STOCK MARKET ANOMALIES AND MOMENTUM STRATEGIES ON THE MALAWI STOCK EXCHANGE

MASTER OF ARTS (ECONOMICS)

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UNIVERSITY OF MALAWI
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By

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DECLARATION

I, the undersigned, hereby declare that this thesis is my original work and has not been submitted to any other institution for similar purposes. Where other people's work has been used acknowledgements have been made.

THOKOZANI MAXIN SAULOSI

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Name

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Signature

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Date

CERTIFICATE OF APPROVAL

The undersigned certify that this thesis represents the student's own work and effort and has been submitted with my approval.

Signature: _____Date:_____

Ben Kaluwa, PhD (Professor of Economics)

Main Supervisor

Signature: _____Date:_____

Innocent Makuta (Lecturer in Economics)

Second Supervisor

DEDICATION

To my family

ACKNOWLEDGEMENTS

A candle loses nothing by lighting another candle. (Unknown)

Memories of the path I have travelled to this destination make me realise now more than ever before that I am much indebted to many who inspired me and brought me to the point I am. I can but only express my gratitude.

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While any credit due to this work must be duly shared, to me belongs the entire shortcoming herein.

ABSTRACT

This paper uses asset pricing models to analyze whether the nascent Malawi stock exchange exhibits calendar anomalies and whether returns are influenced by factors investigated in mature and more sophisticated markets. The findings are that there exist a positive Tuesday and Thursday, day of the week effect on returns at the market level but with the lowest risks. However, when controlled for the size effect and the value premium as per the Fama and French (1993) three-factor model, it was found that the day of the week effect disappears. Rather than the usual January effect, May has a stronger effect in terms of month of the year effect. The possible profit opportunities on the SEM in terms of both economic and statistical significance are also investigated and how robust these strategies are after controlling for size and value.Strong momentum profits were found to be associated with small market capitalization portfolios as well as high book equity to market equity. The momentum factor was also statistically significant when considering momentum portfolios, in addition to the size effect and value premium. However, the explanatory power of the momentum factor does not dominate that of size and value.

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LIST OF ACRONYMS AND ABBREVIATIONS

ASEA	African Securities Exchange Association
BE	Book Equity
CAPM	Capital Asset Pricing Model
CDH	Continental Discount House
CoSSE	Committee of SADC Stock Exchanges
DSI	Domestic Share Index
EMH	Efficient Market Hypothesis
FDH	First Discount House
FIP	Finance and Investment Protocol
FSI	Foreign Share Index
HML	High Minus Low
MASI	Malawi All Share Index
ME	Market Equity
MSE	Malawi Stock Exchange
MSE ACM	Malawi Stock Exchange Alternative Capital Market
NBS	New Building Society
NICO	National Insurance Companny
PIM	Packaging Industries Limited
SADC	Southern African Development Community
SMB	Small Minus Big

CHAPTER ONE

INTRODUCTION

1.1 Background

The efficiency of the Stock market is important in understanding the dynamics of capital markets particularly in developing stock markets such as Malawi. The efficiency of the developing stock markets is of great importance as the trends of investments are accelerating in these markets as a result of regulatory reforms and removal of other barriers for the international equity investments (Levine & Zervous, 1998). The Efficient market hypothesis suggests that stock prices should reflect the impact of all available private and public information on the value of the firm which means no investor can make profit above the market by taking advantage of this information (Fama, 1970). Thus, stock prices should follow a random walk which is the notion that stock price changes are random and unpredictable (Kendall, 1953).

However, empirical results of the existence of anomalies seem to be inconsistent with maintained theories of asset pricing behavior which run on the assumption of market efficiency. Anomalies either indicate profit opportunities (market inefficiency) or inadequacies in the underlying asset pricing model (Schwert, 2001). Tversky & Kahneman (1986) stated that:

> An anomaly is a deviation from the presently accepted paradigms that is too widespread to be ignored, too systematic to be dismissed as random error and too fundamental to be accommodated by relaxing the normative system.

In standard financial theory, a financial market anomaly is a situation in which the performance of a stock or a group of stocks deviate(s) from the assumptions of efficient market hypotheses (Latif, et al., 2011). Calendar effects are one of the broadly known anomalies (Kleidon, 1986). Calendar effects consisting of the day of the week effect, January effect, the trading month effect, and holiday effect in stock exchange markets have puzzled financial economists for years. Internationally, French (1980) , Cross (1973) and Rogalski (1984) have empirically shown the existence of the day of the week effect, while Ayadi, (1998) and Chukwuogor (2008),demonstrate the presence of the day of the week effect in African stock market returns.

Momentum effect is another form of a stock market anomaly present in capital markets which is difficult to explain using the context of traditional price paradigms. The momentum effect is generally defined as a positive correlation between return of a stock in a certain period with its lagged return (Jegadeesh & Titman, 1993,1995). Thus, a momentum strategy involves buying past winners and selling past losers. This is manifested in the case of shares that have high earnings (returns) over a period between 3 and 12 months, and in the following period earn higher than average returns. This situation also applies in the opposite case, where shares that have earned lowest returns in the one period continue to earn lower than average returns in the next period. Medium-term profit “momentum” was first reported by Jegadeesh and Titman (1993, 1995).

However, it had been criticized by many as the product of data snooping process since its first appearance as an anomaly. However, Grundy and Martin (2001) documented that momentum profits are remarkably stable across sub-periods post 1926 which nullifies the data snooping arguments.

Schwert (2001), Kohers et al. (2004) and Hui (2005) argue that since its first documentation in the 1980s, these market anomalies seem to have disappeared, or at least weakened substantially, in developed stock markets. However, there are very few studies documenting the existence of such anomalies in the developing stock markets. This paper investigates the presence of anomalies (the day of the week effect, month effect) and momentums in the context of a least developed stock market such been the Malawi stock exchange market.

1.2 Problem Statement

Since the inauguration of the Malawi Stock Exchange (MSE), researchers have tried to find whether the stock market is efficient or not (Simons & Laryea,2006: Alliance Capital Limited, 2011: Kampanje, 2012). If the market is not efficient, stock market anomalies will exist in the market, which some investors will exploit and gain some abnormal returns by using well planned market strategies. This effectively diminishes the confidence of the participants in the stock market as a tangible investment vehicle and thus limiting its prospects for growth.

However, asserting the efficiency of the Malawi stock market is a challenge. On one hand, some studies found that the Malawi stock Market depicts the weak form of market

efficiency (Stockbrokers Malawi Limited (2010:6), and Alliance Capital Limited (2011)). This was attributed to the market having some dominant players who buy and sell shares in large chunks and hence depicting signs of weak form of market efficiency (Alliance Capital Limited ,2011).

