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The rate of return of investable assets and economic growth rate in Kenya, 2001 - 2020.

Wachira Stephen Mathenge

099716

Supervised By: Brian Nyangena

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Strathmore Institute of Mathematical Sciences

Strathmore University

Nairobi, Kenya

DECLARATION

I declare that this work has not been previously submitted and approved for the award of a degree by this or any other University.

To the best of my knowledge and belief, the Research Project contains no material previously published or written by another person except where due reference is made in the Research Project itself.

Stephen Wachira [Name of Candidate]

Steph. [Signature]

12/02/2020 [Date]

This Research Project has been submitted for examination with my approval as the Supervisor.

_____ [Name of Supervisor]

_____ [Signature]

_____ [Date]

Strathmore Institute of Mathematical Sciences Strathmore University

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List of Abbreviations

AKI	Association of Kenya Insurers
CBK	Central Bank of Kenya
CPI	Consumer Price Index
GDP	Gross Domestic Product
HPI	Housing Price Index
JCHS	Joint Centre for Housing Studies
KBA	Kenya Bankers Association
KNBS	Kenya National Bureau of Statistics
REITs	Real Estates Investment Trusts
NSE	Nairobi Securities Exchange
NASI	Nairobi All Share Index
NSE20	Nairobi Share Exchange 20 Index
RI	Rental index
T-Bill	Treasury Bill
T-Bond	Treasury Bond
UNDP	United Nations Development Programme

Abstract

What is the rate of return of a portfolio of investable assets in Kenya and how does it compare with the economic growth rate in Kenya? What can we learn about wealth inequality given the rate of return of investable assets and the economic growth rate in Kenya? Which investable assets have yielded the highest risk-adjusted rate of return in Kenya over time? What can we learn about the excess returns of different investable assets and the risk premium in Kenya? These are the key questions answered from a constructed dataset of the rate of returns of the investable assets in Kenya for a 20-year period, starting 2001 to 2020. The findings indicate the rate of return of investable assets in Kenya have always been higher than the economic growth, with a spread of as high as 8% on average, which justifies the high wealth inequality measured by the Gini coefficient of around 42%. Treasury bonds, with a Sharpe Ratio of 1.52, have consistently outperformed real estate with a Sharpe Ratio of 0.62 and stocks with a Sharpe Ratio of 0.13, respectively in terms of the risk-adjusted rate of return. Lastly, the risk premium has been low at around 2.23% on average mainly due to the low spread between the rate of returns of a possible basket of risky assets and basket of safe assets in Kenya.

CHAPTER 1: INTRODUCTION

1.1 Background of the Study

The rate of return of a portfolio of investable assets in an economy can be viewed as the return on wealth in the economy. Return on wealth is the income generated by wealth which includes interest income, dividend income, rental income, and income from asset appreciation while the economic growth rate is the increase in level of output in the economy. The return on wealth has been the subject of discussion in the study of inequality and risk premium. This paper aims to compare the return on wealth and the economic growth rate in Kenya as a frontier economy. The current debate is that whenever the return on wealth is greater than the rate of economic growth, the owners of wealth will accumulate wealth at a faster rate leading to wealth inequality. A major contribution of this research paper is to compile a dataset of the real estate returns, equity returns, treasury bills and bonds annual yields and compute risk premium in Kenya. Our data will cover 20-year period starting from 2001 to 2020.

Investors are turning to frontier economies given the slowing growth of returns in the emerging markets. However, according to UNDP (2019) most of the frontier economies are lacking detailed data on wealth, specifically housing returns which accounts for around half of the national wealth of a typical economy, Piketty (2014). In this paper, we will build on the data provided by the national accounts of Kenya and the different publications to construct a comprehensive list of data for the different asset classes. The evidence we gather in this paper will shed light in the academic research in asset pricing and wealth inequality.

We will create a diversified portfolio consisting of different weighted investable assets to determine the return on wealth. The annual income from the diversified portfolio comprises the capital gain plus the asset yield of the different asset classes. Huang (2007) elaborated investable assets as both tangible and intangible assets held for producing additional income in terms of yields or for speculation purpose with anticipated capital gains. Idzorek (2013) stated that the investment assets comprise both risky and safe assets, where risky assets include stocks and real estate while safe assets include treasury bonds and treasury bills as Jorda et. al (2019) outlined.

1.2 Problem Statement

What is the return on wealth in Kenya? This is a simple question yet hard to answer. The return on wealth has been a central thesis in the studies of inequality and risk premium in the economies. Probably another question to ask is how does the housing returns compare with the other asset classes returns? This is a key question in computing the return on wealth. The data on housing returns which comprises like half of the total wealth in the economy is not easily accessible. Real estate is the most used asset, yet it is one of the assets that we least know about (Shiller, 2000). Real estate properties are commonly used as collateral in banks to acquire loans in banks. The Table 1 below indicates a KBA (2015) report which indicates the proportion of mortgages as a percentage of GDP in different African frontier economies. It is the asset class that drives wealth in the frontier economies.

Table 1 KBA Housing market survey 2015

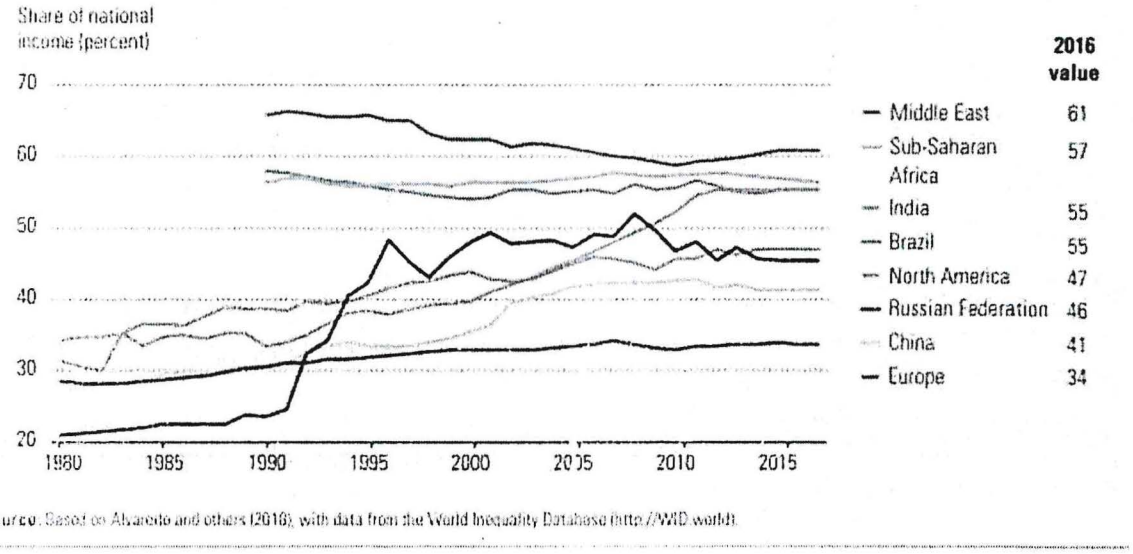
Country	**Mortgages as a % country mortgages as a %**	**Country**	**Mortgages as a % country mortgages as a %**
South Africa (2011)	26.4	Botswana (2009)	2.3
Namibia (2011)	19.6	Rwanda (2009)	2.3
Morocco (2011)	16.9	Burundi (2011)	1.6
Mauritius (2012)	12.2	Algeria (2009)	1.3
Tunisia (2010)	12	Zimbabwe (2012)	1.2
Seychelles (2010)	3.94	Uganda (2011)	1.1
Kenya (2010)	2.51	Egypt (2011)	1.0

We will compile a time series dataset of the housing returns and compare it with the other asset classes in the frontier economies. The research project builds on a research methodology carried out by Jorda et.al (2019) when investigating the rate of return of everything in advanced

economies. They considered housing and stocks as risky assets while treasury bills and treasury bonds as safe assets.

There is a current debate of increasing income and wealth inequality in the world, where the top 10% are earning high income and accumulating wealth amid the continued economic hardships experienced by most of the population, Piketty (2014). The Figure 2 below indicates the share of national income owned by the top 10% has been rising since 1980 in most regions of the world.

