# THE EFFECT OF ASSET ALLOCATION ON THE FINANCIAL PERFORMANCE OF UNIT TRUST SCHEMES IN KENYA

BY

FRANCIS KIPKIRUI SANG

D61/83664/2015

A RESEARCH PROJECT PRESENTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTERS OF BUSINESS ADMINISTRATION,SCHOOL OF BUSINESS, UNIVERSITY OF NAIROBI

DECEMBER 2017

# DECLARATION

I declare that this research project is my original work and my own effort and that it has not been submitted to any other institution of higher learning for any academic purposes

Signature …………………………….. Date ………………………

Francis Kipkirui Sang

D61/83664/2015

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

Signature…………………………. Date………………………………

Mr. Karanja James Mwangi

# DEDICATION

I dedicate this project to class mates, my friends and family who believed in education and kept on encouraging me to work hard and complete this project.

# ACKNOWLDGEMENT

I wish to express my sincere gratitude to God for the courage and strength bestowed upon me while writing my research thesis. I greatly feel honored to my Supervisor Mr. Karanja James Mwangi, my classmates and family.

# LIST OF ABBREVIATIONS

**AIA**        -Adaptive Investment Approach

**AMH**       -Adaptive Market Hypothesis

**ANOVA**     -Analysis of Variance

**APT**         -Arbitrage Pricing Theory

**CAPM**      -Capital Assets Pricing Model

**CBK**        -Central Bank of Kenya

**CIS**          -Collective Investment Scheme

**CMA**       -Capital Markets Authority

**MPT**        -Modern Portfolio Theory

**NSE**         -Nairobi Securities Exchange

**T-Bills**      -Treasury Bills

**T-Bonds**    -Treasury Bonds

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# ABSTRACT

The main purpose of the study was to establish the impact of asset allocation on the performance of Unit Trust Funds in Kenya. More specifically, the study sought to determine how weight of cash in the fund, weight of bank deposits both fixed and call deposits, weight of treasury bills in the fund, weight of corporate bonds in the fund, weight of treasury bonds in the fund, weight of equity, weight of commercial paper in the fund affected performance of Unit Trust Funds in Kenya. Descriptive research analysis and multi factor model is the type of research design that was employed in the analysis of data. The study collected data between the years 2012 to 2016. The entire population of the 45 registered unit trust schemes was used in the analysis. Data was collected by the use of a data collection form. Regression analysis was performed on the data to determine the nature of the relationship. Additionally a correlation analysis will also be done in order to analyze the significance of the relationship. The study employed the use of regression and correlation analysis to establish the relationship between the various asset classes and the performance of unit trust funds in Kenya. The study results and the tests of significance employed concluded that the various asset classes had an impact on the performance of the unit trust funds in Kenya. The study recommends that Unit Trust Scheme Trustees in Kenya should strike a balance between amount of money held in cash and the one invested in other investments, top management of Unit Trust Funds in Kenya should keep sufficient amount of their investments in bank deposits as this is safer as compared to cash, money Funds in Kenya should invest tactically while allocating funds among the asset classes and within the investment guidelines provided for by the regulator who is the Capital Markets Authority. The Capital Markets Authority should work hand in hand with other stakeholders in the market to introduce new investment platforms that will enhance diversification, flexibility and higher returns while impacting positively in the economy.

# CHAPTER ONE: INTRODUCTION

## 1.1 Background to the Study

Unit Trust Schemes in Kenya are collective investment schemes that are regulated by the Capital Markets Authority under the Capital Markets Act Cap 485, Collective Investment Schemes Regulations, (Mutual Funds Magazine, 2017). These schemes are usually selected by investors in terms of their specific needs in order to invest in a fund that satisfies that specific needs. It is basically a pooled fund that is invested in a portfolio of asset classes as per the investment guidelines regulations provided by the regulator. Unit Trust Funds have a corporate structure that is the basis of corporate governance in the scheme. In the structure there consist service providers to the fund namely; the Custodian, the Fund Manager and the Trustee (Capital Markets Authority, 2017).

Theoretically asset allocation is expected to have an effect on the performance of unit trust schemes. Theories that have attempted to explain the effects of asset allocation on a portfolio of investment are theories that touch on investments. The theories are the modern portfolio theory, the capital assets pricing theory, the arbitrage pricing theory, the adaptive investment approach theory and the adaptive market hypothesis theory. These theories try to explain the impact of risk, how to balance risk and return in investing and the timing approaches that investors should apply in general in order to maximize returns from a basket of assets in the market(Capital Markets Authority, 2017).

The Custodian is the safe keeper of the assets of the Unit Trust scheme. It is an entity that is basically a commercial bank or an investment bank licensed by the CMA to carry out custodial services as per the CIS regulations of 2001(Capital Markets Authority, 2017).

The Custodian is appointed by the Trustee of the Unit Trust Scheme to offer Custodial services to the scheme. The Fund Manager who is also appointed by the Trustee performs duties that have been delegated by the Trustees of the scheme. The duties include; making investment decisions and managing the portfolio of investments on behalf of the trustees and also carrying out administration and compliance duties on behalf of the trustees (Capital Markets Authority, 2017).

 The Fund Manager is a financial institution also licensed by the CMA to carry out Fund Management duties to a CIS. The scheme Trustee is usually appointed by the sponsor of the scheme. A Trustee has to be a person licensed by the authority to offer Trustee services to the scheme. The trustee of a CIS has to be a commercial bank or a financial institution licensed by the CMA (Capital Markets Authority, 2017).The Trustee is responsible for all the operations of the scheme as per the law. In simple terms there work is to ensure that the Custodian and the Fund Manager are carrying out their duties in the best interest of the unit holders and as per the regulations provided. The Sponsor is the entity that injected the seed capital in order to kick start the operation of the Unit Trust Scheme.

There are mainly 5 types of unit trust funds being operated by Fund Managers in Kenya; the bond fund, equity fund, money market fund, the fixed income Fund and the balanced fund (Capital Markets Authority, 2017). The Bond Fund is a form of unit trust whose biggest holding in form is in bonds. Its operation is a unit based form of accounting whereupon investors in such a scheme purchase units that are priced. An investor's value is determined by the change in the price of the units bought, the price of the unit is determined by the performance of the investment portfolio which is mainly made of

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bonds. An increase in value of bonds in the investment portfolio will lead to an increase in the value of the price and a drop will lead to a drop in the price. Bond Funds are mainly considered as long term funds and investors joining such funds are usually encouraged to do it for periods longer than a year in order to reap maximum returns from the scheme. An investor can make a loss or gain in investments depending on the performance of the bond portfolio in the market(Pozen & Crane, 2002).

The Equity Fund is a form of unit trust whose biggest holding is in shares. Its operation is a unit based form of accounting where investors purchase units that are priced in the scheme. A change in the price of these units is what determines a change in the value of an investor. Equity funds are also considered as long term funds and investors are usually encouraged to invest for a long period of time in order to maximize returns. An investor can make a gain or loss in his value in the fund depending on the performance of the equity portfolio in the market (Pozen & Crane, 2002).

The Balanced Fund is a form of unit trust that has both shares and interest earning securities like bonds, bills and bank deposits in its portfolio of assets. It is usually considered to be a medium to long term form of unit trust investment. Its operation is also based on the unitized system of accounting where its value is divided into units that are priced. Investors in the fund purchase the units and there value changes when the unit price changes. The price of the unit is dependent on the performance of the investment portfolio of the fund. Investors can main a gain or loss on his investments depending on the performance of the investment portfolio in the market (Elton, Gruber, Brown, & Goetzmann, 2015).

The Money Market Fund is considered short term and its main investment holdings are securities maturing within a period of 364 days (Stigum, 1990). It is also considered as a liquid fund and investors with short term investment needs are encouraged to save in this CIS. The fund allows members to join and exit on short term periods of time. Its operation is based on an interest earning basis. Investors who join the fund earn interest on the principal they have deposited into the fund depending on the average net yield being earned by the investment portfolio (Campbell, Shiller, & Research., 1991). An investor should not lose his principal when investing in this fund. The interest rate component being earned by an investor can vary depending on the performance of the investment portfolio of the fund. The interest component of a money market fund can vary quite a number of times in a year as it will be affected by the maturity of the short term investment and the purchasing of new investments (Sullivan, 1983).

The Fixed Income Fund is considered short to medium term and a big portion of its investment holding is a mix between short and long term interest earning securities. The holdings are majorly based on investment in long term bonds, medium term bonds, treasury bills and fixed deposit in financial institutions like commercial banks. It operates on an interest based form of accounting where members earn interest based on their principal values. The interest rate earned is dependent on the average net yield of the investment portfolio of the fund (Fabozzi & Mann, 2012).

There are two modes of dividend sharing in Unit trusts that invest in equities. We have the growth funds which do not pay dividends to its members but reinvest the dividends earned back into the fund to increase the unit Net Asset Value. We also have funds which

pay dividends to its members as per the ratio of units held by each member of the scheme (Dickson, Shoven, Sialm, & Research., 2000).

### 1.1.1 Asset Allocation

This is the distribution of funds across securities in different investment classes (Gibson, 2013). An asset class is a group of securities with similar characteristics in terms of risk and return. The Fund Manager usually develops and Investment Policy that articulates the tactical strategy that guides in distributing funds across each investment class (Center for Investment Policy Studies (Ithaca, 1997). The Investment Policy must also be within the regulatory range as provided by the CMA in the Investment Guidelines to be adhered to every Fund Manager when making such investments (Gibson, 2013).

The Fund Manager usually invests based on a risk to return basis. The best investments are the ones offering the highest return for a particular level of risk. The FM of the Asset Manager who is tasked with carrying out the analysis of the investments in the market (Pennsylvania Health Care Cost Containment Council, 2000).

The three main asset classes in terms of unit trust portfolio investments are equities, fixed income and cash and cash equivalents (Wikipedia, 2017). Fund Managers use different asset allocations or asset classes for different objectives. An investor invests or saves fund based on his financial goals in life. One investing for the long term time horizon will most likely invest in an asset class predominated by equities (Solin & Wollman, 2006). This is because shares of listed companies are known to produce good returns of a long period of time. Investors with medium to short term needs will definitely invest in fixed income securities like mid-term bonds and bills. An investor putting money aside to earn

something and to cater for emergencies will invest in cash and cash equivalents. Risk and return are the two factors that play a key role in terms of investment decisions. The other factor is the purpose of the investment or the goal that is to be attained by making the investment.

**1.1.2 Unit Trust Performance**

Financial performance can be measured in a number of ways while using the financial reports. It is basically a measure of how efficiently a firm utilized its resources to generate returns. It is a measure of a firms overall financial wellbeing (Black, Fraser, Power, & Dundee, 1980-1990).