On the other hand Ntim et al (2011) and Kampanje (2012) found that the Malawi Stock Exchange market is inefficient even in the weak form of market efficiency. An upsurge in the prices of certain stocks in the absence of any major announcements or public information that raises the specter of insider trading as there may be parties that are privy to privileged information and either deliberately or inadvertently passes on this information to other players in the market. This is against a backdrop that price increases should be as the result of market-wide demand and not a small number of buyers pushing large volumes of the stock. This proves to be a risk to well informed investors who by using simulation or sensitivity analysis tools to know the best times to invest or disinvest may not be able to do so because of market inefficiencies.

However, previous studies have not shown the nature and sources of such stock market inefficiencies and they lack statistical analysis of the Malawian Capital Market trends. Ascertaining the nature and sources of these market inefficiencies is important for strategy development in order to improve the performance of the on the stock market which will lead to growth of the stock market. Thus, the study therefore investigates whether market anomalies and momentum strategies exist on the MSE and how they affect returns.

1.3 Objectives of the study

1.3.1 General Objective

The main objective of the study is to analyze whether stock market anomalies and momentum strategies exist on the MSE.

1.3.2Specific Objectives

The specific objectives of the study are to:

- Analyze whether stock market anomalies; day of the week effects and other calendar (January) effects, are present on MSE.
- Analyze possible profit opportunities (momentum strategies) on the MSE.
- Analyze investment strategies based on momentum in returns on the MSE.

1.4 Hypotheses tested

To achieve the above stated objectives, the following hypotheses will be tested:

- Stock market anomalies do not exist on the MSE
- Momentum strategies are not present on the MSE
- Investment strategies based on the momentum in returns are not present on the MSE.

1.5 Justification

Study of the stock market anomalies and strategic momentum is necessary in several ways. Firstly, studies done in Malawi are done on the efficiency of the stock market but studies done to ascertain the nature of those market inefficiencies do not exist, thus this study will bridge the gap in knowledge on the nature and sources of market inefficiencies in Malawi. Secondly, theory suggests that small capital markets should be inefficient due to small size, market restrictions and a handful of listed companies unlike big markets that have no or little market restrictions, lots of participants and a lot of listed companies. This study seeks to prove this theory by studying the Malawi stock Exchange as it fits in the small capital markets description. The study will also provide valuable insight for market participants, regulators and policy makers by investigating the market anomalies and momentum strategies by applying both mean and variance specifications for a less developed stock market. Lastly, the study will be valuable to investment managers, portfolio managers, arbitrageurs and the investment public at large. The research will demonstrate how the results can be useful to them in adjusting their trading strategies. The study will show how to profit from seasonal and other anomalies if they exist. In a developing stock market of Malawi, it is important to see whether there are certain patterns which can be exploited by investors.

1.6 Organization of the study

The rest of the study is organized in five chapters. Chapter two gives an overview of the Malawi Stock Exchange Market. Chapter three reviews the relevant literature whereby market anomalies are discussed from a theoretical perspective and the major empirical studies on Stock market anomalies relevant to this study are discussed. Chapter four describes the methodology in which two financial models will be used as specified by Bundoo, S, K (2011) but with some modifications in accordance with data availability and the reviewed literature. Chapter five presents and discusses the empirical results.

It gives the interpretation of the results obtained from the econometric and statistical tests. Finally, Chapter six provides the policy implications of the results obtained, as well as the concluding remarks, and the limitation of the study.

CHAPTER TWO

THE MALAWI STOCK EXCHANGE MARKET

2.1 Introduction

This chapter provides a brief background on the Malawi Stock Exchange and the context in which the study is been conducted. The chapter will cover the origin and objectives of the Malawi stock exchange. In addition, it will look into the counters, listing dates and trading systems among other salient features. The information in this chapter is sourced from various reports by the Malawi Stock Exchange, Reserve Bank, Asset Management firms in Malawi and Kampanje, 2012.

2.2 Background of the Malawi Stock Exchange Market

Approximately two-thirds of African stock markets emerged in the late 1980s and early 1990s (Mlambo & Biekpe, 2001). The Stock Exchange of Malawi was inaugurated in March 1995 but began trading in November 1996, after the listing of Malawi's largest insurance firm, NICO Holdings Limited, under the aegis of the Reserve Bank of Malawi, with 2300 Malawian citizens buying shares. Before the listing of the first company, the major activities that were being undertaken were the provision of a facility for secondary market trading in Malawi Government securities which included Treasury Notes and Local Registered Stock. The other reason of the establishment of stock exchanges in

African inclusive of the Malawi Stock exchange was to serve as a vessel through which government would privatize government owned companies to the public (Moss, 2004).

African stock exchanges are the smallest in the world in terms of both number of listed stocks and market capitalisation (see Appendix 21). The largest African stock market in terms of market capitalisation is the JSE. The market capitalisation of the JSE is ten times the combined capitalisation of the rest of Africa's stock markets and over 100 times their average. Of the more than 2 000 firms listed on Africa's stock exchanges, the majority are listed on Egypt's Cairo and Alexandria Stock Exchanges (CASE).

There has been an increase in market capitalization on the MSE and this is mainly due to an increase in number of firms listed on the MSE and also increase in the prices of shares. Market capitalization has increased since 1996 to 2015 (Figure 1). An increase in market capitalization of MK1, 120,358.45 (US$9,051.16 million) was noted in 2005 which increased to MK251, 447.07 million (US$1,788.39million) in 2008 but dropped to MK3, 562,267.61 (US$10,570.5270Million) in 2012. This was due to the delisting of Packaging Industries Malawi in 2011. The number of shares outstanding reduced due to the delisting thus prompted the reduction in market capitalization.