Income inequality based on the top 10 percent's income share has risen since 1980 in most regions but at different rates

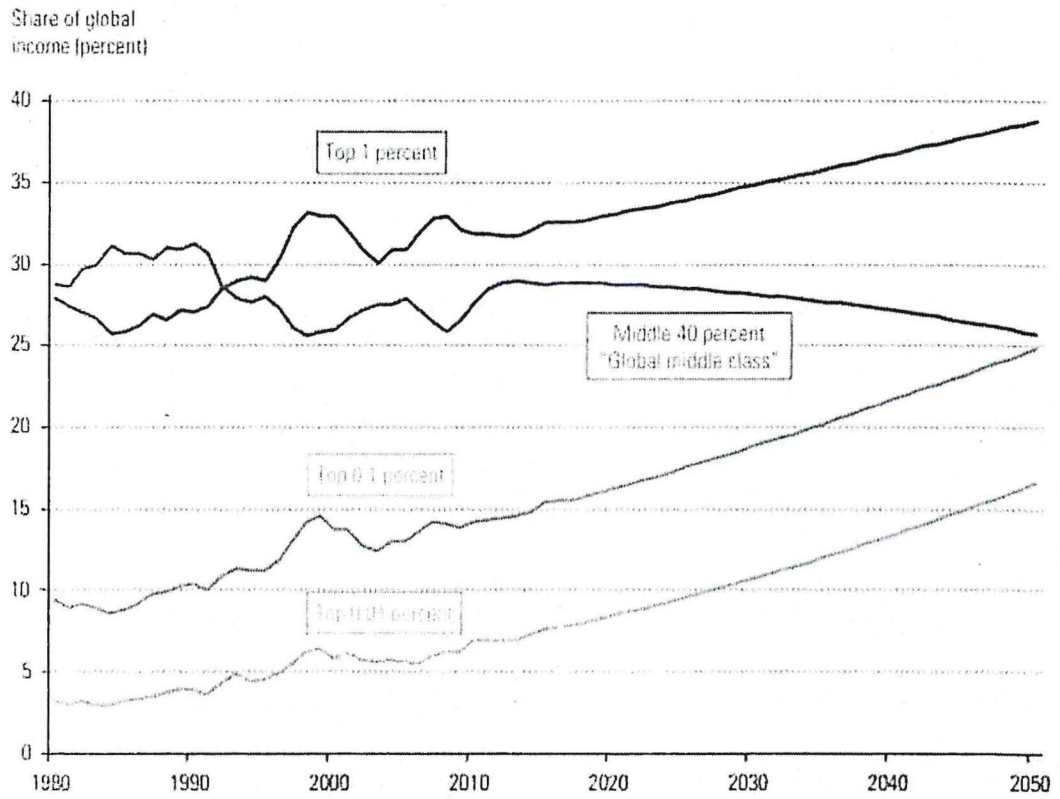


Source: Based on Alvaredo and others (2016), with data from the World Inequality Database (http://WID.world).

Figure 1 Income Inequality in the world.

We aim at finding out how the return on wealth compares with the economic growth rate in Kenya as a frontier economy and thus the evolution of the wealth inequality. Piketty (2015) observed the relationship between the return on wealth and the economic growth rate is not the only or primary tool for considering changes in income and wealth inequality, however, when the economic growth rate is low, then wealth tends to accumulate at a faster rate from capital than from labor. This results in accumulation of more wealth among the top 1% and 10% compared to the rest of the population thus increasing wealth inequality. The Figure 3 below predicts that if the current trend continues, the global top 0.1% could end up owning as much as 25% of the global income share, which is equivalent to the global share that the middle 40% currently owns.

If current trends continue, by 2050 the global top 0.1 percent could end up owning as much of the world's wealth as the middle 40 percent of the world's population



Source: Alvaredo and others (2018), based on data from the World Inequality Database (http://WID.world)

Figure 2 Projected Wealth Inequality trend.

However, there have been diverging sentiments on the focus of the historical income on wealth data to study inequality. There are suggestions for the use of consumption data rather than income on wealth data which Bill Gates (2014) argued, in his thoughts on Piketty's book, maybe more important in understanding human welfare. Nevertheless, it is important to note that the income data is readily available and easy to collect compared to the data on consumption. Besides, in most cases consumption data is usually a subset of income data, thus we can analyse income data to explain wealth inequality. The Figure 4 below outlines the current trends in the global wealth inequality, where the share of personal wealth held by the top 1% has been rising since 1980s in the most parts of the world.

Trends in wealth inequality

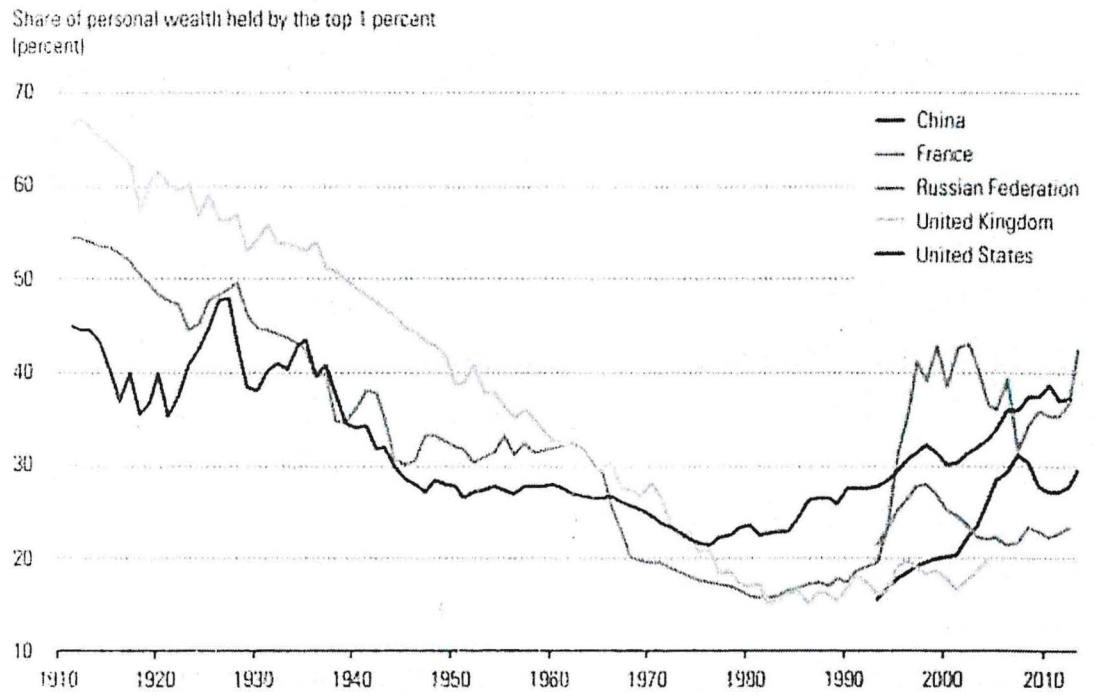


Figure 3 Wealth Inequality in the world.

To make the comparison discussed in the preceding paragraphs we need to compute the return on wealth. The return on wealth being an aggregate of all the income derived from wealth, we will compile a dataset of the different asset classes in the economy. Real estate constitutes the large share of the national wealth therefore we will create a series of the housing returns and aggregate it with the stock market returns, treasury bill yields and treasury bond yields to arrive at the return on wealth in the economy. Thereafter, compare the return on wealth series with the real economic growth rate.

Secondly, we will investigate the returns and volatility of investment assets in frontier economies, the long run trend of the returns provided by different asset classes in comparison with their volatility. Besides, which of the asset classes have the highest returns and their volatility characteristics. An important question when investing in frontier economies is whether the risk premium provided by investments is sufficient to compensate for the risks involved.

These economies face a wide range of risks with the main ones being foreign exchange rate risks, non-normal distribution of returns which tends to be negatively skewed, prevalent insider trading, lack of liquidity of the different asset classes, inadequate and difficulty in raising capital, weak corporate governance, and great political risks. Lastly, we will determine the long run trend of the investment assets returns and their corresponding risk premium.

1.3 Research Objectives

The overall objective of our research is to compute the return on wealth and compare it with the economic growth rate in Kenya.

The specific objectives of the study include:

1. Compute the return on wealth in Kenya from 2001 - 2020.
2. Compare the return on wealth with the economic growth in Kenya over time.
3. Determine the long run trend of the rate of return of the different investable assets and their volatility over time.
4. Determine which investable assets have the highest long run risk-adjusted rate of return in Kenya.
5. Compute the approximate risk premium in Kenya over time.

1.4 Research Questions

1. What is the return on wealth in Kenya?
2. How does the return on wealth compare with the economic growth rate in Kenya?
3. What is the long run trend of the rate of return of the investable assets? What is their volatility?
4. Which asset classes have the highest long-run risk-adjusted rate of returns?
5. What is the approximate risk premium in Kenya over time?

1.5 Significance of the Research

Our research impacts the policy makers, investors and the financial analysts as discussed:

The policy makers will be interested in understanding the comparison of the return on wealth and the economic growth rate, and its impact on the level of wealth inequality in the country. We will attempt to find out whether the puzzle that emerged from Jorda (2019) analysis of the advanced

economies that fluctuations of "r minus g" over time does not systematically correspond with the economic growth rate applies in Kenya as a frontier economy. This will be of importance to the policy makers in understanding the relationship between the performance of the investment industry and the general performance of the economy.