The performance of a Unit Trust Scheme can be measured financially by assessing its financial reports for a certain period of time. The balance sheet provides a summary of the assets, liabilities and the unit holder's funds available at a particular date in time. A CIS statement of financial position will exhibit the stability of the scheme in terms of asset financing either from unit holder's funds or retained income reserve. Unit Trust Schemes in Kenya are by law not allowed to access credit or give loans. Therefore the statement of financial position will basically show whether the fund will be able to sustain itself into the foreseeable future at a snapshot (Gremillion, 2013).

The income statement of the CIS will show financial performance over a period of time. It exhibits how resources were spent or invested compared to the revenue or income generated. A higher net revenue or net income means that the performance was positive and that income exceeded spending. The income statement aggregates total income and

expenditure incurred during the financial period whether paid for or not. It used the accrual method of accounting (Elliot & Elliot, 2008).

The Cash Flow statement is a summary of the movement of cash and cash equivalents during a financial period. It is basically an integration of the income statement and the statement of financial position. It gives a stronger indication of performance especially from a liquidity perspective. It shows how much cash and cash equivalents were generated and spent during the period for the various fund activities whether operations, investment or financing. It also gives a snapshot of the cash position at the end of the period just like the statement of financial position (Elliot & Elliot, 2008).

For accurate analysis the performance of a Unit Trust Scheme has to be compared with a bench mark. A bench mark is the point of reference from which we can relate the performance and accurately argue whether there was an under or over performance (Pennsylvania Health Care Cost Containment Council, 2000). An example of a performance bench mark is an index in the market. Choice of an index should be based on the market where majority of the assets in the holdings are traded. Other Unit Trust Funds of the same characteristics can also be used as a benchmark for the performance.

**1.1.3 The Effect of Asset Allocation and Unit Trust Performance**

Asset allocation relies on the premise that assets in different classes have different return and risk characteristics (Gibson, 2013). This is why it is proposed that diversification reduces risk in a portfolio of investments and will also have an effect on the return (Bertoneche & Knight, 2003). Unit Trust Funds pool funds from different investors and

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invest them in a portfolio as per the type of fund and within the restrictions of the investment guidelines provided by the regulator (Capital Markets Authority, 2017).

Strategic asset allocation is expected to boost the performance of the investment portfolio of the unit trust scheme. A haphazard mode of asset allocation is expected to either reduce the performance of the investment portfolio make it make a loss. It is highly unexpected for a portfolio of investment to perform better when investments were allocated in a manner that was not procedural, although at times due to sheer luck it may make a gain. Portfolio investment or asset allocation is usually done using fundamental approaches by fund managers and analysts (Brinson, Singer, & Beebower, 1991). Some investors use chartist or technical analysis approaches when analyzing the nature of assets to invest in a portfolio. Above all risk and return are the main guiding principles used in making investments. Different unit trust funds with different risk categories or unique investor needs invest using different approaches in order to satisfy the specific need of the fund(Center for Investment Policy Studies (Ithaca, 1997).

### 1.1.4 Unit Trust Schemes in Kenya

Unit Trusts are established under the Capital Markets Act Cap 485, Collective Investment Scheme Rules and Regulations of the year 2001(Capital Markets Authority, 2017). They are a new way of investing in Kenya in which members or unit holders are enabled to pool funds and a scheme and invest as one. They are regulated by the Capital Markets Authority through the Capital Markets Act Cap 485. Unit Trust Funds are managed by licensed Scheme Trustees who delegate to the Fund Managers the role of fund management and scheme administration, Trustees are appointed by a scheme sponsor

who injected the seed capital that was the initial investment by the fund (Capital Markets Authority, 2017). Trustees carry the responsibility of ensuring that the fund is operated in accordance with the rules and regulations. The work of the Trustee is to appoint the Fund Manager and the Custodian both of who must be licensed by the CMA. The Custodian is like the safe keeper of the assets of the fund and stores in safe custody all titles of the assets of the fund. The Trustee, Custodian and the Fund Manager must be financial institutions licensed to carry out trustee, custody and fund management duties by the CMA.

The Trustee and Custodian are mostly commercial banks licensed to carry out the respective business. These three service providers work hand in hand to ensure that the operations of a CIS are in compliance with the law and in the best interest of the unit holders. The fund manager is usually guided by an investment policy that guides his tactical approach when investing funds in a CIS. Investment and asset allocation must be within the regulatory guideline limits (Bertoneche & Knight, 2003).

## 1.2 Research Problem

The conceptual framework illustrates that asset allocation has an impact on the performance of unit trust funds, strategic asset allocation done in a fundamental manner and taking into account the risk and return balance is expected to boost portfolio performance (Elton, Gruber, Brown, & Goetzmann, 2015). The opposite where the required procedure or approach is not used in the allocation of funds to various asset classes is expected to generally lead to an under performance or a deterioration of the fund portfolio performance (Bertoneche & Knight, 2003). The fund manager who is

charged with the responsibility of making the investment decisions in order has to do a continuous research and analyses of the market in order to make good investment decisions (Bertoneche & Knight, 2003). Analysis can be done fundamentally or technically by analysts attached to fund managers who guide the manager in making investment decision whose facet is the asset allocation approach.

Unit trust funds in Kenya are registered by fund managers or sponsors whom have to later appoint trustees who will appoint the fund managers and other service providers to the scheme. They are established by the Capital Markets Act Cap 485, laws of Kenya Collective Investment Schemes rules and guidelines. Each specific unit trust scheme has a specific investment guideline provided by the regulator who is the CMA (Capital Markets Authority, 2017). For money market funds a big portion of the investment portfolio should be on securities that mature within a year and for equity based funds the biggest portion are shares. The fund manager is limited to the level and types of assets he can invest in by the investment guidelines given by the CMA. Therefore the manager has to employ a tactical approach to ensure that he maximizes returns when investing in the best interest of the unit holders of the fund (Capital Markets Authority, 2017).

The question is whether the limits in the investment guidelines issued will hamper the flexibility and capacity of a FM to invest and generate good returns (Capital Markets Authority, 2017). It is stated that investments should be done in a manner to maximize the returns of the unit holders in the scheme. The investment market is also volatile in nature depending on the asset categories that a specific fund will invest in. Blind investment decisions without analyzing the market conditions can lead to losses in the fund and this will lead to a decrease in the value of unit holder's funds (Spaulding, 1997).

Fund managers have to be tactical in their investment procedure in order to maximize the returns of the unit holder's funds. In an effort to maintain good returns while avoiding risk, fund managers are usually guided by an Investment Policy statement. This statement exhibits the general tactical approach that is used when investing unit holder's funds. An investment policy statement will be unique and specific to the type of fund because different types of funds invest in different asset classes (Spaulding, 1997). The research gap is whether there is a specific known approach that fund managers can be able to use given the limits provided for in the investment guidelines to maximize the returns of the unit holders' funds. The research question was then "what is the effect of asset allocation on the financial performance of unit trust schemes in Kenya?"

## 1.3 Research Objective

To establish the impact of asset allocation on the financial performance of Unit Trust Funds in Kenya.

## 1.4 Value of the Study

The study would help Unit Trust Scheme Trustees understand the procedures to put in place in order to manage risks and enhance returns of the CIS. It would also enlighten them on the importance of having in place a documented tactical approach to investing in the form of an investment policy statement (Center for Investment Policy Studies (Ithaca, 1997).

It would also enhance the level of returns generated by schemes and help in the maximization of the unit holder's funds. The study would also serve as an eye opener to more areas of research and improvement thereafter when making investment decisions.

Unit Trust Schemes promote national savings and provision of liquidity to the government as they participate in the purchase of Government Securities like the Treasury Bills and the Treasury Bonds (United States; Department of the Treasury; Office of the Secretary; Dept, Circular; public debt series, 1984). Unit Trust holdings in government securities account for a significant portion that runs into billions of shillings. Therefore they promote national savings and end up reducing the amount of debt the government borrows from foreign financial institutions that issue credit. Local credit is cheaper to finance by the government that loans accessed from foreign institutions (Ndolo, 2001).

# CHAPTER TWO: LITERATURE REVIEW

## 2.1 Introduction

In this section the research will establish to look at premises both theoretical and empirical put forward by other researchers in an attempt to explain the impact of asset allocation on the performance of various investment portfolios (laitos., 1992). Theoretical review will look at premises put forward by scholars in an attempt to give a solution to a problem but do not look or analyze evidence. Empirical reviews on the other hand are premises put forward by scholars after analyzing the evidence in the environment and testing them in order to come up with a conclusion.

## 2.2 Theoretical Review

### 2.2.1 Modern Portfolio Theory

The theory was proposed by Harry Markowitz in 1952, and it states that investing in a portfolio of assets should be with the aim of maximizing returns for a given level of risk (Elton, Gruber, Brown, & Goetzmann, 2015). Unit Trust Funds pool money for a number of investors and invest the same in a portfolio of assets. It is important that this investment is candidly done in order to reap the best possible returns for the unit holders of the scheme. The theory stipulates that risk averse investors can construct portfolios in order to maximize return for a particular level of risk. The theory goes on to stipulate that it is not enough to look at the expected risk and return of a single asset in an effort to maximize returns. It stipulates the importance of diversification in an effort to eliminate

risk (Elton, Gruber, Brown, & Goetzmann, 2015). The five statistical measures used to decipher risk in modern portfolio theory are: alpha, beta, standard deviation, R-squared, and the Sharpe ratio. Modern Portfolio theory provides a basis for the measurement of risk and return in mutual funds or unit trust funds.

The modern portfolio theory is relevant to the research as it provides and explanation about risk and return when it comes to investing. It also gives an illustration on how investment risk can be quantified and a procedure that investors can use to balance between risks for a particular level of return. This theory guides portfolio managers when selecting assets to invest in an effort to balance between risk and return for a particular class of unit trust fund (Euromoney, 2013).

## 2.2.2 Capital Assets Pricing Theory

The theory was brought forward by Jack Treynor (1961, 1962) and William Sharpe (1964), John Lintner (1965a, b) and Jan Mossin (1966). It is a theory used to establish the return an asset should generate before an investor makes a decision of adding it to a portfolio of investment. It describes the relationship between the systematic risk and the expected return of an asset (Morin, 1980). The theory uses the concept of beta, it a measure of the volatility of a security in relation to that of the market. It compares how a security's return will behave after swings in the market. It is usually calculated using regression analysis. The beta of a security in relation to the market is computed by taking the covariance of the security's returns and the benchmark returns by the variance of the benchmark returns over a period of time. A beta of 1 indicates that a security will fluctuate in the same direction the market will fluctuate. A beta of less than 1 indicates

that a security is less volatile in the market. Fund Managers can use this approach in evaluating the return of assets in an attempt of building a good portfolio of investments (Morin, 1980).

The CAPM theory is a single factor single period formula which is a form of weakness. In an economy multiple factors will affect the performance of a security and this fact makes CAPM a weak theory by disregarding the use of multiple factors to determine the relationship between a security's performances to that of the market. The CAPM theory though simple to apply has its own share of weaknesses: the yield on government securities used to determine the risk free rate might be volatile and be changing over time, return on the market usually given by the average yield on dividend and capital gains from securities produce a problem when the same is a negative value, it is also difficult to determine the accurate value of beta. The model is also based on an assumption that investors can borrow and lend at the risk free rate (Research, 2004).