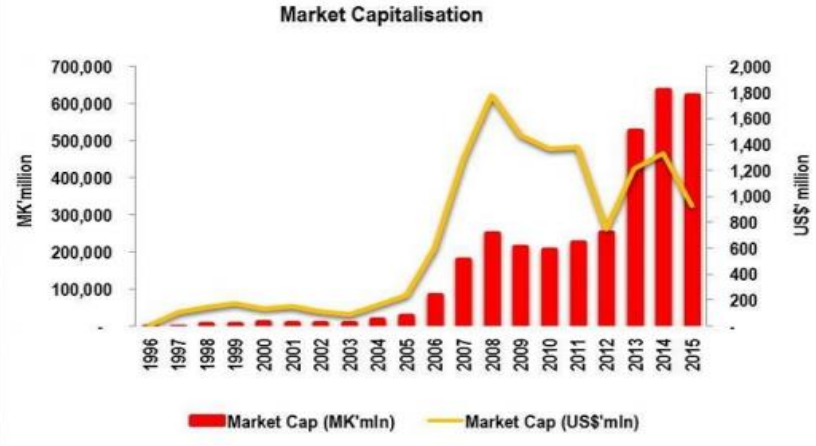

Figure 1: Market Capitalization on the MSE (1996-2015)
Source: MSE

Since the inauguration, the exchange has listed a total of 15 companies with two companies delisting from the exchange. Currently, there are 13 listed companies on the stock exchange of Malawi after the delisting of Packaging Industries Malawi Ltd (PIM) in 2011. Old mutual, however, is the only foreign originated company on the exchange market. The Malawi stock exchange market is dominated by financial institutions (Table 1)

Listed companies on the MSE

Table 1: Listed Companies on the Malawi Stock Exchange Market

Company	Code	Sector	Date listed	Listing Price (Mk)
AGRICULTURE AND MANUFACTURING				
Illovo Sugar Malawi	ILLOVO	Manufacturing	Nov-97	2.25
REAL ESTATE				
Malawi Prop Inv. Co. Ltd	MPICO	Property	Nov-07	2.25
HOSPITALITY				
Blantyre Hotels	BHL	Hospitality	Mar-97	0.84
Sunbird Tourism Ltd	SUNBIRD	Hospitality	Dec-00	1.85
BANKING				
Standard Bank	STANDARD	Banking	Jun-98	3.25
National Bank of Malawi	NBM	Banking	Aug-00	4.00
First Merchant Bank	FMB	Banking	Jun-06	2.50
NBS Bank Ltd	NBS	Banking	Jun-07	2.60
INSURANCE AND INVESTMENTS				
Nico Holdings	NICO	Insurance and banking	Nov-96	2.00

Old Mutual	OML	Insurance and Banking	Jul-99	79.56
CONGLOMERATE				
Press Corporation Ltd	PCL	Food manufacturing, Trading Property & Banking	Sep-98	14.89
INVESTMENT TRUST				
National Investment Trust Ltd	NITL	Insurance and Banking	Mar-05	2.65
TELECOMMUNICATION				
Telekom Networks Malawi	TNM	Communication	Nov-08	2.00

Source: MSE 2015

The holders of the Malawi Stock Exchange market include the Reserve Bank of Malawi and the Malawi Government. The stock exchange has four stock-broking companies in operation which consist of Stockbrokers Malawi Limited; FDH stockbrokers; African Alliance Securities Limited and CDH Stockbrokers Limited.

Indices on the MSE

Three indices are used on the MSE. The Malawi All Share Index (MASI), which is the barometer that measures the average price movement of all counters, the Domestic Share Index (DSI) which measures the average price movements of all local registered companies on the MSE and the Foreign Share Index (FSI) which measures the prices movements of all foreign owned companies. The MASI has increased since 1996 to 2015. It can be observed from the figure 1 that there has been an increase in the MASI which is partly due to an increase in the number of companies listed on the exchange. Increases in price movements on the MSE of individual companies also have led to an increase in the MASI. This shows that there is an improvement in the performance of the Malawi stock exchange but the market is still relatively small.

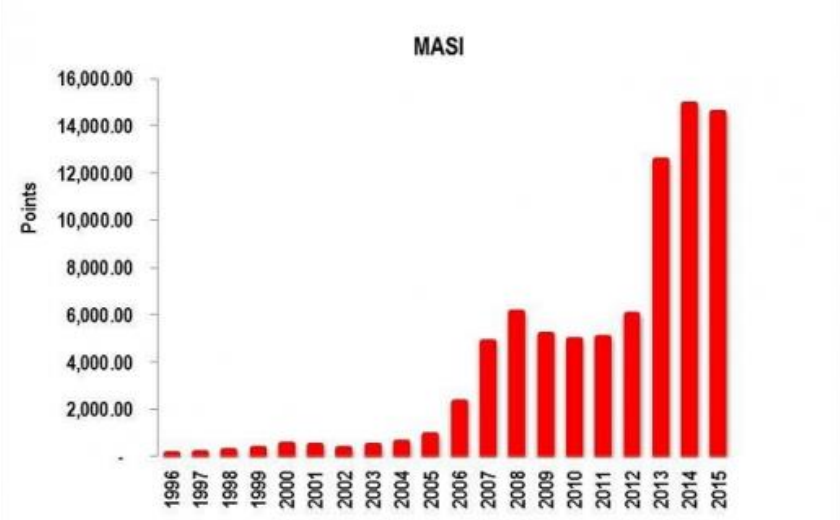

Figure 2:Malawi All Share Index
Source: MSE

Bonds

The stock exchange of Malawi also deals in bonds and has two listed bonds which are government bonds.

Table 2:Listed Bonds on the MSE

Bond code	Issuer	Maturity Date	Coupon Rate	Nominal Value Issued	Interest Due Date
MW5YN	Malawi Government	30-Dec-16	10.00	822,040,000.00	30 June & 31 December
MW3YNR	Malawi Government	30-June-17	10.00	106,870,000,000.00	30 June& 31 December

Note: The nominal values are in Malawi Kwacha

MSE Alternative Capital Market

The stock exchange established the Malawi Stock Exchange Alternative Capital Market (MSE ACM) in order to encourage more companies to list on the exchange. This is established mainly for small to medium companies that do not meet the full criteria for listing on the exchange's main board. For the purposes of listing small to medium companies, the MSE ACM has less stringent requirements for listing than the main board and thus, allows companies in their growth phase to list and when they are fully grown they graduate to list on the main board. However, there is no company listed on the MSE ACM.

2.3 Trading

The majority of stock markets in Africa trade from Monday to Friday (Sunday to Thursday in Egypt), except for a few such as Ghana, Tanzania, and Uganda, which, in 2002 were trading three times a week. Trading is done once a day from Monday to Friday using a single price auction system. Trading times also vary, ranging from one hour per trading day in Tanzania to the whole business day from 08h00 to 16h30 in Zimbabwe (see Appendix 22).

Financial instruments traded on the Malawi Stock Exchange are common stock, preference shares, corporate debentures, warrants, government stocks and fixed interest securities, with bulk of listings and trades of common stock. Trading on the MSE is by call over, using an open-cry floor system on a matched basis. Clearing occurs by transaction, and settlement occurs on a T + 7 basis. There is no depository. The sudden supply of vast amounts of mobile capital in the early 1990s created an environment conducive for the emergence of stock markets in Africa.

However, portfolio inflows to Africa have been disappointing due to the unfavourable scenario that the acquisition of shares by foreigners is limited on some African stock markets. In Malawi, the Reserve Bank of Malawi (RBM) manages the exchange control. Foreign investment capital, whether in the form of equity or loans, needs to be registered with the RBM. Foreign loans and equity investments, the remittance of dividends and capital, among other transfers, require permission from the RBM.