Similarly, investors will be interested in knowing the average return they expect in their investments. They compare the return on wealth with the cost of capital to make appropriate investment decisions. There are ongoing debates regarding the use of historical returns to determine the investment decisions, Ilmanen (2003). Different scholars have suggested models for determining expected returns such as the dividend discount method, discounted cash flow method and residual income method. However, it is essential to note that the knowledge of the historical average returns gives an investor a rough estimate of the returns they expect on an investment and corroborate it with the expected return given by the forward-looking models.

On the other hand, the financial Analysts will be interested to know an approximate excess returns and risk premium in the economy which they use in calculating the required return on different asset classes, Damodaran (2003). We will calculate the spread between the returns on risky assets and the returns on safe assets to determine the approximate risk premium in the economy. However, Aswath Damodaran (2012) has done many studies on the risk premium where he provided alternative suggestions on the estimation of the equity risk premium and country risk premiums which are used in the valuation of businesses. Though, it is worth noting that there are several critiques on his methods of calculating the risk premium, Kruschwitz (2012). This suggests computing the spread between the risky and safe asset returns as a relevant method in estimating risk premium.

Lastly, the evidence and data collected in this research paper will shed light on the area of study in asset pricing and wealth inequality. The return on wealth has been the subject of discussion in papers discussing wealth inequality. The risk premium is also a central thesis in asset pricing discussions. A compilation of dataset on the different asset classes returns will be of value to these fields of academic research.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

Different scholars have contributed both theoretical and empirical studies that have explored the process of portfolio management and asset selection. The debate on a higher return on wealth than the economic growth rate resulting in increasing inequality has spurred different research being done on the topic, with one group of researchers supporting the idea while others being critical about it. The asset returns over time, have been studied in time series analysis which attempts to explain the return and volatility characteristics of a wide range of assets both financial and non-financial.

2.2 Review of Theories

The concepts of the portfolio theory, asset-returns, volatility, and comparison between return on wealth and economic growth rate have been analysed through different theories that have developed over time. Initial theories established the fundamentals of the analysis framework using different assumptions. However, newer theories have adopted different assumptions and explored alternative factors that affect the portfolio return and volatility relationship.

2.2.1 Portfolio Theory

Markowitz (1952) evaluated the portfolio theory by linking linear programming concepts to investment theory. He describes how an investor can reduce the portfolio standard deviation by selecting assets with returns that are negatively correlated. He concentrated with the portfolio rather than individual assets. He argued that portfolio selection is made based on a set of relevant beliefs about future performances in an investment process rather than a speculative one. He assumed that an investor seeks to maximize the discounted expected portfolio returns and the portfolio variance is undesirable.

Variance is a measure of dispersion from the expectation. Expected returns is measured by the yield of the asset while the variance of return is considered as the risk. The choice of portfolio is separated from beliefs using the expected return-variance of returns rule. Hence the evaluation of this relationship is the basis of the choice thus eliminating decisions made of beliefs. Diversified portfolios are superior to non-diversified portfolios in terms of maximizing expected discounted returns.

He argued that there exists a combination of assets with maximum expected returns that is superior to any other combination and gives the highest level of returns at the lowest level of risk called the efficient frontier. The graph below illustrates the concept of efficient frontier where on it, a graph of expected returns vs. variance of returns makes it possible to find the most efficient portfolios from a set of all attainable E-V combinations associated with a given expected value of investment.

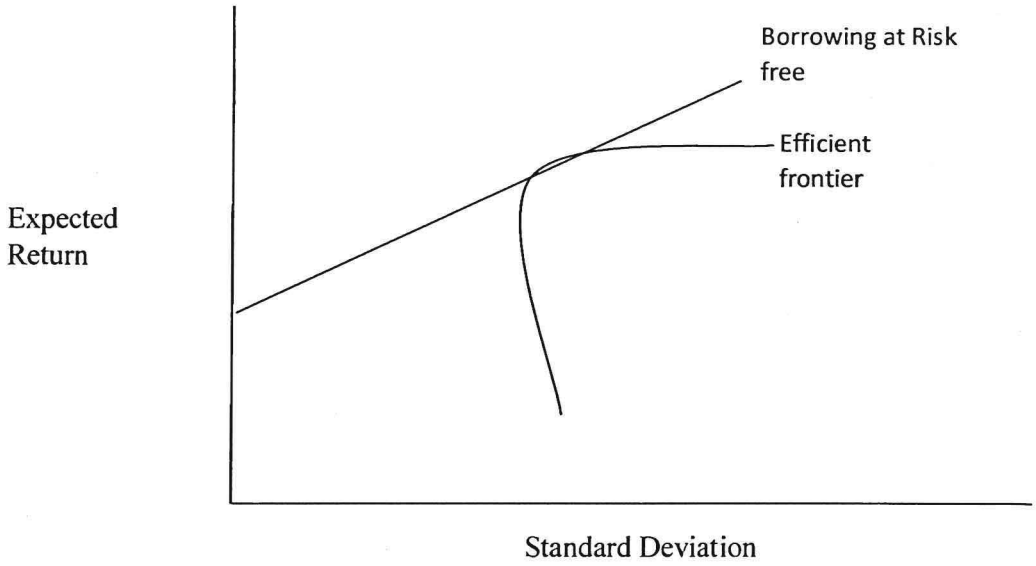


Figure 4 Efficient Frontier

Portfolio return is the weighted sum of expected return of the individual assets.

$$E(Rp) = \sum i\ \omega i\ E\ (Ri)$$

Where Rp is the portfolio return, R_i is the return on asset i and ω_i is the weighting of asset i.

Portfolios variance is calculated as:

$$\sigma p2\ = \sum i\ \omega i2\ \sigma i2\ + \sum i \sum j\ \omega i\ \omega j\ \sigma i\ \ \sigma j\ \ \rho ij$$

Where ρ_{ij} is the correlation coefficient of the returns on assets i and j and $i \neq j$.

In conclusion, diversification provides a superior portfolio where it minimizes the variance by ensuring that the assets do not positively correlate. Weaknesses in the portfolio theory emerge from the difficulty in estimating the correlation coefficient for two assets, which is even harder for multiple assets which require complex tools.

2.2.2 Volatility and Rate of Return

Volatility (σ) is the degree of variation of the asset returns over time. It is measured by the standard deviation of the logarithmic returns. Historical volatility measures past asset returns while implied volatility looks forward in time. Implied volatility is derived from the market price of a traded derivative, a good example being an option. There are theoretical models explaining how volatility comes where Roll (1984) explain volatility is affected by market microstructure.

Risk is the potential permanent loss while volatility is rapid changes in the asset prices. Risk is the possibility of an outcome deviating from the expectation. In portfolio management it is the likelihood that the returns will deviate from the expected. Downside risk is more critical in portfolio management since it is a probability of making a loss. This may include gaining less return than expected, making no return, or even losing the investment itself. Variability in return is analysed by calculating the standard deviation thus reflects the inherent risk in an investment. Markowitz (1952) noted that the risk of a portfolio is affected by the asset composition and their individual variances.

Rate of returns from investment assets consist of each periodic asset yields and the asset appreciation. Asset yield is the percentage of the return to the value of the asset.

$$Asset\ yield\ =\ \frac{\sum_i^t Ct}{Po}$$

Where;

$\sum Ct =$ *the expected cash flow at end period and*

$Po =$ *Asset price at the beginning of the period.*

Expected return is the average return in the period under consideration multiplied by their probability percentages.

$E(r) = \sum_i^t Piri$

Where;

$E(r)$ *is the expected return,*

Pi is the probability of return and

ri is the return per period.

The asset risk is the standard deviation of the returns, which is measured by the deviation from the expected return.

$\sigma = \sqrt{\sum Pi\, ri2} - E(r)2$

Markowitz (1952) argued that an investor will seek to maximise returns of the asset at minimum possible risk. Sharpe (1964) started that investors considers both diversifiable and non-diversifiable risk where the non-diversifiable risk is systematic risk that affects the whole market while the diversifiable risk is non-systematic risk which only affects a certain industry hence can be reduced or eliminated in a portfolio through diversification. Therefore, a portfolio should contain assets which are negatively correlated to reduce portfolio risk. Correlation is the interdependence of the asset returns, therefore, a portfolio with two perfectly negatively correlated assets would be riskless.

2.2.3 Return on Wealth and Economic growth rate.

Piketty (2013), formulated two laws of capitalism. The first law of capitalism states that the share of income attributed to the owners of capital equals the product of the return on wealth and the wealth-output ratio.

$\alpha = r \times \beta$

Where, α represents the capital share of income, r represents return on wealth and β represents wealth-output ratio.

The second law of capitalism states that the wealth-output ratio equals the savings rate divided by the economic growth rate in steady state.

$\beta = s / g$

Where, s represents the savings rate and g the economic growth rate.