CAPM theory guides portfolio managers on the minimum required rate or return an asset should be able to provide before it is included in a portfolio of investment. This is important because the selection of good quality assets is relevant when the fund manager wants to maximize the portfolio return of a unit trust scheme when investing in assets (Rometsch, 2008).

### 2.2.3 Arbitrage Pricing Theory

Proposed in 1976 by Stephen Ross with the aim of predicting the relationship between the returns of a portfolio and that of an asset through the combination of multiple variables linearly. It is at times considered as an improvement to the CAPM theory

because it is more flexible and considers that more factors affect the return of an asset in an economy. It is mainly used by investors to determine the most accurate price of a mispriced security in the market and take arbitrage opportunity in order to reap returns(Lorie & Kimpton, 1973).The strength of the APT model is that it is a multi-factor and a multi period model. It considers more than one factor and more than one period when analyzing the required return of an asset and the reason it is much more preferred to CAPM model. The weakness of APT model is that it does not specify what the true factors to be used are, the factors can change over time and estimating multi factor models requires ample time and data collection (Stapleton, 1985).

Unlike CAPM, APT is a multifactor model and therefore guides portfolio managers in considering multiple factors when selecting assets to add onto their portfolio of investments. The consideration of a number of relevant factors makes asset choice more precise and takes into account most of the factors that influence the return of an asset for a particular level of risk (Euromoney, 2013).

## 2.2.4 Adaptive Investment Approach

First proposed by Ma (2010, 2013 and 2015), which involves investment strategies under which investors should constantly adjust their investments to reflect market conditions. Unit Trust or Mutual Funds invest in securities issued in the market. Performance of most these assets depend on macro-economic factors. Fund Managers or Investment Managers should constantly forecast the market as they adjust the investment portfolios in order to maximize returns in the market. The changes in the market can be termed as market volatility(Wilcox & Fabozzi, 2013).

The AIA approach in simple terms means timing the market when making investments. The theory is relevant because it guides portfolio managers especially in volatile markets on market timing techniques in an effort to generate arbitrage gains when investing in assets. This will guide portfolio managers in market timing when investing in volatile markets (Rangel, 2006).

## 2.2.5 Adaptive Market Hypothesis

Proposed by Andrew Lo as an attempt to reconcile economic theories. Under the approach traditional models of finance should be able to coexist with the behavioral models. This applies to mutual funds as mutual fund investments are affected by traditional modes used to predict the market and the use of behavioral finance as managers are influenced by factors of behavioral finance as they are human beings. This theory can be applicable to managers when they are making investment decisions by analyzing information in the public domain and how such information may fundamentally and behaviorally affect the decision of investors and how it may impact the market. This will enable more accurate judgments when investing with an aim to generate good returns (Urquhart, School, & Tyne, 2013).

The AMH approach is based on balancing between behavioral and traditional approaches to investing. This will guide fund managers to take advantage of behavioral and also traditional market tendencies in order to time the market and maximize on arbitrage profits from investor behavior (Markets. & Associates, 2003).

## 2.3 Determinants of Unit Trust Schemes Performance

### 2.3.1 Level of Liquidity

Liquidity can be termed as the availability of cash or assets that can be easily converted into cash (Low, 2017). The amount of liquidity or free cash flows available for investments will influence the choice and number of asset classes that an investor will allocate the funds. A high level of liquidity gives the fund manager a bigger capacity to invest in more asset classes than a fund manager with low liquidity and will therefore have an impact on the return generated by the unit trust scheme. A high liquidity in times when the economic conditions are volatile act as a buffer in reducing excessive movements in the value of the fund when all other things are kept constant (Low, 2017).

### 2.3.2 Prevailing Economic Conditions

The conditions prevailing in the economy like interest rate regimes, levels of inflation and the performance of the global economic environment will have an effect on the performance of unit trust schemes. These conditions will have a bearing on the performance of the individual assets that unit trust schemes invest in and will therefore impact on the performance of unit trust schemes (Bertoneche & Knight, 2003).

### 2.3.3 Political Environment

The nature of the political environment in terms of stability or risk has an influence on the performance of investments in general. This is because the level of political risk either encourages or discourages investor's especially foreign ones from investing in a country. This leads to poor performance especially of shares because the demand is low and the price will now drop (Mutual Funds Magazine, 2017).

### 2.3.4 Asset Quality

The quality of the specific assets invested in the portfolio of investments will have an effect on the level of income generated by the scheme. A good quality asset yields the highest returns for a particular level of risk. A high number of such quality assets in the investment portfolio will generate higher returns for the scheme (Campbell, Shiller, & Research., 1991).

### 2.3.5 Fund Manager Competence

The tactical ability of a fund manager to operate at low costs and strategically make investments in a timing approach has an impact on the performance of a unit trust scheme. A high level of fund manager competence will increase the level of performance of the scheme and a low level will reduce the level of performance of the scheme (Fund, 2017).

## 2.3.6 Tax Regime

High taxes will reduce the level of income generated by the individual assets in the investment portfolio. This will in turn reduce the performance of the investment portfolio and will impact negatively on the fund. Low taxes on specific investments will lead to higher income generated and will have a positive impact on the performance of the fund (Bertoneche & Knight, 2003).

## 2.4 Empirical Review

Brinson, Singer and Beebower (2010) illustrated 91.5% of the portfolio return on investment was due to strategic asset allocation. Elkin (2012) did establish that asset allocation, instead of stock selection or timing in the bourse, is a key factor in the determination of portfolio performance. Surz, Stevens and Wimer (2012) used a model that assisted them to determine that 95% of returns in an investment portfolio is due to asset allocation.

Ibbotson and Kaplan (2000) in their study of US retirement benefit scheme determined empirically that asset allocation was the main attribute that resulted in the level of investment return, more than the effect of the selection of shares. In their study, they analyzed 94 collective investment schemes and their returns for 10 years and also 58 returns for the retirement benefit funds for 5 years. They concluded that asset allocation is the main contributor to the level investment return in a portfolio.

Beebower (2009) and Brinson et al (2010) undertook an analysis on the US retirement benefits company schemes, they established that asset allocation contributed to 93.6% of

the total variance of the returns of the fund. They undertook a study on 91 retirement benefits schemes for a decade. They attributed the variation in returns to the nature of the investment policy that provided the tactical framework for the fund managers.

Dimson, Marsh and Staunton (2002) and Cornell (2012) established that there is a significant amount of evidence that illustrates that additional risk is compensated for by additional expected returns; hence, there is a straight line compensation between risk and return in the long or short investment horizon, as explained by Capital Asset Pricing Model (Sharpe, 1964), and equities are not as appealing as they seem for long term horizon investors. They also established an incentive in hedging in equity than other asset classes (Sutcliffe, 2004).

Loeper (2012), in his Asset Classes Article, illustrated a cross-sectional variation in average ex post returns to strategic asset class balancing, market timing, and security selection. Allocations over the long term horizon also account for the biggest variation in the returns of a fund. The study analyzed 306 retirement benefit funds over a period of 8 years. Maina (2011) researched on the effect of portfolio characteristics on the performance of equity growth based Unit Trusts in Kenya, she concluded in her report that there is a relationship between portfolio characteristics and the performance of unit trust funds in Kenya.

Mwachanya (2015) researched on the impact of asset allocation on the performance of pension schemes in Kenya; she concluded that there is a relationship between asset allocation and the performance of pension schemes in Kenya. Nguthu (2009) in his

research established the variation in returns over time for pension schemes is explained up to 62.4% by investment policy adopted by the trustees of the scheme.

## 2.5 Conceptual Framework

Strategic asset allocation is expected to have a positive effect on the performance of unit trust schemes because selection and balancing of assets in the portfolio was done using fundamental analysis. It is also believed that when allocating assets strategically, the concept of risk and return is put into consideration. On the other hand an asset allocation done in a manner that is not procedural is expected to have a negative impact on the performance of a unit trust scheme (Elliot & Elliot, 2008). This is because funds were allocated to asset classes based on a guess work approach. Diversification is also expected to reduce portfolio risk (Gibson, 2013).

Asset allocation is a sensitive matter in terms of investing funds to generate returns. It is expected that the way asset allocation is employed in the managing of unit trust funds is expected to have a significant effect on the performance of the portfolio. A good mix of assets in a portfolio is scholarly expected to maximize the return of the same for a given level of risk (Euromoney, 2013).

Different assets in different asset classes have different qualities. Good quality assets are the ones that give a good return for a particular level of risk. They can be converted to another asset or to cash in times of need easily. They are assets whose mechanisms of generating income are easy to understand by a layman. Investment in the asset should be done through a regulated process to ensure that the procedure abides with the law of the land (Center for Investment Policy Studies (Ithaca, 1997).