Malawi Stock Exchange is characterized by thin trading. That is to say there is large inactivity is some counters where some companies stay for some periods without trading of shares. This poses as a challenge of the stock exchange. However, it is noted from figure 3 that certain counters have registered increased trading of shares from 2000 to 2015 while others have registered a decrease in the volume of shares traded. Old Mutual counter in 2001 registered 1,211,017,366 shares traded but decreased to less than 50,000,000 shares thereafter while TNM registered less than 50,000,000 traded shares in the year it registered but increased to 3,959,069,267 shares traded in 2013, however, decreased to less than 50,000,000 in 2015.

Evaluating the annual trading shares on the basis of sectors, in figure 3, on average, banks have registered low volumes of trading shares on the MSE compared to telecommuniaction and investments sector. However, when comparing banks in terms of traded shares, it shows that traded shares of standard bank rose from 2000 to 2001 but decreased in 2002. National Bank of Malawi and NBS bank traded shares were below 20,000,000 since the year 2000. FMB which registered in 2006 had traded shares less than 20,000,000 but increased to 1600753264 in 2015.

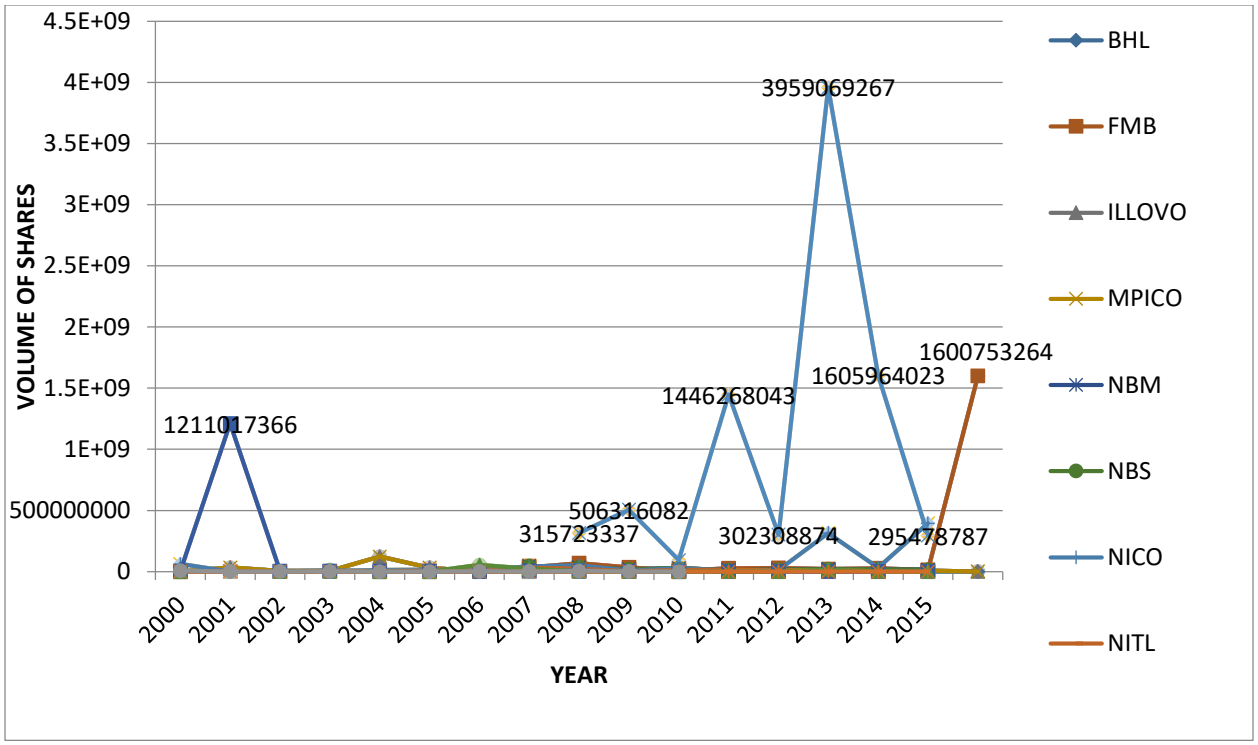

Figure 3: Trading stocks on the MSE
Source: MSE

Despite the market been characterized by thin trading, it was noted that, some months of the year exhibit an increase in number of shares traded. From Figure 4 below it shows that there is a pattern in terms of volumes of traded shares in the months of September to December from 2006 to 2009 which shows that there is an increase in the volume of traded shares in the September and drop after February.

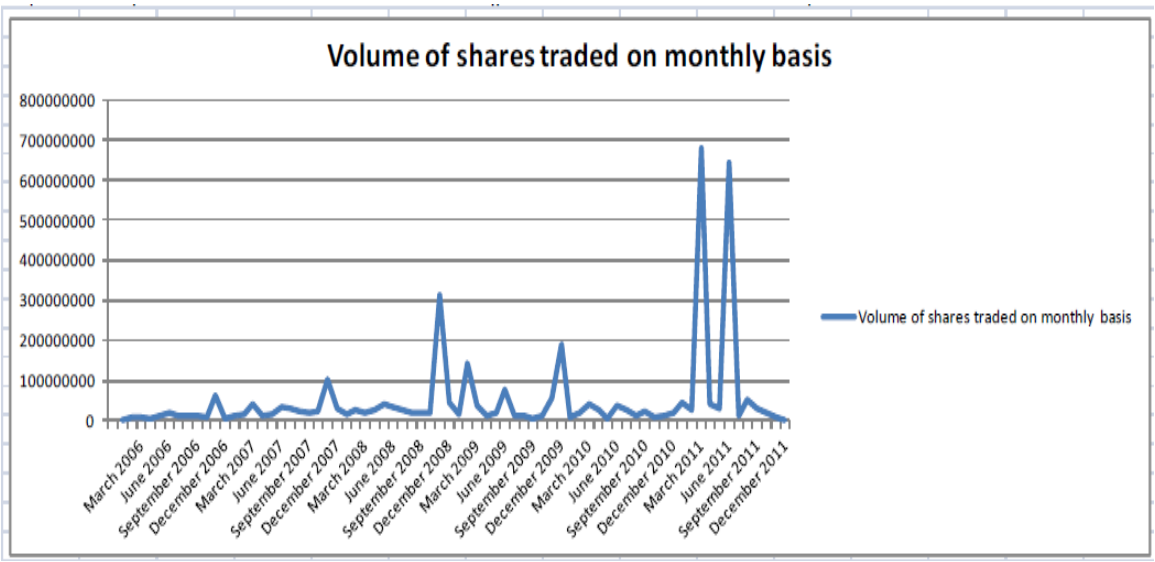

Figure 4: Volume of shares traded monthly
Source: MSE

2.4 Challenges facing the MSE

The major challenge the exchange faces is the size of the market. It has taken the MSE13 years to have 15 companies listed where two companies deregistered and most of the listed companies are financial institutions. This means there is no sufficient variety in terms of categories of companies listed. The privatization process was the main route through which listing slightly increased. The reason of having such a small stock market is linked to an increase in family owned companies in Malawi. As such, family's share and power would be reduced if the company is to list on the stock market. Fear of hostile takeover when the company is listed is high as such companies would rather operate outside the stock market despite that sourcing capital on the stock market is cheaper than outside the market. The other challenge is that most Malawians live under poverty conditions and their income is used on consumption rather than saving and investing on the stock exchange. The major players of the stock market are usually large companies

