

From Table 3, R had a value of 0.785 which indicated that the independent variable is a good predictor of housing index. This was as a result of introduction of interest rate as a control variable. The $R^2$ showed that the independent variable, NSE 20 share index
explained 61.6 percent of the proportion of variance of the dependent variable, housing index.

The ANOVA table provided the statistical significance of the test. The ANOVA table showed the F-Value and whether the independent variable was able to significantly predict the dependent variable. From the table, F (2,15=12.052), p(0.001)<0.05 shows that the regression model is a good fit of the data at 5 percent significant level and all the independent variables are significant in the analysis.

The coefficients table provided values that were used for the regression model. The model from the output was:

\[ Y = 69.696 + 0.015(\text{NSE share index}) + 1.759(\text{Interest rate}) \]

4.3.3 Regression with inflation rate as control variable

Table 4: Regression of NSE 20 share index on housing index with inflation rate as control

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.585(^a)</td>
<td>.342</td>
<td>.254</td>
<td>9.6251303</td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), Inflation Rate, NSE Share index

ANOVA\(^b\)

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Regression</td>
<td>722.515</td>
<td>2</td>
<td>361.258</td>
<td>3.899</td>
</tr>
<tr>
<td></td>
<td>Residual</td>
<td>1389.647</td>
<td>15</td>
<td>92.643</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>2112.162</td>
<td>17</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), Inflation Rate, NSE Share index

b. Dependent Variable: Housing Index

Coefficients\(^a\)

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>(Constant)</td>
<td>67.258</td>
<td>27.704</td>
<td></td>
<td>2.428</td>
</tr>
<tr>
<td>NSE Share index</td>
<td>.017</td>
<td>.006</td>
<td>.903</td>
<td>2.716</td>
</tr>
</tbody>
</table>
Table 4 had an R value of 0.585 which indicated that the independent variable is an average predictor of housing index. The R² showed that the independent variable, NSE 20 share index explained 34.2 percent of the proportion of variance of the dependent variable, housing index. This was after the introduction of inflation rate as a control variable in the study, implying that it has a small impact on the dependent variable, housing index. This is because the R increased from 0.464 without the control to 0.585.

The ANOVA table provided the statistical significance of the test. The ANOVA table showed the F-Value and whether the independent variable was able to significantly predict the dependent variable. From the table, F (2,15=3.899), p(0.043)<0.05 shows that the regression model is a good fit of the data at 5 percent significant level, with only the NSE 20 index being a good indicator with sig. value of 0.016 while inflation rate had a sig. value of 0.110.

The coefficients table provided values that were used for the regression model. The model from the output was:

\[ Y = 67.268 + 0.017\text{(NSE share index)} + 0.909\text{(Inflation rate)} \]

### 4.3.4 NSE share index on housing index with interest rate and inflation rate controls

Table 5: Regression of NSE 20 share index on housing index with interest rate and inflation controls

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.807</td>
<td>.651</td>
<td>.576</td>
<td>7.2596284</td>
</tr>
</tbody>
</table>

**ANOVA**

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Regression</td>
<td>1374.331</td>
<td>3</td>
<td>458.110</td>
<td>8.692</td>
</tr>
<tr>
<td></td>
<td>Residual</td>
<td>737.831</td>
<td>14</td>
<td>52.702</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>2112.162</td>
<td>17</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), Interest Rate, NSE Share index, Inflation Rate

b. Dependent Variable: Housing Index
Table 5 had an R value of 0.807 which indicated that the independent variable is a good predictor of housing index. The R\(^2\) showed that the independent variable, NSE 20 share index explained 65.1 percent of the proportion of variance of the dependent variable, housing index. This was after the introduction of inflation and interest rates as control variables in the model, implying that the two variables combined have a significant impact on the dependent variable, housing index. This is seen from the increase in R from 0.464 without the control to 0.807.

The ANOVA table provided the statistical significance of the test. The ANOVA table showed the F-Value and whether the independent variable was able to significantly predict the dependent variable. From the table, F(2,15=8.692), p(0.002)<0.005 shows that the regression model is a good fit of the data at 5 percent significant level. The NSE 20 share index and interest rate had a significant value of less than 0.05 while inflation rate variable was greater than 0.005 which shows that in the model it is only significantly affected by NSE 20 share index and interest rate.