**Conceptual Framework Diagram**

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┌─────────────────────────┐                    ┌─────────────────────────┐
│ Asset Allocation        │                    │ Unit Trust Performance  │
│   • Treasury Bonds      │                    │ Measurement             │
│   •  Treasury Bills     │                    │    • Fund Returns       │
│   • Bank Deposits       │─────────────────▶  │                         │
│   • Corporate Bonds     │                    │                         │
│   • Commercial Paper    │                    │                         │
│   • Equity              │                    │                         │
└───────────┬─────────────┘                    └─────────────────────────┘
            │                                               ▲
            │                                               │
┌───────────┴─────────────┐                                │
│ Control Variables       │                                │
│   • Expected Portfolio  │                                │
│     Return              │────────────────────────────────┘
│   • Risk Free Rate      │
│   • Standard Deviation  │
│     of the Portfolio    │
│     Returns             │
└─────────────────────────┘
```
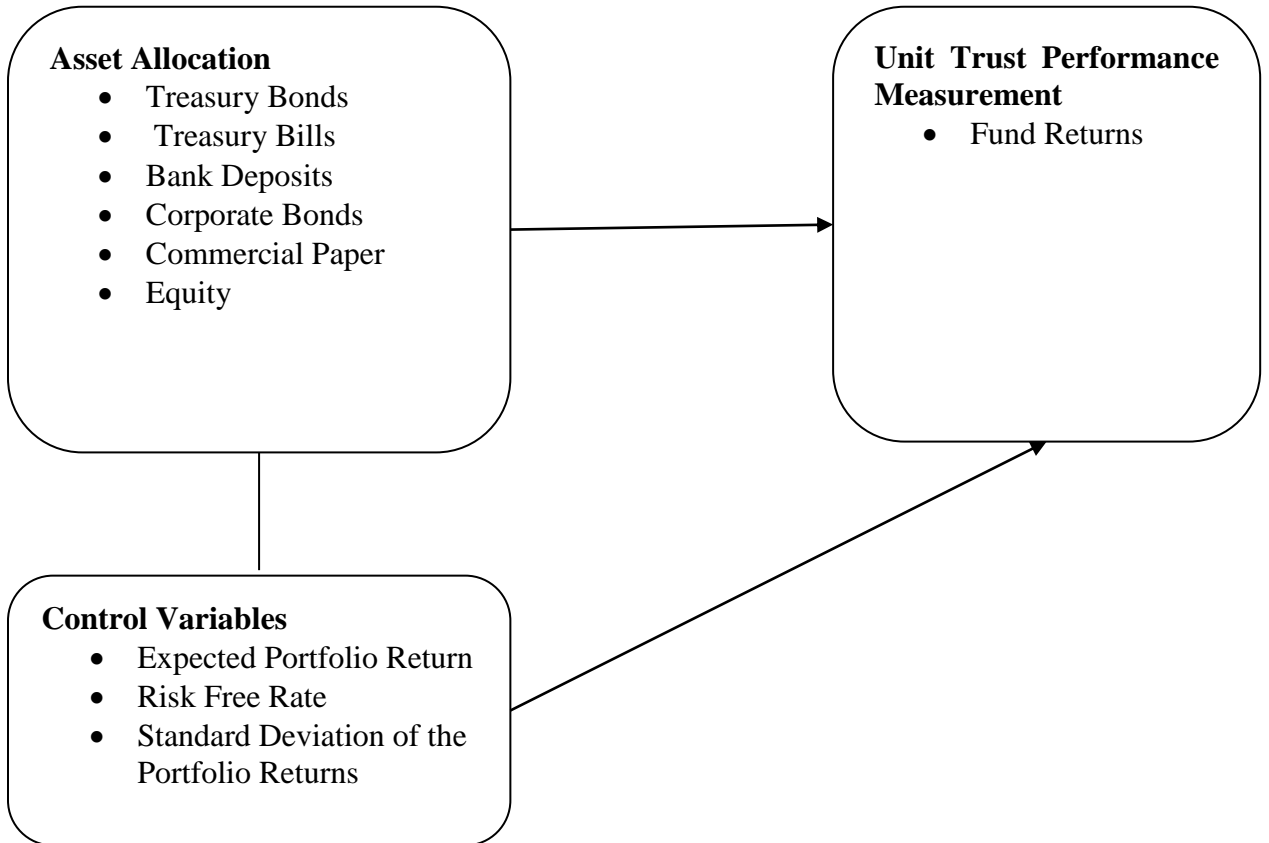
**Figure 2.1: Conceptual Framework**

**2.6 Summary of Literature Review**

Studies conducted before have concluded that there is a significant relationship between portfolio allocation and investment performance. The studies to some extent include tests that have been carried out to know to what extent portfolio allocation will affect investment performance. There still lies a research gap as there is no clear study that has

shown the optimal criteria of portfolio allocation that will guide fund manager in building the best portfolio to maximize returns for a particular level of risk.

The theoretical framework and the empirical studies both suggest that there is a significant relationship between asset allocation and the performance of a portfolio of investments. Unit Trust Funds are based on a portfolio of investments into a certain range of asset classes restricted by the investment guidelines (Capital Markets Authority, 2017).

The research gap that still exists even after looking at the literature review is that no researcher has come up with the optimal asset allocation procedure to ensure maximum returns when allocating investments to different asset classes in a unit trust scheme. The biggest challenge is that there are limits to the types and the levels of investment that can be made to different asset classes (Capital Markets Authority, 2017). This limit is provided for by the investment guideline that is given by the CMA.

# CHAPTER THREE: RESEARCH METHODOLOGY

## 3.1 Introduction

The chapter outlines the type of research methodology employed during the research. The issues that are discussed in this chapter include; the Research Design, The Target Population, The Sample Design, Data Collection Tools and the technique adopted for data analysis (Donley & Grauerholz, 2012).

## 3.2 Research Design

Descriptive research analysis and multi factor model is the type of research design that has been employed in the analysis of data. The study aimed to understand and analyze the performance of Unit Trust Funds between the years 2012 to 2016. The period between 2012 and 2016 had a significant number of events that took place in the financial sector which included the high interest rate and inflation regimes of the year 2011 and the second half of 2015, 2016 also had two of the biggest deposit taking banks in Kenya going under receivership in the name of Imperial Bank and Chase Bank Limited. These events directly affect the performance of Money Market Funds and they would enable in analysis of performance of the funds and whether the unique asset allocations in different fund portfolios had an effect on the performance of the funds. The multi factor model is an appropriate one as it would help identify the various factors that affect the ability of fund managers to combine assets in the required weights and characteristics in order to yield good returns for the Money Market Funds (Vaus, 2006).. The study aimed to

analyze the performance of the fund for a period; hence a time series analysis will also be employed in the process.

## 3.3 Population

A population is the entire pool from which a statistical sample is generated. In our case the population is made of 45 registered Unit Trust Schemes in the country (Productions, 1980). The funds consist of equity funds, balanced funds, bond funds, money market funds and fixed income funds.

The entire population of the 45 registered unit trust schemes was used in the analysis (Productions, 1980),, therefore a census was conducted in the research methodology. Therefore the study used a census rather than a sample due to few numbers of registered schemes (Appendix).

## 3.4 Data Collection

The data was collected by the use of a data collection form because the study only utilized secondary data in its analysis. The data collection form is attached in the appendix given at the end of the research proposal. The data was collected from published unit trust fund accounts which were sourced from financial analysts, fund managers and the Capital Markets Authority (Capital Markets Authority, 2017).

## 3.5 Diagnostic Test

The diagnostic tests were carried out on the data collection procedure in order to determine the attributes of the data being collected for the study. The data being collected

has to be measurable, collected in a systematic manner, quantifiable, aggregate facts, collected for a determined purpose, affected by multiplicity of causes and collected for a predetermined cause (Donley & Grauerholz, 2012). One of the tests of normality to be done on the data will be the skewness and kurtosis test.

## 3.6 Data Analysis

The application of descriptive statistical methods was employed in the analysis of the data. Regression analysis was performed on the data to determine the nature of the relationship. Additionally a correlation analysis was also done in order to analyze the significance of the relationship.

The application of the Pearson correlation coefficient and the multiple linear regression analysis was employed in the analysis of the data. The correlation coefficient determined the strength of the nature of the relationship between the independent and the dependent variable.

### 3.6.1 Analytical Model

The regression equation is as shown below:

$$Y_t = \propto + \beta_1 X_{1t} + \beta_2 X_{2t} + \beta_3 X_{3t} + \beta_4 X_{4t} + \beta_5 X_{5t} + \beta_6 X_{6t} + B_7 X_7 + \varepsilon$$

Where, $Y_t$= is the Fund Return

$$Y_t = \frac{Expected\ Portfolio\ Return_t - Risk\ Free\ Rate_t}{Standard\ Deviation\ of\ the\ Portfolio\ Return_t}$$

α-      the risk free rate of return

β-      The regression coefficient

$X_1$-      weight of cash in the fund calculated by dividing the value of cash by the total value of the fund

$X_2$-      weight of bank deposits both fixed and call deposits taken by dividing the value of fixed and call deposit by the value of the fund

$X_3$-      weight of treasury bills in the fund calculated by dividing the value of treasury bills by the total value of the fund

$X_4$-      weight of corporate bonds in the fund calculated by dividing the value of corporate bonds by the total value of the fund

$X_5$-      weight of treasury bonds in the fund calculated by dividing the value of treasury bonds by the total value of the fund

$X_6$-      weight of equity calculated by dividing the value of equity in the fund by the total value of the fund

$X_7$-      weight of commercial paper in the fund calculated by dividing the value of commercial paper by the total value of the fund

### 3.6.2 Test of Significance

Multivariate collection between the predicted and the actual results of the study was used on the regression model. The coefficient of determination R squared which is a key output of the multifactor regression model was used to determine the strength of the relationship between asset allocation and performance of unit trust funds in Kenya. The

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one way Analysis of Variance ANOVA was used to determine whether there was any statistically significant difference between the averages of the independent variables, the sample paired t test was used to determine the nature of distribution of the data and the relationship to the whole study.

# CHAPTER FOUR: DATA ANALYSIS, RESULTS AND DISCUSSIONS

## 4.1 Introduction

The researcher presents the findings of the analyzed data in this section. Secondary data was collected using data collection sheets. The collected data was sorted and coded into SPSS software where the analysis commenced. Analysis of the data was done descriptively and inferentially. The findings are indicated in subsequent sections.