with enough capital to invest in shares and not households whose income is not sufficient enough for investment on the stock exchange.

CHAPTER THREE

LITERATURE REVIEW

3.1 Introduction

The chapter presents a summary and discussion of what other researchers have done in the area of stock market anomalies and strategic momentums. The chapter has three sections. Section 3.1 provides some theoretical literature that gives the theoretical framework upon which the study is based. The second section, 3.2, presents some empirical evidence on anomalies. Lastly section 3.4 concludes the chapter.

3.2 Theoretical Framework

If the efficiency of the stock market hold, it is impossible for an investor to outperform the market and earn abnormal returns. Based on this different theories exist that explain anomalies on the stock market. This chapter discusses four theories: The Efficient Market Hypothesis (Fama, 1970), The Capital Asset Pricing Model (CAPM) (Sharpe, 1964), the calendar effects hypothesis and the Tax loss selling hypothesis (Ritter, 1988).

3.2.1 The Efficient Market Hypothesis (EMH)

The concept of efficient market hypothesis suggests that asset prices fully reflect and incorporate all available information and therefore it is impossible to outperform the market in order to make abnormal returns (Fama, 1970). EMH deals with informational

efficiency and strongly based on the idea that the stock market prices or returns are unpredictable and do not follows any regular pattern. The theory simply suggests that prices of shares are determined by the laws of demand and supply in the competitive market with rational investors. Thus to say investors gather all the available information very rapidly and immediately incorporate this information into stock prices. This means only new information, i.e. news, will cause changes in prices. However, news by definition is unpredictable; therefore stock market which is immediately influenced by the news should also be unpredictable.

Investors purchase securities with the perception that the security will increase in value in the future at the time of purchase, while for selling, investors hold the perception that security's value in the future will be less than the current selling price. However, with efficient markets, then an individual should only be capable of outperforming the market by means of luck, as opposed to skill, since "prices fully reflect all available information" (Fama, 1970).

3.2.2 The Capital Asset Pricing Model (CAPM)

The CAPM as developed by Sharpe (1964), Lintner (1965) and Black (1972) has led several authors to hail it “the birth of Asset Pricing models” (Fama and French, 2004). The expected return on asset is the sum of the return on a risk free asset plus an expected premium for risk expressed as a function of the asset return covariance with the market return (beta). The CAPM in its simplest form can be expressed as:

$$\mathrm{E}(\mathrm{R_i}) = R_f + \beta_i E\left[\left(R_m - R_f\right)\right] \qquad (1)$$

Where

$E(R_i)$ is the expected return of stock i

β_i is the systematic risk calculated as $Cov(R_i, R_m) \big/ Var(R_m)$

$E(R_m)$ is the expected return of the market

$E(R_m - R_f)$ is the market premium

R_f is the risk free return

The CAPM predicts that a portfolio of invested wealth is mean-variance efficient. This results in a linear cross-sectional relationship between mean excess returns and exposures to the market factor (Fama and French, 1992). Thus, fundamentally the model stipulates that the market will reward only the holding of systematic risk as the unsystematic risk can be handled by holding a diversified portfolio (Bundoo, 2011). In the study, systematic risks are measured by the market return (MASI) and the unsystematic risks are measured by the days of the week. This means that, for companies i and j, the market return will have the same effect on their returns, but the days of the week will affect their returns differently. However, the beta cannot be directly observed but can only be estimated. To estimate the beta of the firm, a regression is used and requires firms to select both an estimation period and a return interval. The daily return series can be used to estimate individual company's beta. The market model can be used to estimate the beta then augmented the model to consider the day of the week effect and Month effect. The market model is given as:

$$E(R_i) = \alpha + \beta_i E[(R_{m,t})] \quad (2)$$

Where

α is the constant term

The other explanatory variables are as in Equation 1 above

3.2.3 Calendar Effects Hypothesis

The calendar effect hypothesis suggests that there are consistent abnormal patterns in asset return in terms of hours of the day, day of the week, week of the month and month of the year (Levine, 1991).There are a number of calendar anomalies which includes the day-of-the-Week Effect, turn of the month effect, month-of-the-year effect and the holiday Effect. The day of the week anomaly states that for all the week days the expected returns are not same (Wachtel, 1942). The theory speculates that the average return on Monday is significantly negative and is lower than average returns of other week days due to what is termed as the weekend effect. On the other hand, returns on Friday are assumed to be abnormally high than the rest of the days. The possibility of studying this effect is through the use of daily data to examine the relationship between the stock price changes that occur from one trading day to the next and over weekends.

Calendar effects theory also postulates that the return on common stock is not the same for all the months of the year (Schwert, 2001). This is commonly known as the month of the year effect. This effect suggests that there exist a certain month of the year when returns of a stock are abnormal and thus investors earn returns above the market return. This study examines the existence of the day of the week effect and the month of the year effect on the MSE.

3.2.4Tax Loss Selling Hypothesis

The tax-loss-selling hypothesis explanation of the turn-of-the-year effect is stated by Roll (1983) as follows:

> There is downward price pressure on stocks that have already declined during the year, because investors sell them to realize capital losses. After the year's end this price pressure is relieved and the returns during the next few days are large as those same stocks jump back up to their equilibrium values.

Thus, the hypothesis provides the basis for January (Month) effect as it is speculates that, investors tend to sell out the securities held at the end of the tax year in order to realize capital losses. This helps in reducing their tax liabilities. Stock prices go down as a result of this downward trend in the market. Investors tend to start purchasing securities at the start of a new tax year and this increases stock prices (Ritter, 1988).