Putting the two together, the long-run capital share of output is.

$$\alpha = r \times \frac{s}{g}$$

An increase in the wealth-output ratio, s/g, will induce a subsequent increase in α. The increase in wealth-output ratio implies an increase in saving rate and a decrease in the economic growth rate. Higher saving rates implies strong accumulation of wealth, re-investments of the realised return on wealth. The strong accumulation of wealth and low economic growth over long periods of time, results with the effect that workers receive a correspondingly smaller share of the total income hence worsening wealth inequality.

Treating s and g as two independent variables may result to a division by zero problem in case of no economic growth rate, g = 0. However, because each generation holds the same wealth S as its predecessor in a stationary economy the problem does not arise. To explain the concept, we denote wealth as S, the change in wealth as $\hat{S}$, and the growth rate of income as $\hat{Y}$ / Y, thus s/g can be rewritten as.

$$\frac{\hat{S}}{\hat{Y}} = \frac{\hat{S}}{Y} \times \frac{Y}{\hat{Y}}$$

The final equation will be as follows, and thus no division by zero problem in case of a stationary economy, g = 0.

$$\alpha = r \times \frac{\hat{S}}{Y} \times \frac{Y}{\hat{Y}}$$

Nevertheless, there have been both critical remarks and diverging sentiments on the approach. Hormbug (2015) argued the total reinvestment of return on wealth is an unrealistic assumption which ignores the consumption aspect of the return on wealth. Bill Gates argued that concentrating on the historical return on wealth series, does not take into account that wealth decays overtime with new industries coming up to replace the existing ones, as it has happened in recent past where new technology companies have emerged hence new wealthy individuals. Bill Gates emphasized that the consumption data may be even more important for understanding human welfare. Lastly, there is the aspect where some owners of capital give out their fortunes to philanthropy which directly impacts human welfare and helps reduce inequality.

2.3 Review of Empirical Theories

Ilmanen (2003) argued that the realized returns (historical returns) may be misleading when used to indicate the returns that an investor may get from an investment. Therefore, a lot of caution must be taken when using historical returns to make investment decisions. He outlined that the historical equity returns have been low for several years (5%–8%), but the current actual returns have been moderate. He outlined that the divergence between historical and expected returns was extraordinarily wide around 2000 while the gap has narrowed since then though it may not have fully closed.

Piketty (2013) focused on wealth and income data to study wealth and income inequality in Europe and the United States since the 18th century. His central thesis was that when the return on wealth (r) is greater than the economic growth rate (g) over the long term, the result is concentration of wealth, and thus unequal distribution of wealth which causes social and economic instability. He related the return on wealth (r) to economic growth (g), where r includes profits, dividends, interest, rents and other income from capital and g is measured as growth of economy's output. When the rate of economic growth is low, wealth tends to accumulate more quickly from capital income than from labor income and tends to accumulate more among the top 10% and 1%, thus increasing wealth inequality. Thus, one of the drivers of divergence and greater wealth inequality can be summarised by the inequality $r > g$.

Homburg (2015) suggested critical remarks on the approach by Piketty (2013) suggesting that the main assumption of total reinvestment of return on wealth is unrealistic and when a portion of return on wealth is consumed, the central theme of $r > g$ fails most of the time. Secondly, the data provided by Piketty (2013) does not support that argument where the return on wealth was flat for large periods despite the accumulation of wealth. However, Piketty (2015) replied that the relationship between the rate of return on wealth and the rate of economic growth are not the only or primary tool for considering changes in income and wealth inequality.

Jorda et al. (2019) when studying the aggregate return on wealth in advanced economies, focused on housing, equities, treasury bills and treasury bond returns over long periods of time, 1870 – 2015. Their main findings indicated that housing returns, and equity returns in the long run are similar and are on average 7%, but housing tends to be much less volatile. On the other hand, the real safe asset return (treasury bonds and treasury bills) had been very volatile than the risky

assets return over the long run, than one might expect. In addition, the risk premium, risky assets minus safe assets, had been volatile over the very long run. They used "r minus g" in Piketty's notation, to measure the portfolio return compared to the growth rate of the economy. They found out that in peacetime, r had always been greater than g and recently about 3%–4%, though it had narrowed to 2% in the 1970s before widening in the years leading up to the 2008 financial crisis.

UNDP (2019) report on measuring inequality in income and wealth indicated that the share of national income owned by the top 10% has been rising since 1980 in most regions of the world and currently stands at 50% - 60% in most frontier economies. It estimated that if the current trend continues, the global top 0.1% could end up owning as much as 25% of the global income share in 2050, which is equivalent to the global share that the middle 40% currently owns. The report also revealed that the share of personal wealth held by the top 1% has been rising since 1980s in the most parts of the world and is currently at 20% - 40% in most parts of the world. The report emphasizes on the importance of data availability and transparency in studying income and wealth inequality in economies. Most of the data are collected through surveys and from the national accounts. The government through the tax authorities usually publishes data on wealth and income in the country for taxation purposes.

2.4 Research Gap

Major focus has been on advanced economies with no paper studying return on wealth and economic growth rate in Kenya as a frontier economy. There lacks a compiled data set on income and wealth in Kenya. UNDP (2019) outlines that the frontier economies still score lowly in terms of data transparency and availability. Our major contribution will be to compile a dataset of the housing returns, equity returns, treasury bills and bonds annual yields and risk premium in Kenya. Our data will cover Kenya as a frontier economy starting from 2001 to 2020. Our research project builds on a research methodology carried out by Jorda et.al (2019) when investigating the rate of return of everything in advanced economies.

2.5 Conceptual Framework

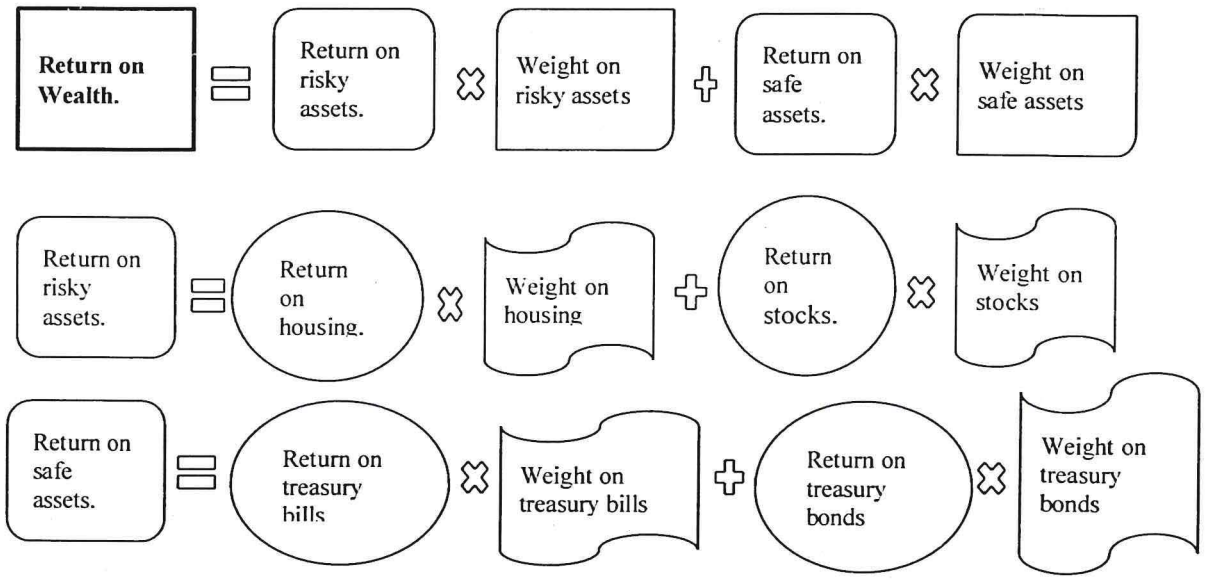


Figure 5 Conceptual Framework

The return on wealth was calculated as shown above then compared to the economic growth rate.

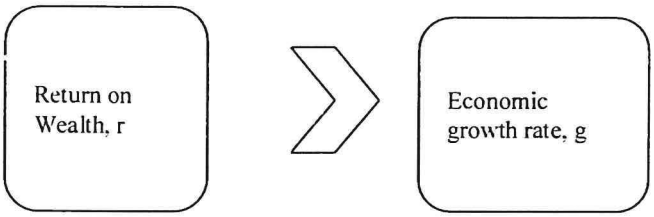


Figure 6 Return on Wealth.

The equation above indicates a driver of wealth inequality.

Similarly, we computed the risk premium, using a basic approach by subtracting the returns on risky assets and returns on safe assets.