### 4.1.1 Response Rate

The researcher targeted 45 unit trust funds operating in Kenya as at 31$^{st}$ of December 2016 for a five year period 2012-2016 and therefore N was (45X5) equivalent to 225. Out of these, the researcher was only able to collect data from 32 unit trust funds for a period of 5 years which comes to (32X5) that is 160. This represented a response rate of 71%.
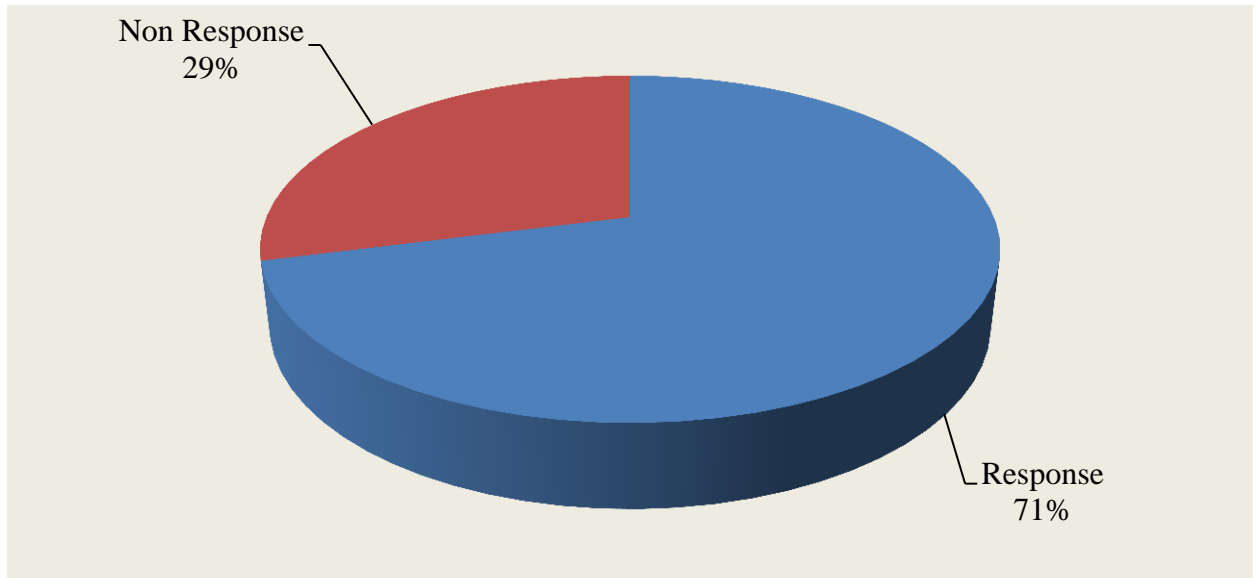
**Figure 4.1: Response Rate**

According to Mugenda and Mugenda (2003), a response rate of 70% and above is excellent. On the other hand, Babbie (2004) notes that return rates of above 50% are acceptable to analyse and publish, 60% is good and 70% is very good and above 80% is excellent. Therefore, this response rate was sufficient to proceed with analysis.

**4.2 Descriptive Statistics**

Means and standard deviations were used to descriptively analyze data. The findings are indicated in Table 4.1.

**Table 4.1: Descriptive Statistics**

| 8 | N | Mean | Std. Deviation | Skewness | | Kurtosis | |
|---|---|---|---|---|---|---|---|
| | Statistic | Statistic | Statistic | Statistic | Std. Error | Statistic | Std. Error |
| Fund Return | 160 | -7.803 | 14.668 | -4.449 | .192 | 24.179 | .381 |
| Weight of Equity | 160 | .053 | .140 | 3.732 | .192 | 13.303 | .381 |
| Weight of Corporate Bonds | 160 | .023 | .028 | 1.640 | .192 | 3.910 | .381 |
| Weight of Cash | 160 | .012 | .018 | 1.660 | .192 | 1.788 | .381 |
| Weight of T-bonds | 160 | .019 | .049 | 10.541 | .192 | 124.560 | .381 |
| Weight of Bank Deposit | 160 | .007 | .013 | 3.121 | .192 | 12.036 | .381 |
| Weight of T-bills | 160 | .039 | .036 | 2.796 | .192 | 19.960 | .381 |
| Weight of Commercial Paper | 160 | .017 | .037 | 10.654 | .192 | 126.220 | .381 |

From Table 4.1, fund return had a mean of -7.803, with standard deviation of 14.668, Skewness of -4.449 and Kurtosis of 24.179. Weight of equity had mean of 0.053 with standard deviation of 0.140, Skewness of 3.732 and Kurtosis of 134.303. Weight of corporate bonds had a mean of 0.023, standard deviation of 0.028 Skewness of 1.640 and Kurtosis of 3.910. Weight of cash had a mean of 0.012, standard deviation of 0.018, Skewness of 1.660 and standard deviation of 1.788. Weight of treasury bonds had a mean of 0.019, standard deviation of 0.049, Skewness of 10.541 and Kurtosis of 124.560.

Weight of bank deposit indicated a mean of 0.007 with standard deviation of 0.013, Skewness of 3.121 and Kurtosis of 12.036. Weight of T bills had a mean of 0.039, standard deviation of 0.036, Skewness of 2.796 and Kurtosis of 19.960. Weight of commercial paper showed a mean of 0.017, standard deviation of 0.037, Skewness of 10.654 and Kurtosis of 126.220.

From the findings, weight in equity with greatest mean 0.053 indicates that it affected

## 4.3 Correlation Analysis

Correlation analysis was used to establish the strength and direction of relationship between the study variables. The findings are clearly indicated in Table 4.2.

**Table 4.2: Correlation Analysis**

| | | Fund Return | Weight of Equity | Weight of Corporate Bonds | Weight of Cash | Weight of T-bonds | Weight of Bank Deposit | Weight of T-bills | Weight of Commercial Paper |
|---|---|---|---|---|---|---|---|---|---|
| Fund Return | Pearson Correlation | 1 | | | | | | | |
| | Sig. (2-tailed) | | | | | | | | |
| | N | 160 | | | | | | | |
| Weight of Equity | Pearson Correlation | .188 | 1 | | | | | | |
| | Sig. (2-tailed) | .017 | | | | | | | |
| | N | 160 | 160 | | | | | | |
| Weight of Corporate Bonds | Pearson Correlation | .364 | .795 | 1 | | | | | |
| | Sig. (2-tailed) | .000 | .000 | | | | | | |
| | N | 160 | 160 | 160 | | | | | |
| Weight of Cash | Pearson Correlation | -.837 | -.235 | -.514 | 1 | | | | |
| | Sig. (2-tailed) | .000 | .003 | .000 | | | | | |
| | N | 160 | 160 | 160 | 160 | | | | |
| Weight of T-bonds | Pearson Correlation | .225 | .588 | .628 | -.258 | 1 | | | |
| | Sig. (2-tailed) | .004 | .000 | .000 | .001 | | | | |
| | N | 160 | 160 | 160 | 160 | 160 | | | |
| Weight of Bank Deposit | Pearson Correlation | .250 | .924 | .902 | -.326 | .723 | 1 | | |
| | Sig. (2-tailed) | .001 | .000 | .000 | .000 | .000 | | | |
| | N | 160 | 160 | 160 | 160 | 160 | 160 | | |
| Weight of T-bills | Pearson Correlation | .421 | .570 | .814 | -.620 | .222 | .626 | 1 | |
| | Sig. (2-tailed) | .000 | .000 | .000 | .000 | .005 | .000 | | |
| | N | 160 | 160 | 160 | 160 | 160 | 160 | 160 | |

| Weight of Commercial Paper | Pearson Correlation | .197 | .581 | .624 | -.260 | .993 | .714 | .225 | 1 |
|---|---|---|---|---|---|---|---|---|---|
| | Sig. (2-tailed) | .013 | .000 | .000 | .001 | .000 | .000 | .004 | |
| | N | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 |

Table 4.2 shows correlation coefficients and probability values of individual independent variables against the dependent variable of the study. Normally correlation ranges from negative to positive, between 0 and 1 and can either be weak, moderate or strong. Weak correlation is between 0 and 0.29, moderate correlation is between 0.3 and 0.49 and strong correlation is 0.5 and above. Based on the findings, weight of equity had Pearson correlation of 0.188 with probability value of 0.017. Therefore, there was a significant and positive relationship between weight of equity and fund returns of unit trust funds. This relationship is significant because probability value ranges between 0.017 and 0.05.

For weight of corporate bonds, the value of correlation coefficient was 0.364 with probability value ranging between 0.000 and 0.05, an indication of moderate positive and significant relationship between corporate bonds and performance of Unit Trust Funds in Kenya. Regarding weight of cash, the Pearson correlation coefficient was -0.837 with probability value ranging between 0.000 and 0.05; suggesting strong significant negative relationship between weight of cash and fund returns. This means that an increase in weight of cash reduces performance of Unit Trust Funds in Kenya.

In view of the weight of treasury bonds, Pearson correlation coefficient was 0.225 with probability value ranging between 0.004 and 0.05. This signifies presence of weak positive significant relationship between weight of treasury bonds and performance of Money Market Unit Trust Funds in Kenya. For weight bank deposits, Pearson correlation was 0.250 with probability value ranging between 0.001 and 0.05, implying presence of

weak significant and positive relationship between weight of bank deposit and performance of Unit Trust Funds in Kenya. Treasury bills had Pearson correlation 0.421 with probability value of 0.029, showing presence of positive relationship between T-bills and performance of Unit Trust Funds in Kenya.

Weight of commercial papers had Pearson correlation of 0.197 with probability value ranging between 0.013 and 0.05, an indication of weak positive significant relationship between weight of commercial papers and performance of Unit Trust Funds in Kenya.

## 4.4 Regression Analysis

Multiple regression analysis was used to establish the effect of asset allocation on the performance of Unit Trust Funds in Kenya. The findings are reported in subsequent Tables.

**Table 4.3: Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .890 | .792 | .782 | 6.85013 |

Table 4.3 indicates the coefficient of correlation R of 0.890; an indication of strong positive correlation between the study variables. The coefficient of determination R square is 0.792; showing that 79.2% change in fund returns of money market unit trusts funds in Kenya is explained by the independent variables of the study.

**Table 4.4: ANOVA**

| | Sum of Squares | Df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Regression | 27076.759 | 7 | 3868.108 | 82.433 | .000[b] |
| Residual | 7132.490 | 152 | 46.924 | | |
| **Total** | **34209.249** | **159** | | | |

From the ANOVA findings, F calculated is 82.433 while F critical at degrees of freedom (7, 152) equals to 2.07. Since F calculated is greater than F critical that is 82.433 greater than 2.07, this shows that the overall regression model was a significant predictor of the relationship between asset allocation and performance of Unit Trust Funds in Kenya.

**Table 4.5: Regression Coefficients**

| | Unstandardized Coefficients | | Standardized Coefficients | T | Sig. |
|---|---|---|---|---|---|
| | B | Std. Error | Beta | | |
| (Constant) | 6.369 | 1.403 | | 4.540 | .000 |
| Weight of Cash | 778.242 | 41.310 | .968 | 18.839 | .000 |
| Weight of Bank Deposit | 17.572 | 187.762 | .016 | .094 | .926 |
| Weight of T-bills | 57.836 | 37.289 | .145 | 1.551 | .023 |
| Weight of Corporate Bonds | 66.718 | 74.727 | .128 | .893 | .373 |

| | | | | |
|---|---|---|---|---|
| Weight of T-bonds | 678.145 | 100.640 | 2.271 | 6.738 | .000 |
| Weight of Equity | 12.476 | 11.133 | .120 | 1.121 | .264 |
| Weight of Commercial Paper | 895.683 | 128.314 | 2.279 | 6.980 | .000 |

The resultant regression equation becomes:

$$Y_t = 6.369 + 778.242X_{1t} + 17.572X_{2t} + 57.836X_{3t} + 66.718X_{4t} + 678.145X_{5t}$$
$$+ 12.476X_{6t} + 895.683X_7$$

Where;

$Y_t$ - represents the expected return of the fund portfolio measured using the ex-ante Sharpe ratio

$X_1$- weight of cash in the fund calculated by dividing the value of cash by the total value of the fund