3.3 Empirical Literature Review

One of the most enthralling areas in financial market research during the previous decades has been on stock market anomalies. This section gives the review of other studies done on anomalies. Section 3.2.1 gives a review on Day of the week effect; section 3.2.2 gives evidence of Month of the Year effect (January effect) anomalies and section 3.2.3 reviews evidence on momentum strategies.

3.3.1 Day of the week effect

There is a large body of literature testing for the presence day of the week in asset returns. One of the first pioneers documenting the existence of the day of the week effect was Fields (1931). Using a period of 15 years, he studied the Dow Jones from 1915 to 1930, in which he found that the price was higher on a Saturday. Further the study found that Monday on average produced negative equity returns than returns for the rest days of week that had positive returns. However, the drawback of the method the study used was that it used the mean returns which do not take into account outliers, which can skew the distribution to a particular direction. To overcome this problem Fields used a large sample size and found the same results. In addition, another limitation was that Saturday's closing price was not compared to any other day's closing price. Malawi stock market only trades during the week and not during the weekend which differs from the trading days on the Dow Jones. This narrows the study to test only trading days from Monday to Friday.

Concurring with studies done by Fields (1931), in Japan, Kato (1990) finds that returns on Tuesday were negative but positive for Wednesday and Saturday. This is similar for Greece as they found that Monday and Tuesday had negative average returns and that Monday had the highest standard deviation of returns (Alexakis & Xanthakis, 1995). The study further found that Fridays had positive and highest returns as compared to other days. Monday and Tuesday have negative returns because, listed companies tend to give out information that will have a negative effect on the share prices at the beginning of the week thus having negative effects on Monday and can also affect Tuesday prices. Mills et al. (2000) went further to examine not only basket indexes but also constituent stocks of the Athens Stock Exchange general index from 1986 to 1997. The study found significant evidence for higher returns on Fridays and lower returns on Tuesdays and Wednesdays. Thus Monday's have negative returns and Fridays tend to have positive effects due to the weekend effect. The main reason for the weekend effect (low returns on Mondays and high returns of Fridays) is the arrival of negative news at the close of business on Fridays. Thus, firms with bad news tend to release it after close of business on Friday and good news is released quickly during the week so that investors can bid the stock price up (Schwert, 2001).

Similar results are found when studying stock markets in the United States and Turkey. Lakonishok and Levi (1982), Mehdian and Perry (2001), among others document the Monday returns were significantly negative and were lower than returns of any other day of the week on United States stock markets. In Turkey, Dicle and Hassan (2007) investigated the Istanbul stock exchange indices and they found that Mondays exhibited

significant negative returns. The study also found that Fridays had high positive returns followed by Thursday. However, there is no evidence of the day of the week effect on the Russian stock markets. Using the GARCH, EGARCH and TGARCH models to analyze day of the week effect on the stock market the study found that day of the week effect is nonexistent. However, a closer look at the study found that the study took into account the transactions costs which had the bid-ask spreads as the proxy. This could explain why the day of the week effect was not found.

However, when using the same models (GARCH (1,1), EGARCH (1,1) and TGARCH (1,1)) on the Indian stock markets it was found that from the GARCH (1,1) model there exists the day-of-the-week effects on stock returns but the effects seem to have disappeared when analyzed using the EGARCH(1,1) and TGARCH(1,1) models. This means that results of the day of the week effect vary depending on the model used. The study found the existence of positive Monday and Wednesday effects with the average return on Monday been significantly higher than the average return of Wednesday in the NSE-Nifty and BSE-SENSEX market returns (Srinivasan & Kalaivani, 2014). This is contrary to the findings of Lakonishok and Levi (1982), Mehdian and Perry (2001) among others who found negative Monday returns. The settlement procedure could be the explanation for positive Monday returns in India. However, settlement procedures vary for different countries.

It is interesting to note that similar results are also found on emerging African stock markets. Bhana (1985) found that for shares traded on the Johannesburg Stock Exchange

(JSE), had significantly negative average returns on Monday with the highest positive returns on Wednesday. However, Davidson and Meyer (1993) using All share index for the period of 1986 to 1991 found that the Monday effect was not significant anymore on the JSE. Chukwuogor-Ndu (2007) investigates the presence of the day-of the- week effect on the stock market return for five African stock markets. The results show that several stock markets in Africa experience market anomalies differently. Nigeria, Botswana and Ghana have the highest returns on Wednesday which differs from the findings of Mills et al. (2000) who found lower returns on Wednesday. South Africa and Egypt experienced their highest returns on Monday which is similar to what Srinivasan & Kalaivani, (2014) found when analyzing stock markets in India. Egypt and Botswana have negative returns on Tuesday. This could be due bad news which is usually given on Monday and thus having negative returns on Tuesday. It was noted from the results that Ghana and Nigeria, had no negative returns during the trading days of the week and did not exhibit day of the week effects. However, using the Kruskal-Wallis test the study found that there exist no day-of-the-week effects on stock returns in the Botswana, Egypt and South Africa stock markets.

Bundoo (2011) documented that the highest returns on individual stock on the Stock Exchange of Mauritius (SME) are observed on Wednesday, followed by Friday. He, however, tested the effect on the day of the week effect on the market return and found that it was positive and stronger for Wednesday, Thursday and Friday. This concurs with Agathee (2008) where returns were higher on Friday on the SME. However, he further found that the mean returns of the week days were jointly insignificant and differ from

zero. The study analyzed the day of the week effect using the asset pricing models rather than the conventional econometric models.

When examining empirically the day-of-the-week effect on the Tunisian stock exchange index return using the three multivariate general autoregressive conditional heteroscedasticity models (GARCH (1,1); EGARCH (1,1) and TGARCH (1,1)) it was found that Thursdays have significant positive effect while Tuesday retained a significant negative effect on TUNIDEX returns (Derbali et. al, 2016). However, the study did not investigate how the day of week effect affects individual stocks since there variability exists in individual stocks. However, most of these studies have concentrated on developed economies and emerging stock markets while studies done in undeveloped stock markets are limited. For a stock market that has been in existence since 1996 it is imperative to investigate if day of the week effect exists on the Malawi stock market.

3.3.2 Month of the year effect and January effect

Watchel (1942) was the first to study the month of the year effect. Concentrating on the January effect Watchel (1942), found that in the US stock market the returns are higher in the month of January than any other months. Rozeff and Kineey (1976) also found that on the New York Stock Exchange for the period of 1904 to 1974, returns are higher in the month of January more especially the first fifteen days of the month. Boudreaux (1995) proved the existence of monthly effect for three out of seven countries. When investigating the presence of the-month of the year effects in the Romanian equity market, using Bucharest Stock Exchange returns between 2000 and 2011, there was no

trace of traditional Monday or January effect for the entire study period. However, January effect was only observed during pre-crisis period (Diaconasu et. al 2012).