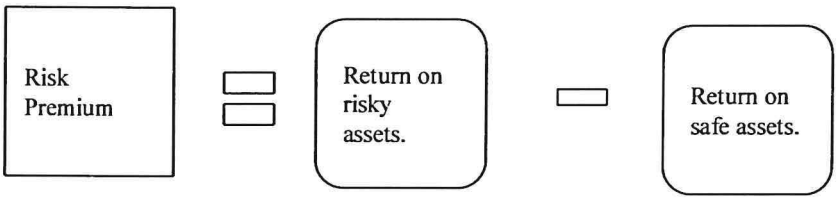


Figure 7 Risk Premium

2.6 Conclusion

Having looked at the theoretical knowledge on the fundamental laws of capitalism and the sentiments against it and their empirical studies available, we can infer that the method proposed by Thomas Piketty is important in understanding wealth inequality because of its feasibility and ease of getting wealth income data.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Research Design

We carried out an empirical study on the return on wealth and macroeconomic variables in Kenya as a frontier economy, by constructing a portfolio of the time series of rate of returns of different investable assets in Kenya.

3.2 Population

Our target population for the study was all the investable assets in Kenya. They included, real estate, private equities, listed stocks, corporate bonds, government bonds, structured products like mutual funds, bank deposits and cash. On the macroeconomic variables we had economic growth rate, inflation rate and foreign exchange rate.

3.3 Sample Design

Our sample was categorized into risky assets class and safe assets class. Under risky assets we had listed stocks and real estate which are the two largest risky asset classes. Under safe assets we had government issued treasury bills and treasury bonds which are the two biggest safe assets classes in Kenya. The assets selected were also based on ease of data collection and approximation.

3.4 Data Collection

We collected secondary data to create a portfolio of assets to compute return on wealth, r. We got the data on housing from KNBS and complemented it with the data from the various publications in the sector e.g., Hass consult and Global Property Guide. Time series of individual countries' stock index returns was collected from NSE while the annual government treasury bills average yield and treasury bonds average yield was taken from the Central Banks of Kenya.

We compared the returns in real terms, because of wide differences in inflation across time. To achieve this, we first computed the realized CPI inflation rate in Kenya for a given time t as follows.

$$\pi i, t = \frac{CPIi,t-CPIi,t-1}{CPIi}, t-1$$

Where πi, t is the realized consumer price index inflation rate.

Then we calculated the inflation-adjusted real returns r for return on wealth.

$$rj\ i,t\ = \frac{1+Rj\ i,t}{1+\pi i,t} - 1.$$

Where rj i, t is the inflation-adjusted real returns while Rj i, t is the nominal returns.

A plot of the nominal return on wealth and inflation was used to compare the return earned by investable assets in the economy above the inflation rate.

A comparison of the return on wealth and economic growth rate was also plotted over time to visualize the co-movement between the two series over-time.

3.4.1 Housing Data

Our primary source of housing data was the extrapolation of the of the rent-price approach. It started from a benchmark rent-price ratio RI_o/HPI_o estimated in a selected baseline year, Jorda et. al (2019). We collected the data on the HPI_t and RI_t for different time periods. Then we were be able to extrapolate the yearly rent-price ratio through forward and backward projections as follows.

$$\frac{RIt}{HPIt} = \left[\frac{\left(\frac{RIt}{RIo}\right)}{\left(\frac{HPIt}{HPIo}\right)}\right]\frac{RIo}{HPIo}$$

Afterwards we aggregated the rent-price ratio with the yearly change in the HPI_t to get the total housing returns in a period as follows.

$$rht\ = \left(\frac{HPIh,t}{HPIh,t-1} - 1\right) + \left(\frac{rh,t}{HPIh,t-1} - 1\right)$$

where rht is the annual housing simple return, $HPI_{i,t}$ is the closing housing price index of year t for country i while $HPI_{i,t-1}$ is the opening housing price index of year t-1 for country i. Clearly the annual housing return was a sum of the rental yield and the capital gain from the above formula. The main assumption of this method is that the HPI and the RI are a representative of all the houses in Kenya.

We also verified the rent-price approach estimate using various other estimates.

i) The point in time estimates from the various publications such as the newspapers and other publications.

ii) The balance sheet approach where we calculated the rental yield as net rental income divided by the total housing wealth in the economy from the national accounts.

iii) The historical stock returns from the available REITs in the specific countries.

The data on real estate GDP in Kenya was used to calculate the weighting on the housing returns.

3.4.2 Stock Data

Annual stock index simple returns was calculated as follows:

$$rit = \left(\frac{Pi,t}{Pi,t-1}\right) - 1$$

Where rit is the annual stock index simple return, $P_{i,t}$ is the closing stock index price of year t for index i while $P_{i,t-1}$ is the opening stock index price of year t-1 for index i. The data on total market capitalisation was also collected to be used in the computation of the weighting on the stocks.

3.4.3 Treasury Bills and Bonds

Annual treasury bills yield, and treasury bonds yield were the average annual yields of the bills and bonds, respectively. The data on total annual government borrowings was collected to be used in computing for the weightings to the treasury bills and bonds.

3.5 Data Analysis

We first computed the return on risky assets as the weighted average of returns from housing and stocks.

$$r\,r,t = rh,t\ x\,wh,t + ri,t\ x\,wi,t$$

Where rr, t is the return on risky assets for time t, rh,t is the return on housing for time t, wh,t is the weight on housing, ri,t is the return on stock index i at time t and wit is the weighting of index i on time t.

The return on safe assets was the average of the treasury bills and the treasury bonds returns. Each of them was given an equal weighting.

$$r\,s,t = rbills,t\ x\ wbills,t + rbonds,t\ x\,wbonds,t$$

Where rs, t is the return on safe assets for time t, rbills, t is the return on treasury bills for time t, wbills, t is the weight on treasury bills, rbonds, t is the return on treasury bond at time t and rbonds,t is the weighting of treasury bond on time t.

We computed the excess return by subtracting the return from a risky asset and the return from a risk-free asset, in our case treasury bills was used a proxy for the risk-free rate.

$$erj\,i,t = rj\,i,t - rbill\,i,t$$

We computed the risk premium as the difference between the return on risky assets and the return on the safe assets.

$$r\,p,t = rr,t - rs,t$$

Where rp, t is the risk premium for time t, rr, t is the return on risky asset for time t and rs, t is the return on safe assets at time t.

We finally computed the return on wealth as a weighted average of the returns on risky assets and the return on safe assets. and on housing.

$$r\,w,t = rr,t\ x\,wr,t + rs,t\ x\,ws,t$$

Where rw, t is the return on wealth for time t, rr,t is the return on risky asset for time t, wr, t is the weight on risky asset, rs,t is the return on safe assets at time t and ws, t is the weighting of safe assets on time t. The weightings were computed from the real estate GDP, stock market capitalization and the public debt, where real estate GDP and market capitalization represented risky assets while public debt represented safe assets.

CHAPTER FOUR: DATA ANALYSIS

4.1 Introduction

The data collected and portfolio constructed covers the four main asset classes (real estate, stocks, treasury bills and treasury bonds) and three macroeconomic variables; GDP growth rate, inflation rate and foreign exchange rate in Kenya over a period of 20years, 2001 to 2020.

4.2 Summary Statistics

Below is a summary statistic of the constructed dataset.

	Return on wealth, R	*R>G*	*Risk Premium*	*Equities Excess returns*	*Real Estate Excess Returns*	*Bond-Bill spread*
Mean	0.1310	0.0835	0.0223	0.0407	0.0330	0.0302
Median	0.0766	0.0363	-0.0270	-0.0155	0.0155	0.0278
Standard Deviation	0.2099	0.2070	0.2557	0.3293	0.0656	0.0229
Kurtosis	1.0933	1.6730	1.8955	2.3120	-1.5352	2.1336
Skewness	0.8122	0.9609	1.0438	1.0860	0.0992	0.4415
Minimum	-0.2196	-0.2346	-0.3669	-0.4454	-0.0708	-0.0210
Maximum	0.6842	0.6552	0.7422	0.9887	0.1267	0.0900
Count	20	20	20	20	20	20

Table 2 Summary statistics 1

The country wide portfolio of investable assets had the highest returns across time, 13.10%, with also the highest volatility, 20.99%. The country risk premium which is the difference between the risky asset portfolio return and the safe asset portfolio return have been around 2.23% on average. Among the asset classes, equities had the highest excess returns, 4.07%, and highest volatility, 32.93%, while treasury bonds had the lowest excess returns, 3.02%, and the lowest volatility, 2.29%. Excess asset return is the returns earned by an asset above the treasury bill yield. On the macroeconomic variables, the economic growth rate averaged 4.76%, the inflation

rate averaged 7.76% and foreign exchange rate 85.84 KES/USD (which has been rising over time).