The coefficients table provided values that were used for the regression model. The model from the output was:

\[ Y = 1374.331 + 0.019\times \text{NSE share index} + 0.493\times \text{Inflation rate} + 1.608\times \text{Interest rate} \]

### 4.4 Correlation Analysis

<table>
<thead>
<tr>
<th></th>
<th>NSE Share index</th>
<th>Housing Index</th>
<th>Inflation Rate</th>
<th>Interest Rate</th>
</tr>
</thead>
</table>

Table 6: Correlation matrix of variables
Pearson’s correlation test was performed to investigate the nature of relationship of the variables in the study. From Table 6 above, the NSE 20 share index has a positive correlation with housing index of 0.464, negative correlation with inflation rate of 0.777, and a negative correlation with inflation rate of 0.49. This shows that the relationship of NSE 20 share index is highly negatively correlated with inflation rate. The housing index has a negative correlation of 0.136 with inflation rate, and a positive correlation of 0.324 with interest rate, while the inflation rate has a positive correlation coefficient of 0.535.

4.5 Summary and Interpretation of findings

Data analysis was done from the provided data and regression was the main analysis done, with Pearson’s correlation test done as a confirmatory test. For regression analysis done, four tests were done to test whether the independent variables had an impact on the dependent variable.

These tests were (i) regression of NSE 20 share index on real estate index with no control variables, (ii) regression of NSE 20 share index on real estate index with inflation rate as
the control variable, (iii) regression NSE 20 share index on real estate index with 91-day treasury bill interest rate as the control variable, and (iv) regression NSE 20 share index on real estate index with both inflation rate and 91-day treasury bill interest rate as the control variables.

Regression analysis (i) which is regression of NSE 20 share index on real estate index with no control variables showed an R value of 0.464, an $R^2$ value of 21.5 percent, ANOVA value of 4.392 and a significance value of 0.052. The above output shows that the model is close to being a reliable estimator of the housing index as the significance value is 0.052.

Regression analysis (ii) which is regression of NSE 20 share index on real estate index with inflation rate as the control variable showed an R value of 0.785, an $R^2$ value of 61.6 percent, ANOVA value of 12.052 and a significance value of 0.001. The above output shows that the model is a reliable estimator of the housing index and would be the preferred of estimation.

Regression analysis (iii) which is regression NSE 20 share index on real estate index with 91-day treasury bill interest rate as the control variable showed an R value of 0.585, an $R^2$ value of 34.2 percent, ANOVA value of 3.899 and a significance value of 0.043. The above output shows that the model is a reliable estimator of the housing index.

Regression analysis (iv) which is regression NSE 20 share index on real estate index with both inflation rate and 91-day treasury bill interest rate as the control variables showed an R value of 0.807, an $R^2$ value of 65.1 percent, ANOVA value of 3.899 and a significance value of 0.043. The above output shows that the model is a good and reliable estimator of the housing index.

Correlation study was also done to check the relationship of the dependent variable housing index with independent variable NSE 20 share index and control variables interest rate and inflation rate. From the results from the correlation matrix, there was slight positive relationship between the NSE 20 share index and the housing index (0.464), a large negative correlation between NSE 20 share index and inflation (0.777), and an average negative correlation between NSE 20 share index and interest rate (0.49). The housing index had a small negative correlation with inflation and a mild positive
relationship with interest rate. Inflation rate had a slightly positive significant relationship with interest rate.

The earlier literature studies showed that there was some relationship between real estate and stock market. Our study shows that there was relationship between real estate market and the stock market when there were controls but there was no relationship when there were no controls introduced.
CHAPTER 5: SUMMARY, CONCLUSION AND POLICY
RECOMMENDATIONS

5.1 Summary
Over time people and institutions have invested in the stock and real estate markets to grow their investments and wealth. Investors look to diversify their investments through portfolio so as to minimize variation in the returns, hence reducing their risks. The rate of growth in these two markets has been different depending on the investors’ perception and questions have been arisen on whether the performance of one market affects the other by shifting or there is no relationship.

Various theories have been forwarded that lead to the fundamental price changes in these markets. However, literature studies have shown of an existence of relationship in the two markets but with the non existence of a REITs market in Kenya, no concrete study has been done to confirm the same. This study therefore sought to investigate of the relationship of the two markets in Kenya.

Data was collected from Kenya National Bureau of statistics, (KNBS), Nairobi Stocks Exchange, (NSE), and various websites that had the information. The data was prepared for analysis and thereafter Statistical Package for Social Sciences (SPSS) was used for data analysis. Descriptive statistics, regression analysis, and Pearson’s correlation test were done and the results presented in tables for interpretation.

The results of the study showed that there was relationship between real estate returns and stock market returns with inflation as control variable or when both inflation and interest are introduced in the model. This shows a co-variation between real estate returns and stock market returns, and one variable affects the other. The regression test showed there was no relationship between real estate returns and stock market returns when there are no variables introduced, indicating that one market does not act as a signal to the other market on whether to invest since they do not move together.
5.2 Conclusion

The objective of the study was to determine the nature and extent of relationship between the real estate market returns and the stock market returns. From the study, the below conclusions were made.