For emerging stock markets in Africa Ayadi et al. (1998) studied the Ghanaian stock market (1991-1996), Nigerian stock market (1984-1995) and Zimbabwe stock market (1987-1995) found there was no seasonality (month effect) on the Zimbabwe and Nigerian stock market but seasonality existed on the Ghanaian stock market. For the Stock Exchange of Mauritius (SEM), Bundoo (2011) found that the January effect did not exist but instead found that there existed a September effect which was significant. This was due to the fact that the financial year of many companies in their sample ends on June 30. However, they are given three months after that to file their audited accounts with the Registrar of Companies. Many companies release their audited accounts in the press towards the end of August and in the first week of September thus causing a September effect.

Brown et al. (1983) in explaining the causes of the month of the year effect claimed that only the January effect is explained by the Tax loss hypothesis. It was, however, heavily challenged by Gultekin and Gultekin (1983) when they studied 15 different stock markets inclusive of the UK stock market with a tax year ending in April. It was found that in all markets January returns were relatively higher than the rest of the months. This suggests that the Tax loss selling hypothesis is not a conclusive explanation of the January effect; therefore, it remains an unexplained puzzle. Given the limited research on developing African stock markets in this area, this study will investigate some of the seasonal

anomalies on the Malawi Stock Exchange (MSE). This is an in depth study as it will link seasonal anomalies in the developing market with asset pricing models.

3.3.3 Momentum strategies in stock returns

Momentum is one of the most challenging and strongest asset pricing anomaly. Momentum profits that are persistent have attracted considerable attention from investment researchers as they pose a challenge to the efficient market hypothesis (Bundoo, 2011).

The first to report self-financing trading strategies were Jegadeesh and Titman (1993). They found that the returns of all the momentum strategies they examined were positive and statistically significant thus, obtaining profits for self-financing portfolios of at least one percent per month. They also reported that momentum strategies earn significant profits in small, medium and large firm, and across beta-based sub samples. Further they reported that the abnormal performance of momentum strategies is due to the long side of the portfolio, rather than the short side which suggests that momentum profits are indeed obtainable for investors.

Wei, et al. (2000) examined the momentum returns in eight Asian countries in one composite sample, and found a weak momentum effect. While Chui et al. (2011) excluding Japanese stocks from the sample, found that the momentum effect was statistically significant, returning an approximate of 1.5% per month in the 1975-1997

sub period[1]. Martin Ji and Griffin (2005, 2003) broaden the country sample further and examined the profitability of momentum strategies in the 40 countries with more than 50 stocks listed. They found that the momentum strategies were generally profitable across the countries that were examined, with momentum returns highly significant in Africa, the Europe and the US but not in Asia.

Bundoo (2011) also investigated the momentum strategies on the Stock Exchange of Mauritius and found that there existed moderate momentum profits on the low BE/ME portfolios and strong momentum profits for the small market cap portfolios as well as the high BE/ME portfolios. Those that were based on big market capitalization stocks did not show momentum profits. He further investigated whether the momentum effects were seasonal found that no seasonality effects were observed.

Jegadeesh and Titman (1993) tried to explain the momentum as a reward for risk but lacked serious consideration as past winners and past losers are classified on the basis of past returns (Bundoo, 2011). This is confirmed by Fama and French (1996) as they failed to price the momentum profits by exposure to risk factors in the three factor unconditional asset pricing model by Fama and French (1993). Moskowitz and Grinblatt (1999) explain the momentum effect to be solely by momentum in industry returns. They found that momentums disappear after correcting for industry effects. However, Lee and Swaminathan (2000), Grundy and Martin (2001) investigated their claim and came with different conclusions.

[1]Chui et al. actually examined momentum returns over the 1975-2000 period. However, momentum returns were arkedly different due to the Asian financial crisis.

With growing interest in researching momentums and due to the fact that there exist no single credible explanation of the existence of the momentums, it is therefore important to investigate if this phenomenon exist in a developing stock market as the MSE.

CHAPTER FOUR

METHODOLOGY

4.1 Introduction

This chapter presents the methodology of the study. Section 4.1 presents the sources and nature of the data. Modeling Framework and Econometric Specification is presented in section 4.2, and diagnostic measures to be done are in section 4.3.

4.2 Data collection

The study uses data collected from the Malawi stock exchange (MSE) and Companies annual reports. Daily and monthly share prices and market index are used. Although there is a scholarly merit in studying long periods, it can, however, lead to long forgotten good or poor performance and can distort the overall results giving a misleading picture and interpretation of recent trends (Chukwuogor-Ndu, 2007). Thus, for this study data covers the period of 2011 to 2015. This is done to capture the period that the stock market had the highest number of listed companies before Real insurance delisted in 2016. Various MSE annual reports are used for descriptive statistics for the market in general and daily and monthly share prices and market index are used for inferential statistics. Company's annual reports are obtained from the listed companies for the years 2011 to 2015.

4.3 Modeling Framework and Econometric Specification

When examining anomalies such as the day of the week effect in stock markets, most studies adopted the Garch (1,1) model (Mehdian & Perry, 2001; Chukwuogor-Ndu, 2008; Liu, 2015; Derbali & Hallara, 2016) This study will, however, analyze market anomalies and momentum strategies within the context of asset pricing models. This is because the GARCH (1,1) model assumes that the innovations have a known distribution e.g. Normal distribution or the student t-distribution and that these innovations are independently and identically distributed (i.i.d) (Rosi, 1973). This exposes the model to high risk of producing inconsistent estimators in the event that the assumed distribution is not correct (Chung, 2012). Further, financial time series often exhibit leptokurtosis (Holly & Montifort, 2010). This means that assuming normality of innovations may technically lead to wrong likelihood functions and hence inconsistent results. Due to this the study will adopt Asset pricing models to investigate stock market anomalies on the MSE.

The daily prices of shares will be used to investigate calendar anomalies. Daily returns will be estimated as follows:

$$R_{i,t} = \left(P_{i,t} - P_{i,t-1}\right) \Big/ P_{i,t} + D_{i,t} \qquad (3)$$

Where

$R_{i,t}$ is the return of company i on day t

$P_{i,t}$ is the share price of company i on day t

$P_{i,t}$ is the share price of company i on day t

$D_{i,t}$ is the dividend given from company i on day t

4.3.1 Market model with day of the week effect

The model is used to estimate betas of the listed companies by taking into account the day of the week effect. This model assumes that returns of a share are affected by systematic and unsystematic risks. Thus, the systematic risk is captured by the market return and the unsystematic risk is captured by the days of the week. The model is augmented and specified as:

$$R_t = \beta\ R_{m,t} + \alpha_1 MON + \alpha_2 TUE + \alpha_3 WED + \alpha_4 THUR + \alpha_5 FRI + \mu_t \quad (4)$$

Where

R_t is the return on share of a given company at time t

$R_{m,t}$ is the market return at time t

μ_t is the error term

β, α_1 to α_5 are the coefficients

Variables MON to FRI are day of the week dummy variables which are equal to 1 on that day and zero otherwise

Note: Equation 4 has no constant terms. This is because of the inclusion of all the day of the week dummy variables (Green, 2003).