$X_2$- weight of bank deposits both fixed and call deposits taken by dividing the value of fixed and call deposit by the value of the fund

$X_3$- weight of treasury bills in the fund calculated by dividing the value of treasury bills by the total value of the fund

$X_4$- weight of corporate bonds in the fund calculated by dividing the value of corporate bonds by the total value of the fund

$X_5$-    weight of treasury bonds in the fund calculated by dividing the value of treasury bonds by the total value of the fund

$X_6$-    weight of equity calculated by dividing the value of equity in the fund by the total value of the fund

$X_7$-    weight of commercial paper in the fund calculated by dividing the value of commercial paper by the total value of the fund

Therefore, if all the study variables were to be held constant, performance of Unit Trust Funds in Kenya would be at 6.369. A unit change in weight of cash in the fund holding other variables constant would result into 778.242. A unit change in weight of bank deposits holding other factors constant would lead to 17.572 changes in performance of Unit Trust Funds in Kenya. A unit change in weight of Treasury bills with other factors constant would result into 57.836 changes in performance of Unit Trust Funds in Kenya. A unit change in weight of corporate bonds with other factors held constant would lead to 66.718 changes in performance of Unit Trust Funds in Kenya. A unit increase in weight of treasury bonds with other factors constant would result into 678.145 increases in the performance of Unit Trust Funds. A unit change in weight of equity with other factors held constant would result into 12.476 changes in performance of Unit Trust Funds in Kenya. A unit increase in weight of equity with other factors held constant would lead to 895.683 increases in performance of Unit Trust Funds in Kenya.

In view of significance of individual variables, weight of cash had probability value ranging between 0.000 and 0.05, weight of treasury bills had probability value ranging between 0.023 and 0.05, T bonds had probability values ranging between 0.000 and 0.05,

weight of equity had probability values ranging between 0.000 and 0.05 and weight of commercial papers probability values ranging between 0.000 and 0.05. This indicates that weight of cash, weight of treasury bills, weight of treasury bonds, weight of equity and weight of commercial paper significantly affected performance of Money Market Unit Trust Funds in Kenya. On the other hand, weight of bank, weight of corporate bonds and weight of equity had probability values of 0.926, 0.373 and 0.264 respectively that are all greater than 0.05 showing they had insignificant effect on performance of Unit Trust Funds in Kenya.

## 4.5 Discussion of the Findings

Both correlation and regression analysis were in agreement that weight of cash with probability values ranging between 0.000 and 0.05, weight of treasury bills had probability values ranging between 0.023 and 0.05, weight of T-bonds had probability values ranging between 0.000 and 0.05, weight of equity had probability values ranging between 0.000 and 0.05 and weight of commercial papers probability values ranging between 0.000 and 0.05 all significantly affected performance of Unit Trust Funds. These findings are consistent with Mwachanya (2015) who researched on the impact of asset allocation on the performance of pension schemes in Kenya and concluded that there is a relationship between asset allocation and the performance of pension schemes in Kenya

However, regression and correlation analysis differed on significance of weight of bank, weight of corporate bonds and weight of equity on performance of Unit Trust Funds. According to regression analysis, all these three factors were insignificant but correlation analysis revealed that the factors were significant. One would however expect equities to

have significant effect on performance of these unit funds. Sutcliffe (2004) noted that equities are not as appealing as they seem to have long term horizon for investors.

Correlation analysis established a strong negative and significant relationship between weight of cash and performance of Unit Trust Funds. This suggests that an increase in weight of cash in the fund reduces financial performance of the fund. Cash is an integral element of liquidity, but idle cash adds weight but not performance to the fund and hence reduces the return expected in the fund. According to (Low, 2017), a high level of liquidity gives the fund manager a bigger capacity to invest in more asset classes than a fund manager with low liquidity and will therefore have an impact on the return generated by the unit trust scheme.

# CHAPTER FIVE: SUMMARY, CONCUSION AND RECOMMENDATIONS

## 5.1 Introduction

A summary of the key findings of the study is clearly presented in this chapter. The conclusions are drawn from the summary of the findings. The conclusions are used to generate recommendations that have relevant implications on theory, policy and practice. The chapter also contains suggestions for further studies.

## 5.2 Summary of the Findings

The purpose of this study was to establish the effect of asset allocation on the performance of Unit Trust Funds in Kenya. More specifically, the study sought to establish how weight of cash in the fund, weight of bank deposits both fixed and call deposits, weight of treasury bills in the fund, weight of corporate bonds in the fund, weight of treasury bonds in the fund, weight of equity, weight of commercial paper in the fund affected performance of Unit Trust Funds in Kenya. A summary of the findings is indicated below.

### 5.2.1 Weight of Cash

From descriptive statistics, Weight of cash had a mean of 0.012, standard deviation of 0.018, Skewness of 1.660 and standard deviation of 1.788. From correlation analysis, the study established at Pearson correlation coefficient of -0.837 with probability value

ranging between 0.000 and 0.05; suggesting strong significant negative relationship between weight of cash and fund returns. This means that an increase in weight of cash reduces fund returns. From the findings of regression analysis, weight of cash had probability value ranging between 0.000 and 0.05 and therefore had significant effect on performance of Unit Trust Funds in Kenya.

### 5.2.2 Weight of Bank Deposit

The findings of descriptive statistics showed that Weight of bank deposit indicated a mean of 0.007 with standard deviation of 0.013, Skewness of 3.121 and Kurtosis of 12.036. From correlation analysis findings, the study documents a Pearson correlation of 0.250 with probability value ranging between 0.001 and 0.05, implying presence of a significant and positive relationship between weight of bank deposit and fund returns. From regression analysis, weight of bank deposit, had p values 0.926 showing it had an insignificant effect on performance of Unit Trust Funds in Kenya.

### 5.2.3 Weight of Treasury Bills

From the findings of descriptive statistics, Weight of T bills had a mean of 0.039, standard deviation of 0.036, Skewness of 2.796 and Kurtosis of 19.960. From correlation analysis, the study established that Treasury bills had Pearson correlation 0.421 with a probability value of 0.000, showing presence of a positive relationship between T-bills and fund returns. Regression analysis indicated that weight of treasury bills had probability values ranging between 0.023 and 0.05 showing that it significantly affected performance of Unit Trust Funds in Kenya.

### 5.2.4 Weight of Corporate Bonds

Descriptive statistics indicated that Weight of corporate bonds had a mean of 0.023, standard deviation of 0.028 Skewness of 1.640 and Kurtosis of 3.910. The findings of correlation analysis indicated that the value of correlation coefficient was 0.364 with p value $0.000 < 0.05$, an indication of moderate positive and significant relationship between corporate bonds and fund returns of unit trusts in Kenya. From regression analysis, weight of corporate bonds had p value 0.373 showing tit had insignificant effect on performance of Unit Trust Funds in Kenya.

### 5.2.5 Weight of Treasury Bonds

The findings of descriptive statistics showed that the Weight of treasury bonds had a mean of 0.019, standard deviation of 0.049, Skewness of 10.541 and Kurtosis of 124.560. Based on the correlation analysis, the study established a Pearson correlation coefficient of 0.225 with probability values ranging between 0.004 and 0.05. This signifies presence of positive significant relationship between weight of treasury bonds and fund return. From regression analysis, weight of T-bonds had probability values ranging between 0.000 and 0.05 showing it significantly affected performance of Unit Trust Funds in Kenya.

### 5.2.6 Weight of Equity

From descriptive statistics, the weight of equity had mean of 0.053 with standard deviation of 0.140, Skewness of 3.732 and Kurtosis of 134.303. Correlation analysis indicated that the weight of equity had Pearson correlation of 0.188 with p value of 0.017.