A total of four regression tests were done and the following results came out: the first test of regression of NSE 20 stock index on real estate index with no control variable indicated little impact of stock market return on real estate index and the ANOVA table showed that the independent variable does not adequately predict the dependent variable. The second test of regression of NSE 20 stock index on real estate index with inflation as control variable showed that there was significant impact of the independent variable on the housing index, and the ANOVA table showed that the independent variable significantly predict the independent variable.

The third test of regression of NSE 20 stock index on real estate index with the interest rate as control variable showed that there was adequate impact (0.585) of the independent variable on the housing index, and the ANOVA table showed that the independent variable significantly predict the independent variable as it had a value of 0.043 which is less than the significant 0.05. The fourth test of regression of NSE 20 stock index on real estate index with both interest rate and inflation as control variables showed that there is a big impact (0.807) of the independent variable on the housing index, and the ANOVA table showed that the independent variable significantly predict the independent variable as it had a value of 0.002 which is less than the significant 0.05.

It can therefore be shown that there is impact of the independent (NSE 20 share index) and control variable (interest rate) on housing index in Kenya on the dependent variable (housing index).

Literature identified macro-economic factors inflation rate and interest rate as control variables. After data collection and analysis done using regression analysis and correlation test, the results showed that there is a relationship between returns in the two markets, and also together with the control variable, interest rate. The degree of impact of
the NSE 20 share index on the housing index is substantial when inflation control is introduced and even higher when both variables are introduced as controls.

The study therefore conforms to the expectation of earlier studies done in the literature review and shows of the relationship of the two markets.

5.3 Policy Recommendations

The real estate and the stock exchange markets are two important markets in the economy of any country. They measure the strength of an economy and with this, close and efficient monitoring is important. These markets are affected by various macro-economic factors that we included as controls in the study. Our economy is still growing and since our literature was largely based on developed economies, various lessons were learnt and the study proposes the following recommendations:

First, the government and relevant stake holders should establish a REITs market in Kenya so as to be able to monitor the real estate market in the country. The real estate market in the country is growing rapidly and with this market it will enable policy makers to make the right decisions based on the information available from this market. As a huge sector in the economy, defining its own index would be okay.

Secondly the government statistical agency/agencies should have proper information database stored in an organized manner to enable ease of access. This will enable researchers to easily get information that would assist the economy.
5.4 Limitations of the study

While conducting the study, several limitations were experienced. First was that of data collection. Since the data used was secondary data, accessing some of the data was difficult. Information such as the inflation rate and interest rate were difficult to find in the years preceding 2009, especially the monthly rates. This made us to work from the year 2009, even though initially the study was meant to analyze data from 2008.

Secondly, being that the property market in Kenya is still on a growth curve, the data collection for the housing index was a challenge because currently it is prepared by a private company, Hass Consult and not the government. For a few of the quarters in our data analysis we had to use estimates in the calculation of the housing indices. The REITs index would have been a more robust source of data. Unfortunately this is still under developed in the Kenyan Market.

Thirdly, the paper majorly relied on the use of secondary sources of data which at times lack the real control over data quality, which then necessitates careful evaluation on such data sources. This is because not all the quantitative data compiled by governments and private organizations are error free.

Lastly, in determining the correlation coefficient between the two markets, the paper entirely dwelt on historical information of realized returns of the two markets. It did not take into consideration the other method which is based on the probability distribution of the future returns of the two markets.
5.5 Recommendation for further research

The results and conclusion of this research raises further questions for future researches. First, it was identified that there is an imbalance in the development of real estate in different cities in Kenya. We recommend future studies to conduct more intensive research by taking much more areas that are under different stages of development.

The second recommendation for improvement would be to quantify the diversification benefits in the Kenyan market from creating a balanced – portfolio including both real estate and the stock assets. This would mean to numerically calculate the benefits by covering both returns and risk of diversification into Kenyan real estate and stock markets. Investors are more convinced when the benefits are presented in the form of visible and persuasive numbers.

Third, it would be meaningful if future researched looked into the question of the composition of the diversified portfolios. The individual investors would want to know the respective weights to be assigned to real estate and stock markets in order to know what proportion of their wealth should be invested in the two sectors.

Lastly, more research should be done on the relationship between real estate and the stock market analyzing other macro-economic factors (such as the cost factors in the two markets, the risk elements identified as well as the magnitude of prospective returns e.t.c) and how they may affect their relationship.
INDEX I: REFERENCES

Federal Reserve Bank of Boston Conference Paper.
Investment Trust Returns: A Search for Evidence of Market Segmentation and
Nonlinear Dependency.
Review, 37(2/3).
Estate Price Index Construction
Beltratti, A. & Morana, C. 2010. International House Prices and Macroeconomic
Fluctuations. Journal of Banking and Finance, 34, 533-545.
Case, K.E. and Shiller, R.J., (1987). Forecasting Prices and Excess Returns in the
Housing Market.
3(1).
Clayton, J. & MacKinnon, G. 2001. The Time Varying Nature of the Link between REIT,
Real Estate and Financial Asset Returns. Journal of Real Estate Portfolio
Management, 7, 43
Economic Journal, 98.