	Return on wealth	*CPI Y/Y*	*KES/USD*	*GDP Y/Y*
Mean	0.1310	0.0776	85.8410	0.0476
Median	0.0766	0.0669	82.7250	0.0540
Standard Deviation	0.2099	0.0338	13.1432	0.0207
Kurtosis	1.0933	-0.2413	-1.0959	-0.0803
Skewness	0.8122	0.7040	0.3121	-0.6839
Minimum	-0.2196	0.0196	63.7000	0.0050
Maximum	0.6842	0.1428	108.7000	0.0840
Count	20	20	20	20

Table 3 Summary statistics 2

4.3 Graphical Representation

A graph of Return on wealth and economic growth rate indicates that the country wide portfolio of investable assets has been outperforming the economic growth rate over time. However, there are some periods where the return on wealth has been lower than the economic growth rate. Notably, 2007 – 2008 during the financial crises and the Kenyan post-election violence. Similarly, in 2011, mid-2015 and 2018 the return on wealth was lower than the economic growth rate due to the under-performance of the investment industry, AKI (2019). It is worth noting that during the 2020, the return on wealth also plummeted due to the covid-19 pandemic that reduced the economic activities in the country.

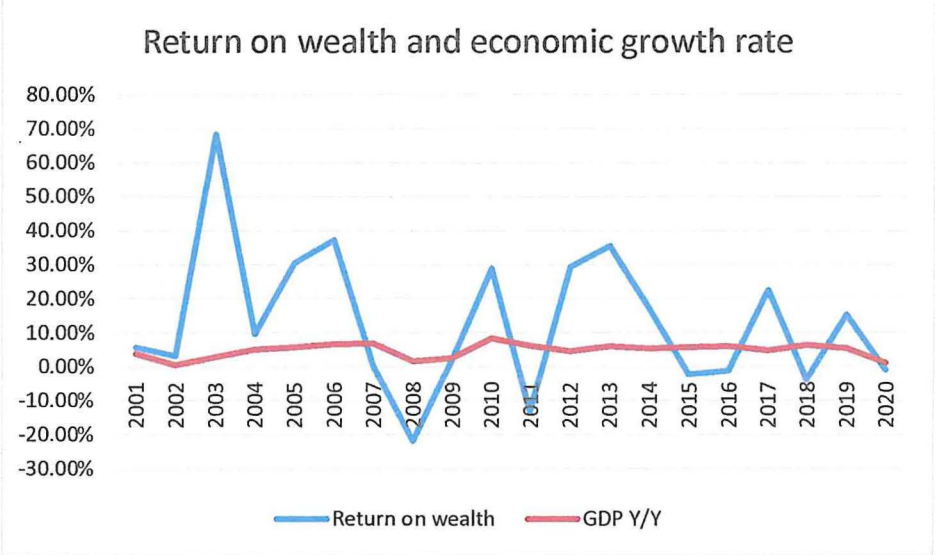


Figure 8 Return on wealth and economic growth rate.

The return on wealth has also been above the inflation rate in Kenya over time indicating higher rate of return on investable assets which compensates the inflation rate. This is except for the periods explained above.

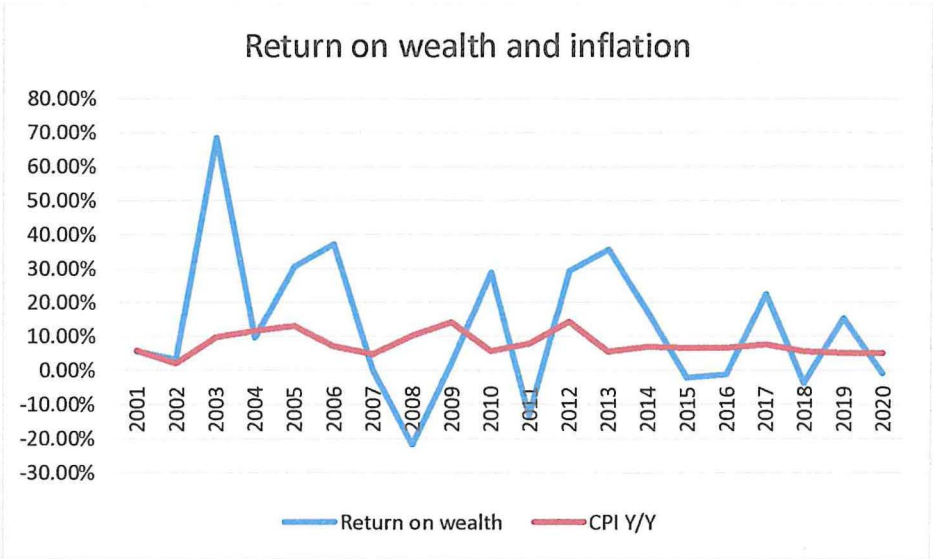


Figure 9 Return on wealth and inflation rate

The Risk premium has been very volatile in Kenya, averaging 2.23% over time as plotted below. The highest risk premium was experienced in 2003, 2006, 2010, 2013 and 2017. During these

notable periods, the investment industry really performed well, notably the stock market which led to the high returns of the risky asset class compared to the safe assets returns.

Figure 10 Risk premium

The equities had the highest excess returns and highest volatility among the asset classes, followed by real estate and the lastly by the treasury bonds. The excess asset return is the asset return above the treasury bill.

The graph depicts that the equities have outperformed the real estate over time but has higher volatility hence riskier than the real estate.

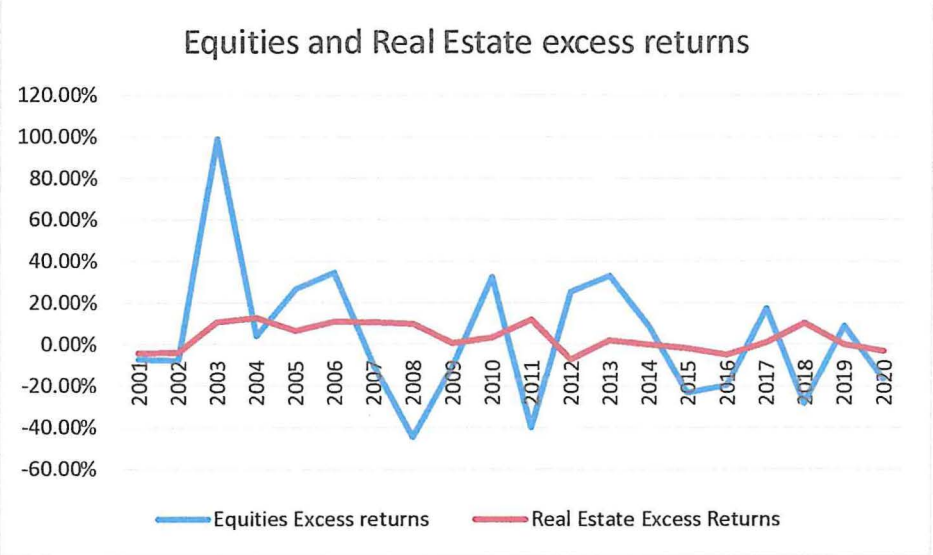


Figure 11 Equities and real estate excess returns

On the other hand, the graph below shows that the bond-bill spread had been falling since 2001 up to its lowest in 2012 when it started rising which can be attributed to the increased domestic borrowing by the current regime, (CBK, 2021).