Therefore, there was a significant and positive relationship between weight of equity and fund returns of unit trust funds. This relationship is significant because probability values ranged between 0.017 and 0.05. The findings of regression analysis indicated that weight of equity had probability values ranging between 0.000 and 0.05 an indication that it had significant effect on performance of Unit Trust Funds in Kenya.

## 5.2.7 Weight of Commercial Paper

The findings of descriptive statistics indicated that the weight of commercial paper showed a mean of 0.017, standard deviation of 0.037, Skewness of 10.654 and Kurtosis of 126.220. As per correlation analysis, weight of commercial papers had Pearson correlation of 0.197 with probability values ranging between 0.013 and 0.05, an indication of weak positive significant relationship between weight of commercial papers and fund returns. Regression analysis indicated that a probability values ranging between 0.000 and 0.05, an indication that the factor had significant effect on performance of Unit Trust Funds in Kenya.

## 5.3 Conclusion

There is a strong significant negative relationship between weight of cash and performance of Unit Trust Funds in Kenya. Weight of cash in the fund significantly influences performance of mutual funds in Kenya. The higher the weight of cash the lower the yield or interest earned as cash in itself unless invested generates returns closer to zero or negative due to charges of holding the same. There is a significant and positive relationship between weight of bank deposit and financial performance of Unit Trust Funds in Kenya. Regression analysis contradicted correlation analysis where weight of

bank deposit had insignificant effect on performance of Unit Trust Funds in Kenya. There is a positive relationship between weight of T-bills and performance of Unit Trust Funds in Kenya.

There is a positive and significant relationship between corporate bonds and fund returns of Unit Trusts in Kenya. From regression analysis, weight of corporate bonds had a significant effect on performance of Unit Trust Funds in Kenya. There is a positive significant relationship between weight of treasury bonds and performance of Unit Trust Funds in Kenya. Weight of T-bonds had significant effect on performance of Unit Trust Funds in Kenya.

## 5.4 Recommendations

The Unit Trust Scheme Trustees in Kenya should strike a balance between amount of money held in cash and the one invested in other investments. This shall enhance liquidity positions of these funds. The top management of Unit Trust Funds in Kenya should keep sufficient amount of their investments in bank deposits as this is more profitable as compared to cash. Unit Trust Funds in Kenya should heavily invest in T-bills as they are less risky and more liquid relative to other forms of investments. This means that Unit Trust Fund Trustees should come up with tactical procedures of investment and document them to assist in balancing when allocating assets to the fund.

Listed firms should be encouraged to issue corporate bonds for Unit Trust Funds in Kenya to invest in and this will enhance the performance of the funds if the companies are being managed well and will also provide an investment diversification platform. The National Treasury need to lower the minimum amount required for investment in treasury

bonds to allow more Money Market Unit Trust Funds to participate and therefore enhancing their performance and increase deepening to clients with low income streams.

The CMA should simplify regulations of buying of equities from listed firms more specifically for Balanced and Equity Funds which shall grow their performance. Capital Markets Authority should create awareness through promotions and campaigns for more listed to issue commercial papers such that Unit Trust Funds in Kenya shall take up and this will enhance their performance. The authority should also enhance the flexibility of the investment guidelines but strike a regulatory balance between risk and return to enable funds invest innovatively. They should also seek advice from the market on the introduction of new and more robust securities that funds could invest in to increase diversity.

## 5.5 Limitations of the Study

Collection of secondary data was challenging as some of the researcher could not access financial statements of some Unit Trust Funds in Kenya either on their websites or the CMA website. To counter this, the researcher only relied on the available data to carry out the analysis. The researcher foresaw strictness and confidentiality of the data to be collected from these firms where it would be possible that some firms would not willingly give out their financial statements. However, this was avoided by substituting complementing the data from companies and the one published by CMA and the websites of respective Unit Trust funds.

The short time period allocated for the study due to unforeseen circumstances also provided a challenge to the researcher. An ample time period would have provided the

researcher with a window that would have enabled him reduce the response failure in terms of data collection. It would have also allowed the researcher to adequately apply most of the research techniques at his disposal to yield more information from the results generated. Despite this limitation the researcher managed to design a program that guided him in the short term period to collect and carry out an analysis on the data.

The research was limited to Unit Trust Funds in the local setting and has not touched on funds in the global setting. This provides a limitation because if the research was done on a global perspective it would have yielded more information on the impact of asset allocation and asset nature when Unit Trust or Mutual Funds invest their available capital to the classes of assets. A comparison between the local results and the global results could have provided more insight which would have led to solutions to the current investment challenges by Unit Trust Funds.

## 5.6 Suggestions for Further Research

Regression analysis showed an R squared of 79.2% showing that weight of cash in the fund, weight of bank deposits both fixed and call deposits, weight of treasury bills in the fund, weight of corporate bonds in the fund, weight of treasury bonds in the fund, weight of equity, weight of commercial paper in the fund only contribute to 79.2% change in performance of Money Market Unit Trust Funds in Kenya; future scholars should study these other factors that account for the remaining 20.8%.

Further research should be conducted on a global platform to enable the generation of more findings that would give a much clearer perspective on the findings and how a fund that invests both onshore and offshore should capitalize on assets available to properly

manage risk and return. This will also act as an eye opener to more researchers and will spur more studies into the area on a global setting and the findings will go a long way in assisting Unit Trust Fund Trustees when it comes to investment decisions.

A research on the area of study requires adequate timelines when it comes to data collection and analysis. This is because both descriptive and inferential analysis using various techniques will be applied in generating information that will guide the researcher when drawing his conclusion. Time is important as it will enable the researcher to carry out the analysis using more techniques and more time to interpret the results generated and draw a more informed conclusion on the study.

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**APPENDIX 1: LIST OF UNIT TRUST FUNDS AS AT 31ST DEC 2016**

|  | **LIST OF UNIT TRUST FUNDS AS AT 31ST DEC 2016** |
|----|----|
| 1 | African Alliance Kenya Shilling Fund |
| 2 | African Alliance Kenya Fixed Income Fund |
| 3 | African Alliance Kenya Managed Fund |
| 4 | African Alliance Kenya Equity Fund |
| 5 | British American Money Market Fund |
| 6 | British American Income Fund |
| 7 | British American Balanced Fund |
| 8 | British American Equity Fund |
| 9 | Stanlib Money Market Fund |
| 10 | Stanlib Fixed Income Fund |
| 11 | Stablib Managed Prudential Fund |
| 12 | Stanlib Equity Fund |
| 13 | Stanlib Balanced Fund |

| 14 | Commercial Bank of Africa Money Market Fund |
|----|---------------------------------------------|
| 15 | Commercial Bank of Africa Equity Fund |
| 16 | CIC Money Market Fund |
| 17 | CIC Balanced Fund |
| 18 | CIC Fixed Income Fund |
| 19 | CIC Equity Fund |
| 20 | Zimele Unit Trust Balanced Fund |
| 21 | Zimele Unit Trust Money Market Fund |
| 22 | ICEA Money Market Fund |
| 23 | ICEA Equity Fund |
| 24 | ICEA Growth Fund |
| 25 | ICEA Bond Fund |
| 26 | Standard Investment Equity Growth Fund |
| 27 | Standard Investment Fixed Income Fund |
| 28 | Standard Investment Balanced Fund |
| 29 | Madison Asset Equity Fund |

| | |
|---|---|
| 30 | Madison Asset Balanced Fund |
| 31 | Madison Asset Money Market Fund |
| 32 | Madison Asset Treasury Bill Fund |
| 33 | Madison Asset Bond Fund |
| 34 | Dyer and Blair Diversified Fund |
| 35 | Dyer and Blair Bond Fund |
| 36 | Dyer and Blair Money Market Fund |