Ling, D. C. and Naranjo, A (1999), The integration of commercial real estate market and Stock Markets, Real Estate Economics, 27(3), 1-28

Liow H and Lee Z (2009), Extreme Dependence between real estate and stock markets


Mengden A.E. and Hartzell, D., (1986). Real Estate Investments Trust: Are They Stocks or real Estate?


Yang and Ye (2010), Return Correlation of China’s Real Estate and Stock Markets
Zeckhauser, S., and R. Silverman (1983), Rediscover Your Company’s Real Estate, ‘’
Harvard Business Review 61: 111 – 117.0
APPENDIX II: DATA TABLE

<table>
<thead>
<tr>
<th>YEAR</th>
<th>QUARTER</th>
<th>NSE Share index</th>
<th>Housing Index</th>
<th>Inflation Rate</th>
<th>Interest Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>Q1</td>
<td>4876.10</td>
<td>116.00</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Q2</td>
<td>5232.47</td>
<td>118.00</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Q3</td>
<td>4565.82</td>
<td>124.00</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Q4</td>
<td>3416.28</td>
<td>129.00</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2009</td>
<td>Q1</td>
<td>2826.23</td>
<td>132.00</td>
<td>24.27</td>
<td>8.24</td>
</tr>
<tr>
<td></td>
<td>Q2</td>
<td>2982.43</td>
<td>130.00</td>
<td>21.13</td>
<td>8.23</td>
</tr>
<tr>
<td></td>
<td>Q3</td>
<td>3127.10</td>
<td>128.00</td>
<td>10.20</td>
<td>7.25</td>
</tr>
<tr>
<td></td>
<td>Q4</td>
<td>3173.53</td>
<td>123.90</td>
<td>5.08</td>
<td>7.10</td>
</tr>
<tr>
<td>2010</td>
<td>Q1</td>
<td>3755.87</td>
<td>126.13</td>
<td>5.08</td>
<td>6.29</td>
</tr>
<tr>
<td></td>
<td>Q2</td>
<td>4271.43</td>
<td>126.76</td>
<td>3.68</td>
<td>4.12</td>
</tr>
<tr>
<td></td>
<td>Q3</td>
<td>4507.67</td>
<td>130.06</td>
<td>3.33</td>
<td>1.82</td>
</tr>
<tr>
<td></td>
<td>Q4</td>
<td>4495.87</td>
<td>135.13</td>
<td>3.81</td>
<td>2.20</td>
</tr>
<tr>
<td>2011</td>
<td>Q1</td>
<td>4197.33</td>
<td>141.07</td>
<td>7.05</td>
<td>2.60</td>
</tr>
<tr>
<td></td>
<td>Q2</td>
<td>4025.00</td>
<td>143.75</td>
<td>13.16</td>
<td>5.86</td>
</tr>
<tr>
<td></td>
<td>Q3</td>
<td>3495.67</td>
<td>142.31</td>
<td>16.51</td>
<td>10.05</td>
</tr>
<tr>
<td></td>
<td>Q4</td>
<td>3289.00</td>
<td>141.31</td>
<td>19.18</td>
<td>16.41</td>
</tr>
<tr>
<td>2012</td>
<td>Q1</td>
<td>3298.33</td>
<td>143.15</td>
<td>16.87</td>
<td>19.35</td>
</tr>
<tr>
<td></td>
<td>Q2</td>
<td>3634.00</td>
<td>145.01</td>
<td>11.78</td>
<td>12.43</td>
</tr>
<tr>
<td></td>
<td>Q3</td>
<td>3890.00</td>
<td>152.40</td>
<td>6.38</td>
<td>10.22</td>
</tr>
<tr>
<td></td>
<td>Q4</td>
<td>4121.00</td>
<td>155.00</td>
<td>3.53</td>
<td>9.01</td>
</tr>
<tr>
<td>2013</td>
<td>Q1</td>
<td>4599.00</td>
<td>155.77</td>
<td>4.08</td>
<td>9.88</td>
</tr>
<tr>
<td></td>
<td>Q2</td>
<td>4790.00</td>
<td>159.35</td>
<td>4.37</td>
<td>6.21</td>
</tr>
</tbody>
</table>

Data

Sources:
1. KNBS: www.knbs.or.ke
2. Hass Consult: www.hassconsult.co.ke
3. www.tradingeconomics.com
4. www.centralbank.go.ke
5. www.treasury.go.ke