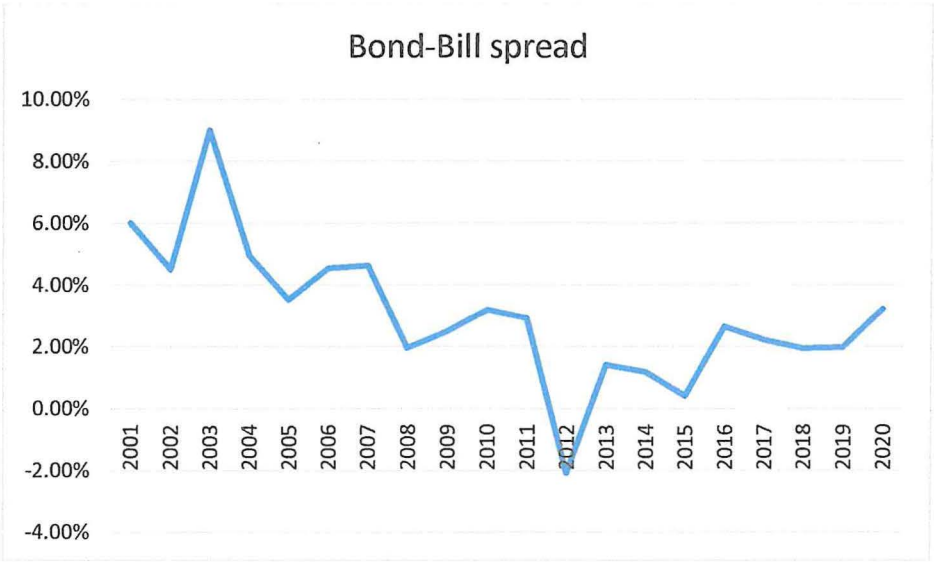


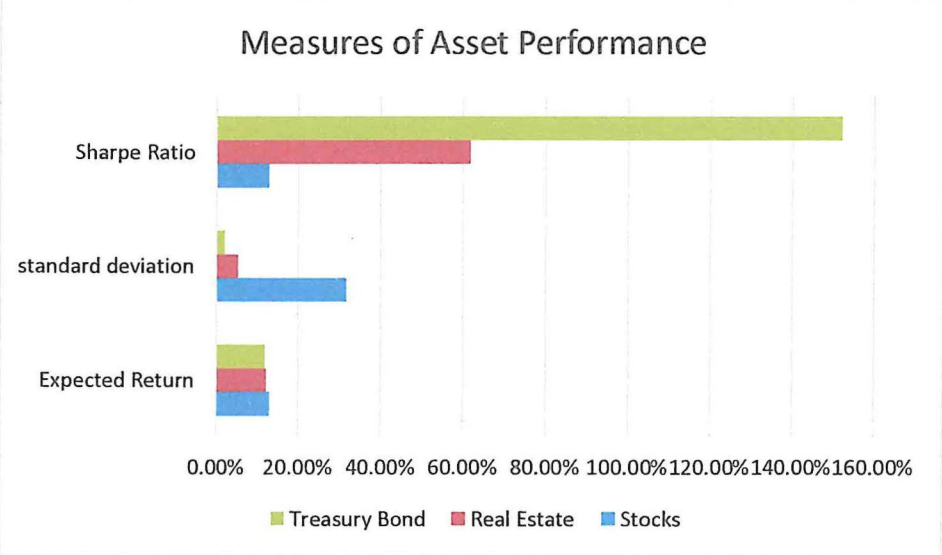
Figure 12 Bond-Bill spread

The table below indicates the Sharpe ratios of the three main asset categories.

Assets	Stocks	Real Estate	Treasury Bond
Expected Return	12.93%	12.16%	11.88%
Standard Deviation	31.63%	5.35%	1.99%
Sharpe Ratio	0.13	0.62	1.52

Table 4 Asset classes performance

Treasury bonds had the highest Sharpe ratio because of the low total risk, followed by Real Estate and finally the equities. The Sharpe Ratio measures the risk-adjusted rate of return of an asset by incorporating the total risk of the asset.



Finally, plotting the KES/USD foreign exchange rate indicates the Kenyan currency have been weakening overtime since 2007 due to weak fiscal policies such as increased public debt and the periodic deteriorating macroeconomic environment. However, we have had a 4-year stable period between 2015 and 2019. This has been because of the sound monetary policy by the current Central Bank of Kenya regime, which has been efficient in its achieving price stability role, CBK (2021).

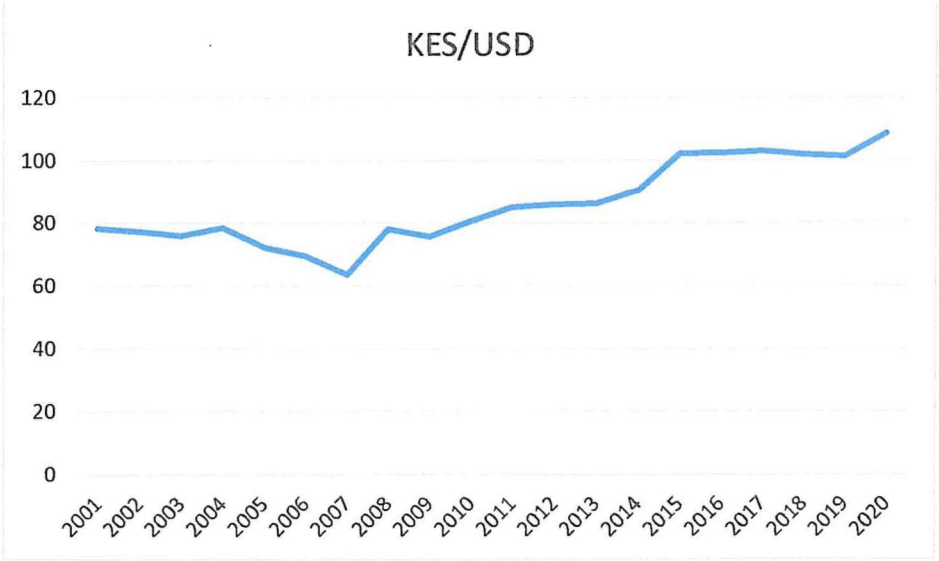


Figure 13 KES/USD Exchange rate

4.4 Discussion of the findings

The findings indicates that the return on wealth in Kenya has been 13.10% on average which is higher than that observed by Jorda et al. (2019) in a study in the advanced economies which they observed to be 6%. Therefore, the rate of return of investable assets in Kenya has been approximately double that in the advanced economies. On the other hand, the findings shows that the return on wealth in Kenya has been very volatile, 21% on average, which indicates the high risk involved in investing in the frontier economies.

The findings indicates that the return on wealth and economic growth rate spread in Kenya has been 8% on average which is higher than the same spread observed by Jorda et. al (2019) in their study in the advanced economies which ranged between 3%-4% in peacetime and declined to 2% in 1970s, before widening when approaching the 2007 - 2008 global financial crisis. The high return on wealth and economic growth rate spread has been because of the high return on wealth, 13.10%, and low stable economic growth rate, 4.76% across most periods, as indicated by the data we collected.

The rate of return on risky assets, that is, equities and real estate, ranges at around 12% in Kenya. This is higher than that observed by Jorda et al. (2019) in the advanced economies at 7%. The equities in Kenya have consistently outperformed the housing in most periods apart from the 2007-2008 financial crises, during stock market under performance in 2011, mid-2015, 2018 and

recently in the lockdown period of 2020 due to the Covid-19 pandemic. Jorda et al. (2019) observed similar trend in advanced economies where before the world war two the housing outperformed the stocks, which later changed post the world war II where the stocks has consistently outperformed the housing market up to date.

The rate of return on safe assets has been relatively high and volatile in Kenya, on average yielding a return of 11%. One peculiar result is the treasury bills yielding higher returns than the treasury bonds in 2012. This in in sharp contrast with what Jorda et al. (2019) in advanced economies observed to be between 1% - 3% in peace time eras. The treasury bill and treasury bond yields used as proxies for the safe returns have been relatively high. CBK (2021) report indicates a weak credit rating of Kenya at B2, Moody's rating, which implies the high credit default risk of Kenya because of high fiscal deficits, that is, high government expenditure compared to the low tax revenues collected.

Lastly, the data indicates that the risk premium has been relatively low in Kenya averaging 2.23% over time. The main reason being Kenya has high safe asset returns of around 10% in comparison to the risky asset return of around 12%. This is unlike that observed by Jorda et al. (2019) study in the advanced economies where the risk premium has been relatively high and stable at around 6% - 8% across all eras and 4% - 5% across most peacetime eras.

4.5 Summary of the Main Findings

The constructed return on wealth constituted weighted risky and safe assets under which we had real estate and stocks under risky assets and treasury bills and treasury bonds under safe assets. The answers to the research questions presented in this paper have been summarised in the table below which outlines the key findings from the investable assets data constructed.

Portfolio/Asset	**Findings**
Return on wealth, R	It averaged 13.10% with a standard deviation of 21% which is a bit high indicating the volatility of the economy wide portfolio. It had extreme values of up to 68.42% and -21.96%.
R > G	On average the return on wealth has been higher than

	the economic growth rate at 8.5% on average and a volatility of 20.70%. It had extreme values of up to 65.52% and -23.46%. It has also been higher than the average inflation rate of 7.76%.
Risk Premium	On average it has been 2.23% with extremes of 74.22% and -36.69%.
Excess stocks returns	On average it has been 4.07% with a high volatility of 32.93% and extreme values of 98.87% and -44.54% which makes equities very risky but very rewarding at the same time.
Excess real estate returns	On average it has been 3.30% with a low volatility of 6.56% and ranges between 12.67% and -7.08%.
Bond-bills spread	On average it has been 3.02% with a very low volatility of 2.29% and ranges between 9.00% and -2.10%.

Table 5 Summary of findings

4.6 Conclusion

The return on wealth in Kenya has consistently been higher than the economic growth rate, with an average spread of 8.5%. The risk premium in Kenya has been 2.23% historically and the stocks have always outperformed real estate and bonds respectively in terms of returns. Similarly, stocks have been the most volatile, followed by real estate and lastly treasury bonds and bills.

CHAPTER FIVE: CONCLUSION AND RECOMMENDATION

5.1 Introduction

The findings of this projects contribute to the current debate that whenever the return on wealth is greater than the economic growth rate, the owners of wealth will accumulate wealth at a faster rate leading to wealth inequality. Our data from Kenya has revealed that historically the return on wealth, 13%, has always been higher than the average economic growth rate of 4.76% and the average inflation rate of 7.76%.