| 37 | Dyer and Blair Equity Fund |
| 38 | Amana Money Market Fund |
| 39 | Amana Balanced Fund |
| 40 | Amana Growth Fund |
| 41 | Old Mutual Equity Fund |
| 42 | Old Mutual Money Market Fund |
| 43 | Old Mutual Balanced Fund |
| 44 | Old Mutual East Africa Fund |
| 45 | Old Mutual Bond Fund |

**APPENDIX 2: DATA COLLECTED FOR ANALYSIS**

| Weight of Equity | Weight of Corporate Bonds | Weight of cash | Weight of T bonds | Weight of Bank Deposits | Weight of T bills | Weight of commercial paper | E(R) |
|---|---|---|---|---|---|---|---|
| 0.69 | 0.15 | 0 | 0.6 | 0.09 | 0 | 0.46 | 0.81 |
| 0.69 | 0.15 | 0 | 0.1 | 0.06 | 0.32 | 0.08 | 0.29 |
| 0.69 | 0.09 | 0 | 0.07 | 0.05 | 0.11 | 0.06 | 0.06 |
| 0.69 | 0.09 | 0 | 0.07 | 0.05 | 0.1 | 0.05 | 0.01 |
| 0.67 | 0.09 | 0 | 0.06 | 0.05 | 0.09 | 0.05 | -0.23 |
| 0.58 | 0.09 | 0 | 0.05 | 0.05 | 0.09 | 0.04 | -0.26 |
| 0.55 | 0.09 | 0 | 0.05 | 0.04 | 0.08 | 0.04 | -0.36 |
| 0.51 | 0.08 | 0 | 0.05 | 0.04 | 0.08 | 0.04 | -0.47 |
| 0.27 | 0.06 | 0 | 0.05 | 0.04 | 0.08 | 0.03 | -0.5 |
| 0.22 | 0.06 | 0 | 0.05 | 0.04 | 0.08 | 0.03 | -0.52 |
| 0.22 | 0.06 | 0 | 0.04 | 0.03 | 0.08 | 0.03 | -0.58 |
| 0.15 | 0.06 | 0 | 0.04 | 0.02 | 0.08 | 0.03 | -0.66 |
| 0.13 | 0.06 | 0 | 0.04 | 0.02 | 0.08 | 0.03 | -0.7 |
| 0.13 | 0.05 | 0 | 0.04 | 0.02 | 0.08 | 0.03 | -0.89 |

| 0.13 | 0.05 | 0 | 0.04 | 0.02 | 0.08 | 0.03 | -0.95 |
|------|------|---|------|------|------|------|-------|
| 0.13 | 0.05 | 0 | 0.04 | 0.02 | 0.08 | 0.03 | -1 |
| 0.1 | 0.05 | 0 | 0.03 | 0.02 | 0.08 | 0.03 | -1.07 |
| 0.1 | 0.05 | 0 | 0.03 | 0.02 | 0.08 | 0.03 | -1.11 |
| 0.09 | 0.05 | 0 | 0.03 | 0.02 | 0.07 | 0.03 | -1.18 |
| 0.09 | 0.05 | 0 | 0.03 | 0.01 | 0.07 | 0.03 | -1.19 |
| 0.08 | 0.05 | 0 | 0.03 | 0.01 | 0.07 | 0.03 | -1.2 |
| 0.08 | 0.05 | 0 | 0.03 | 0.01 | 0.07 | 0.03 | -1.29 |
| 0.07 | 0.05 | 0 | 0.03 | 0.01 | 0.07 | 0.02 | -1.32 |
| 0.06 | 0.05 | 0 | 0.03 | 0.01 | 0.07 | 0.02 | -1.42 |
| 0.06 | 0.05 | 0 | 0.03 | 0.01 | 0.07 | 0.02 | -1.53 |
| 0.06 | 0.05 | 0 | 0.03 | 0.01 | 0.07 | 0.02 | -1.53 |
| 0.06 | 0.05 | 0 | 0.03 | 0.01 | 0.07 | 0.02 | -1.55 |
| 0.05 | 0.05 | 0 | 0.03 | 0.01 | 0.07 | 0.02 | -1.56 |
| 0.04 | 0.05 | 0 | 0.03 | 0.01 | 0.07 | 0.02 | -1.58 |
| 0.04 | 0.05 | 0 | 0.03 | 0.01 | 0.07 | 0.02 | -1.61 |
| 0.04 | 0.05 | 0 | 0.03 | 0.01 | 0.07 | 0.02 | -1.61 |
| 0.04 | 0.05 | 0 | 0.03 | 0.01 | 0.07 | 0.02 | -1.63 |
| 0.04 | 0.05 | 0 | 0.03 | 0.01 | 0.07 | 0.02 | -1.64 |
| 0.04 | 0.05 | 0 | 0.03 | 0.01 | 0.07 | 0.02 | -1.68 |
| 0.04 | 0.05 | 0 | 0.02 | 0.01 | 0.06 | 0.02 | -1.69 |
| 0.04 | 0.05 | 0 | 0.02 | 0.01 | 0.06 | 0.02 | -1.73 |
| 0.04 | 0.05 | 0 | 0.02 | 0.01 | 0.06 | 0.02 | -1.76 |

| | | | | | | | |
|------|------|---|------|------|------|------|-------|
| 0.03 | 0.05 | 0 | 0.02 | 0.01 | 0.06 | 0.02 | -1.77 |
| 0.03 | 0.05 | 0 | 0.02 | 0.01 | 0.06 | 0.02 | -1.8 |
| 0.03 | 0.05 | 0 | 0.02 | 0.01 | 0.06 | 0.02 | -1.87 |
| 0.03 | 0.05 | 0 | 0.02 | 0.01 | 0.06 | 0.02 | -1.87 |
| 0.03 | 0.05 | 0 | 0.02 | 0.01 | 0.06 | 0.02 | -1.92 |
| 0.03 | 0.05 | 0 | 0.02 | 0.01 | 0.06 | 0.02 | -1.93 |
| 0.03 | 0.04 | 0 | 0.02 | 0.01 | 0.06 | 0.02 | -1.94 |
| 0.02 | 0.04 | 0 | 0.02 | 0.01 | 0.06 | 0.02 | -1.95 |
| 0.02 | 0.04 | 0 | 0.02 | 0.01 | 0.06 | 0.02 | -1.97 |
| 0.02 | 0.04 | 0 | 0.02 | 0.01 | 0.06 | 0.02 | -1.97 |
| 0.02 | 0.04 | 0 | 0.02 | 0.01 | 0.06 | 0.02 | -1.99 |
| 0.02 | 0.03 | 0 | 0.02 | 0.01 | 0.06 | 0.02 | -2.02 |
| 0.02 | 0.03 | 0 | 0.02 | 0.01 | 0.06 | 0.02 | -2.02 |
| 0.02 | 0.03 | 0 | 0.02 | 0.01 | 0.06 | 0.02 | -2.02 |
| 0.02 | 0.03 | 0 | 0.02 | 0.01 | 0.06 | 0.02 | -2.14 |
| 0.02 | 0.03 | 0 | 0.02 | 0.01 | 0.06 | 0.02 | -2.18 |
| 0.01 | 0.03 | 0 | 0.02 | 0.01 | 0.06 | 0.02 | -2.25 |
| 0.01 | 0.03 | 0 | 0.02 | 0.01 | 0.06 | 0.02 | -2.26 |
| 0.01 | 0.03 | 0 | 0.02 | 0.01 | 0.06 | 0.02 | -2.27 |
| 0.01 | 0.03 | 0 | 0.02 | 0.01 | 0.06 | 0.02 | -2.32 |
| 0.01 | 0.03 | 0 | 0.02 | 0.01 | 0.06 | 0.02 | -2.39 |
| 0.01 | 0.03 | 0 | 0.02 | 0.01 | 0.06 | 0.02 | -2.42 |
| 0.01 | 0.03 | 0 | 0.02 | 0.01 | 0.05 | 0.02 | -2.43 |

| 0.01 | 0.03 | 0 | 0.02 | 0.01 | 0.05 | 0.02 | -2.45 |
|------|------|---|------|------|------|------|-------|
| 0.01 | 0.03 | 0 | 0.02 | 0 | 0.05 | 0.02 | -2.54 |
| 0.01 | 0.03 | 0 | 0.02 | 0 | 0.05 | 0.02 | -2.55 |
| 0.01 | 0.02 | 0 | 0.02 | 0 | 0.05 | 0.02 | -2.57 |
| 0.01 | 0.02 | 0 | 0.02 | 0 | 0.05 | 0.02 | -2.77 |
| 0.01 | 0.02 | 0 | 0.02 | 0 | 0.05 | 0.02 | -2.91 |
| 0.01 | 0.02 | 0 | 0.02 | 0 | 0.05 | 0.02 | -2.97 |
| 0.01 | 0.02 | 0 | 0.02 | 0 | 0.05 | 0.02 | -2.97 |
| 0.01 | 0.02 | 0 | 0.02 | 0 | 0.05 | 0.02 | -2.97 |
| 0.01 | 0.02 | 0 | 0.02 | 0 | 0.05 | 0.02 | -3.02 |
| 0.01 | 0.02 | 0 | 0.02 | 0 | 0.05 | 0.02 | -3.08 |
| 0.01 | 0.02 | 0 | 0.01 | 0 | 0.05 | 0.02 | -3.08 |
| 0.01 | 0.02 | 0 | 0.01 | 0 | 0.05 | 0.02 | -3.18 |
| 0.01 | 0.01 | 0 | 0.01 | 0 | 0.05 | 0.01 | -3.25 |
| 0.01 | 0.01 | 0 | 0.01 | 0 | 0.05 | 0.01 | -3.27 |
| 0.01 | 0.01 | 0 | 0.01 | 0 | 0.05 | 0.01 | -3.27 |
| 0.01 | 0.01 | 0 | 0.01 | 0 | 0.04 | 0.01 | -3.31 |
| 0.01 | 0.01 | 0 | 0.01 | 0 | 0.04 | 0.01 | -3.32 |
| 0.01 | 0.01 | 0 | 0.01 | 0 | 0.04 | 0.01 | -3.34 |
| 0.01 | 0.01 | 0 | 0.01 | 0 | 0.04 | 0.01 | -3.35 |
| 0.01 | 0.01 | 0 | 0.01 | 0 | 0.04 | 0.01 | -3.37 |
| 0.01 | 0.01 | 0 | 0.01 | 0 | 0.04 | 0.01 | -3.42 |
| 0.01 | 0.01 | 0 | 0.01 | 0 | 0.04 | 0.01 | -3.45 |

| | | | | | | | |
|------|------|------|------|---|------|------|-------|
| 0.01 | 0.01 | 0    | 0.01 | 0 | 0.04 | 0.01 | -3.47 |
| 0.01 | 0.01 | 0    | 0.01 | 0 | 0.04 | 0.01 | -3.57 |
| 0.01 | 0.01 | 0    | 0.01 | 0 | 0.03 | 0.01 | -3.61 |
| 0.01 | 0.01 | 0    | 0.01 | 0 | 0.03 | 0.01 | -3.67 |
| 0.01 | 0.01 | 0    | 0.01 | 0 | 0.03 | 0.01 | -3.7  |
| 0.01 | 0.01 | 0    | 0.01 | 0 | 0.03 | 0.01 | -3.71 |
| 0.01 | 0.01 | 0    | 0.01 | 0 | 0.03 | 0.01 | -3.79 |
| 0.01 | 0.01 | 0    | 0.01 | 0 | 0.03 | 0.01 | -3.8  |
| 0.01 | 0.01 | 0    | 0.01 | 0 | 0.03 | 0.01 | -3.87 |
| 0.01 | 0.01 | 0    | 0.01 | 0 | 0.03 | 0.01 | -3.87 |
| 0    | 0.01 | 0    | 0.01 | 0 | 0.03 | 0.01 | -3.9  |
| 0    | 0.01 | 0    | 0.01 | 0 | 0.03 | 0.01 | -3.93 |
| 0    | 0.01 | 0    | 0.01 | 0 | 0.03 | 0.01 | -3.93 |
| 0    | 0.01 | 0.01 | 0.01 | 0 | 0.03 | 0.01 | -3.94 |
| 0    | 0.01 | 0.01 | 0.01 | 0 | 0.03 | 0.01 | -4.01 |
| 0    | 0    | 0.01 | 0.01 | 0 | 0.03 | 0.01 | -4.13 |
| 0    | 0    | 0.01 | 0.01 | 0 | 0.02 | 0.01 | -4.24 |
| 0    | 0    | 0.01 | 0.01 | 0 | 0.02 | 0.01 | -4.27 |
| 0    | 0    | 0.01 | 0.01 | 0 | 0.02 | 0.01 | -4.3  |
| 0    | 0    | 0.01 | 0.01 | 0 | 0.02 | 0.01 | -4.44 |
| 0    | 0    | 0.01 | 0.01 | 0 | 0.02 | 0.01 | -4.44 |
| 0    | 0    | 0.01 | 0.01 | 0 | 0.02 | 0.01 | -4.51 |
| 0    | 0    | 0.01 | 0.01 | 0 | 0.02 | 0.01 | -4.54 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 0 | 0 | 0.01 | 0.01 | 0 | 0.02 | 0.01 | -4.54 |
| 0 | 0 | 0.01 | 0.01 | 0 | 0.02 | 0.01 | -4.55 |
| 0 | 0 | 0.01 | 0.01 | 0 | 0.02 | 0.01 | -4.76 |
| 0 | 0 | 0.01 | 0.01 | 0 | 0.02 | 0.01 | -4.76 |
| 0 | 0 | 0.01 | 0.01 | 0 | 0.02 | 0.01 | -4.93 |
| 0 | 0 | 0.01 | 0.01 | 0 | 0.02 | 0.01 | -4.94 |
| 0 | 0 | 0.01 | 0.01 | 0 | 0.02 | 0.01 | -5.05 |
| 0 | 0 | 0.01 | 0.01 | 0 | 0.02 | 0.01 | -5.1 |
| 0 | 0 | 0.01 | 0.01 | 0 | 0.01 | 0.01 | -5.35 |
| 0 | 0 | 0.01 | 0.01 | 0 | 0.01 | 0.01 | -5.55 |
| 0 | 0 | 0.01 | 0.01 | 0 | 0.01 | 0.01 | -5.81 |
| 0 | 0 | 0.01 | 0.01 | 0 | 0.01 | 0.01 | -5.85 |
| 0 | 0 | 0.01 | 0.01 | 0 | 0.01 | 0.01 | -6.09 |
| 0 | 0 | 0.01 | 0 | 0 | 0.01 | 0.01 | -6.1 |
| 0 | 0 | 0.01 | 0 | 0 | 0.01 | 0.01 | -6.54 |
| 0 | 0 | 0.02 | 0 | 0 | 0 | 0.01 | -6.6 |
| 0 | 0 | 0.02 | 0 | 0 | 0 | 0.01 | -6.77 |
| 0 | 0 | 0.02 | 0 | 0 | 0 | 0.01 | -7.01 |
| 0 | 0 | 0.02 | 0 | 0 | 0 | 0 | -7.21 |
| 0 | 0 | 0.02 | 0 | 0 | 0 | 0 | -7.25 |
| 0 | 0 | 0.02 | 0 | 0 | 0 | 0 | -7.52 |
| 0 | 0 | 0.02 | 0 | 0 | 0 | 0 | -7.58 |
| 0 | 0 | 0.03 | 0 | 0 | 0 | 0 | -7.69 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 0 | 0 | 0.03 | 0 | 0 | 0 | 0 | -7.79 |
| 0 | 0 | 0.03 | 0 | 0 | 0 | 0 | -7.94 |
| 0 | 0 | 0.03 | 0 | 0 | 0 | 0 | -8.8 |
| 0 | 0 | 0.03 | 0 | 0 | 0 | 0 | -8.88 |
| 0 | 0 | 0.03 | 0 | 0 | 0 | 0 | -10.22 |
| 0 | 0 | 0.03 | 0 | 0 | 0 | 0 | -10.25 |
| 0 | 0 | 0.03 | 0 | 0 | 0 | 0 | -10.98 |
| 0 | 0 | 0.03 | 0 | 0 | 0 | 0 | -12.12 |
| 0 | 0 | 0.03 | 0 | 0 | 0 | 0 | -13.42 |
| 0 | 0 | 0.03 | 0 | 0 | 0 | 0 | -13.67 |
| 0 | 0 | 0.04 | 0 | 0 | 0 | 0 | -13.81 |
| 0 | 0 | 0.04 | 0 | 0 | 0 | 0 | -14.51 |
| 0 | 0 | 0.04 | 0 | 0 | 0 | 0 | -15.54 |
| 0 | 0 | 0.04 | 0 | 0 | 0 | 0 | -15.99 |
| 0 | 0 | 0.04 | 0 | 0 | 0 | 0 | -16.34 |
| 0 | 0 | 0.05 | 0 | 0 | 0 | 0 | -17.04 |
| 0 | 0 | 0.05 | 0 | 0 | 0 | 0 | -19.22 |
| 0 | 0 | 0.05 | 0 | 0 | 0 | 0 | -19.65 |
| 0 | 0 | 0.05 | 0 | 0 | 0 | 0 | -21.19 |
| 0 | 0 | 0.05 | 0 | 0 | 0 | 0 | -21.51 |
| 0 | 0 | 0.05 | 0 | 0 | 0 | 0 | -30.7 |
| 0 | 0 | 0.05 | 0 | 0 | 0 | 0 | -31.62 |
| 0 | 0 | 0.05 | 0 | 0 | 0 | 0 | -31.64 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 0 | 0 | 0.05 | 0 | 0 | 0 | 0 | -36.29 |
| 0 | 0 | 0.05 | 0 | 0 | 0 | 0 | -41.36 |
| 0 | 0 | 0.06 | 0 | 0 | 0 | 0 | -44.02 |
| 0 | 0 | 0.06 | 0 | 0 | 0 | 0 | -49.77 |
| 0 | 0 | 0.06 | 0 | 0 | 0 | 0 | -52.98 |
| 0 | 0 | 0.06 | 0 | 0 | 0 | 0 | -74.12 |
| 0 | 0 | 0.07 | 0 | 0 | 0 | 0 | -76.74 |
| 0 | 0 | 0.08 | -0.05 | 0 | 0.01 | 0 | -116.39 |