5.2 Summary of findings

A Diversified Portfolio of investable assets in Kenya will give you a return of around 13.10% with high volatility of around 21%. The return on wealth is therefore higher than the average economic growth rate of 4.76% which justifies the high income-inequality as estimated by world bank, at a Gini coefficient of around 41% as of 2015. The rate of return of investable assets, 13%, has also been higher than the inflation rate of 7.76% on average. The foreign exchange rate has been depreciating over time with an average KES/USD of 85.84 which is below the end of 2020 KES/US of 108.70. The country risk premium, extra return of investing in risky assets over the safe assets, has been around 2.23% historically. Stocks are the asset class with the highest historical returns, giving an excess return over the T-bills of 4% compared to real estate at 3.30% and a bond-bill spread of 3.03%. Similarly, stocks remain the most volatile asset class, 32.93%, followed by real estate at 6.56% and the treasury bonds the least risky at 2.29% volatility. On the other hand, treasury bonds had the highest Sharpe Ratio, 1.52, compared to Real Estate at 0.62 and Stocks at 0.13 which indicates treasury bonds produced highest risk-adjusted returns compared to other asset classes making it the best asset to invest in on risk-adjusted return basis.

5.3 Recommendations

Our research recommendation is addressed to the policy makers, investors and the financial analysts as discussed in detail below:

Our recommendation to the policy makers who are interested in understanding the comparison of the return on wealth and the economic growth rate, and its impact on the level of wealth inequality in the country is that they should develop policies to reduce income inequality in Kenya. The return on wealth, 13.10%, in Kenya has consistently been higher than the economic

growth rate, 4.76%, which justifies the high income-inequality index, a Gini coefficient of 41% in Kenya as estimated by world bank (2015). The policies may include introduction of wealth tax and tax on consumption of luxurious commodities. The revenue should be channelled to social-economic project which will improve the welfare in the society.

Similarly, our recommendation to investors and financial analysts who are interested in knowing the average return they expect in their investments. The rate of return of investable assets in Kenya is 13.10% and the risk premium has been historically 2.23%. On the other hand, equities remain the most rewarding investment in Kenya with an excess return of 4% but very risky with a volatility of up to 32%. This is compared to real estate with excess returns, above the T-bills, of 3.30% and volatility of 6.56%. The least rewarding but least risky are treasury bonds with an excess return of around 3.03% but least volatility of 2.29%. In terms of the Sharpe Ratio, treasury bonds will give them the highest risk-adjusted return of 1.52, followed by the real estate at 0.62 and lastly stocks at 0.13.

5.4 Areas of further studies

The evidence and data collected in this research paper sheds light in academic research in the areas of study of asset pricing and wealth inequality. The return on wealth has been the subject of discussion in papers discussing wealth inequality. The risk premium is also a central thesis in asset pricing discussing. A compilation of dataset on the different asset classes returns is of value to these fields of academic research. We would recommend further research in other investable assets not tackled in this paper. There are more recent investable assets apart from the 4 main ones studied in this research project, stocks, real estate, treasury bills and treasury bonds. The alternative investments such as private equities, hedge funds, crypto-currencies, forex, and structured products would be potential areas of further studies in the investment industry in Kenya.

5.5 Challenges faced in the project.

The data availability remains the main challenge in research projects. We made several assumptions in construction of the dataset of the different asset classes of the investable assets. When constructing the rate of return on real estate, we approximated the forward and backward projected growth rate of the rental yields as 5% annually which was based on the annual growth rate of the real estate sector in Kenya. We took the 2016 point in time rental yield estimate of

6.5% as estimated by Global Properties and Hass Consult as the base year for projections. The data for REITs in Kenya was insufficient given Fahari i-REIT was only in existence for a period of 4years, 2016-2019. The HPI from KNBS was available only from 2009 – 2020 with 2009 as the base year. Therefore, for the period 2001 – 2008 we had to approximate the capital gain, which we proxied to be equivalent to the real estate GDP growth rate during the period. For the stock market index return we used partially of NSE20 which has been in existence since 1998 and the recently created NASI which has been available from 2008. In the portfolio construction, the weighting was based on the data on total public debt, stock market capitalization and real estate sector GDP. The data on public debt attributed to treasury bills and treasury bonds was not available, therefore equal weighting between the two was made to construct a sub-portfolio of safe assets. Overall, the other datasets were easily available and easy to construct from the relevant data sources, including KNBS, CBK, NSE, World Bank, Hass Consult and Global Properties Guide databases. The project was bulky, in terms of data collection and analysis, thus it was only possible to study Kenya alone as an African frontier economy.

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Appendix 1 Macroeconomic variables and Asset returns.

Year	Return on wealth	CPI Y/Y	KES/USD	GDP Y/Y	R>G	Risk Premium	Equities Excess returns	Real Estate Excess Returns	Bond-Bill spread
2001	5.72%	5.87%	78.45	3.80%	1.92%	-8.68%	-7.20%	-4.12%	6.00%
2002	3.26%	1.96%	77.40	0.50%	2.76%	-8.37%	-7.92%	-3.76%	4.50%
2003	68.42%	9.82%	75.90	2.90%	65.52%	74.22%	98.87%	10.71%	9.00%
2004	9.60%	11.62%	78.50	5.10%	4.50%	2.98%	4.10%	12.67%	4.93%
2005	30.54%	13.11%	72.35	5.70%	24.84%	19.98%	26.68%	6.66%	3.52%
2006	37.27%	6.96%	69.55	6.50%	30.77%	27.67%	34.50%	10.95%	4.52%
2007	0.10%	4.77%	63.70	6.90%	-6.80%	-10.37%	-10.06%	10.65%	4.61%
2008	-21.96%	10.29%	78.10	1.50%	-23.46%	-36.69%	-44.54%	10.10%	1.95%
2009	1.88%	14.11%	75.70	2.70%	-0.82%	-10.06%	-10.83%	0.73%	2.49%
2010	28.85%	5.61%	80.50	8.40%	20.45%	24.87%	32.71%	3.24%	3.20%
2011	-13.25%	7.99%	84.95	6.10%	-19.35%	-28.75%	-40.22%	11.98%	2.92%
2012	29.28%	14.28%	85.75	4.60%	24.68%	19.88%	25.30%	-7.08%	-2.10%
2013	35.59%	5.56%	86.20	5.90%	29.69%	26.96%	33.20%	1.99%	1.39%
2014	17.02%	6.81%	90.35	5.40%	11.62%	6.48%	8.78%	-0.09%	1.18%
2015	-2.18%	6.54%	102.20	5.70%	-7.88%	-19.35%	-23.38%	-1.83%	0.40%
2016	-1.11%	6.58%	102.37	5.90%	-7.01%	-18.28%	-19.83%	-4.78%	2.65%
2017	22.53%	7.67%	103.10	4.80%	17.73%	12.31%	17.54%	1.10%	2.22%
2018	-3.96%	5.59%	101.80	6.30%	-10.26%	-19.76%	-28.42%	10.21%	1.92%
2019	15.29%	5.04%	101.25	5.40%	9.89%	5.33%	9.00%	-0.09%	1.95%
2020	-0.78%	5.00%	108.70	1.05%	-1.83%	-15.72%	-16.85%	-3.21%	3.21%
Average	**13.10%**	**7.76%**	**85.84**	**4.76%**	**8.35%**	**2.23%**	**4.07%**	**3.30%**	**3.02%**

Appendix 2 Asset class weightings

Year	Weight Equities	Weight Real Estate	Weight Risky Assets	Weight Safe Assets
2001	50.57%	49.43%	95.41%	4.59%
2002	56.65%	43.35%	89.52%	10.48%
2003	77.14%	22.86%	83.43%	16.57%
2004	74.77%	25.23%	94.59%	5.41%
2005	79.70%	20.30%	98.60%	1.40%
2006	85.43%	14.57%	94.95%	5.05%
2007	84.80%	15.20%	95.06%	4.94%
2008	82.96%	17.04%	88.95%	11.05%
2009	77.19%	22.81%	84.05%	15.95%
2010	81.53%	18.47%	90.96%	9.04%
2011	73.83%	26.17%	87.67%	12.33%
2012	78.41%	21.59%	84.05%	15.95%
2013	83.36%	16.64%	87.86%	12.14%
2014	84.02%	15.98%	88.18%	11.82%
2015	79.89%	20.11%	79.11%	20.89%
2016	76.53%	23.47%	78.98%	21.02%
2017	78.34%	21.66%	81.26%	18.74%
2018	73.87%	26.13%	80.19%	19.81%
2019	75.72%	24.28%	81.20%	18.80%
2020	74.10%	25.90%	72.80%	27.20%