4.3.2 Market model with Month of the year effect

The augmented market model will be used to analyze the effects of month of the year effect on returns. However, from literature, the January effect will be analyzed. The model is specified as:

$$R_t = \alpha + \beta R_{m,t} + \gamma D_{JAN} \quad (5)$$

Where:

D_{JAN} is a dummy variable taking the value of 1 when it is the month of January and 0 otherwise

Note: Equation 4 and 5 will be run for all individual companies listed on the MSE from the period 2011 to 2015. The above equations will also be run with market return (MASI return) as the dependent variable. This is to capture the effects of market anomalies on the stock market index (MASI).

4.3.3 Fama and French three factor model with day of the week and January effects

The study also adopts the Fama and French Three factor model to investigate the calendar effects by the use of portfolios. Fama and French (1993) proposed a three factor model to capture the cross-section of expected returns in a stock market associated with size and B/M characteristics. The Fama and French three factor model will be augmented to analyze day of the week effects and the January effect respectively. The models are specified as follows:

$$R_t - R_f = \beta\lfloor R_{m,t} - R_f \rfloor + s(SMB_t) + h(HML_t) + \alpha_1(MON) + \alpha_2(TUE) + \alpha_3(WED) + \alpha_4(THUR) + \alpha_5(FRI) + e_t \quad (6)$$

$$R_t - R_f = \alpha + \beta\lfloor R_{m,t} - R_f \rfloor + s(SMB_t) + h(HML_t) + \gamma D_{JAN} + e_t \quad (7)$$

Where:

R_t is the return of a given portfolio at time t

R_f is the risk free rate

$R_{m,t}$ is the market return at time t

β is the coefficient for market premium for each given portfolio

SMB is the size premium (Small Minus Big)

HML is the value premium (High Minus Low)

Sis the coefficient for the excess average return of portfolios with SMB

his the coefficient for the excess average return of portfolios with HML

e_t is the error term for at time t.

The weighted 91-day Treasury Bill rate will be used as a proxy for the risk free rate. The portfolio return will be monthly over the period of January 2011 to December 2015. Fama and French (1993) three factor model requires that the stocks should be split into classes according to size and Book to market equity ratio.

Classification according to size

The stocks will be split into two categories of small market equity and stocks of big market equity. The market equity (ME) is equal to stock price times the number of issued ordinary shares. The formula is given as:

$$ME = P_{i,t} * ordinaryshares_{i,t} \quad (8)$$

The median size of the whole sample will be the breakpoint to differentiate the two categories. Thus, small market firms are those firms with market equity less than the median value and those with values higher than the median value will be considered to be big market equity firms.

Classification according to book to market equity (BE/ME)

Fama and French (1993) classified the stocks into three groups of portfolios consisting of Low book-to-market equity (BE/ME) ratio, medium (BE/ME) ratio and high (BE/ME) ratio. Using this method and given our small sample size, only two classes of book equity to market equity (BE/ME) value (low BE/ ME and high BE/ME) will be created. The group of stocks of below or equal to the median BE/ME will be considered as low BE/ME and those of high BE/ME will be the stocks with BE/ME values higher than the median BE/ME.

Following the classification above, four portfolios will be constructed namely: WHB (High book/Big market capitalization), WHS (High book/Small market capitalization), WLB (Low book/Big market capitalization) and WLS (Low book/Small market capitalization). Value-weighted returns will then be calculated for each portfolio above for each day over the period January 2011 to December 2015.

4.3.4 Methodology on Momentum

Momentum strategies are investigated within three separate bands. Stocks will be sorted on the basis of cumulative daily returns only, then on the basis of market capitalization, and finally on the basis of book equity. Within each bands, momentum portfolios are constructed. Momentum portfolios will be constructed following the method described in Jegadeesh and Titman (1993).

The study will then use the method proposed by Carhart (1997) which is a four-factor model that uses an additional momentum factor in addition to the Fama and French model. For this part of the analysis monthly data will be used from January 2009 to December 2015. The four factor model is an augmented Fama and French three factor model with the momentum factor (WML). WML is constructed as the difference between the returns on the winner's portfolio and the returns on the loser's portfolio for a given set of financial assets. The other explanatory variables were explained in Equation 6 & 7. The equation is given as:

$$R_t - R_f = \alpha + \beta\left[R_{m,t} - R_f\right] + s(SMB_t) + h(HML_t) + m(WML_t) + e_t \quad (9)$$

4.4 Diagnostic Tests

Diagnostic tests will ensure that the model framework satisfy the various assumption in order to derive reliable coefficient estimates.

4.4.1 Multicollinearity

Multicolinearity is one of the problems encountered in regressions. In Classical Linear Regression Model (CLRM), it is also assumed that there is no linear relationship among all or some of the regressors. When there is perfect or near-perfect linear relationship among some or all of the explanatory variables in a regression model it leads to indeterminate regression coefficients and infinite standard errors. Multicolinearity among the explanatory variables can be assessed using the pair-wise correlations or Variance Inflation Factor (VIF). The suggested rule of thumb is that if the pair wise or zero order correlation coefficient between the regressors is high in excess 0.8, then multicolinearity

is a serious problem. Using the VIF, multicolinearity is a serious problem if the VIF is in excess of 10 (Gujarati, 1993).

Various remedial measures to multicolinearity are suggested. However, for the purpose of this study, if multicolinearity is evident, the process of transforming variables into their first difference form will be used. This method entails running the regression, not on the original variables but on the differences of successive values of the variable. Another advantage of first difference transformation is that it may make a non-stationary time series stationary.

4.4.2 Heteroskedasticity

In addition to multicolinearity, heteroscedasticity is also one of the problems in Classical Linear Regressions. The Classical Linear Regression Model also assumes that the variance of each disturbance term conditional on the chosen values of the explanatory variables is some constant number. This is referred to as homoscedasticity but when the variance of each disturbance term is not a constant number it is called heteroscedasticity. In a situation of heteroscedasticity, OLS estimators, though linear and unbiased, they are not minimum variance among the class of linear estimators when disturbances are heteroscedastic. The issue is that outliers can bias regression slopes, particularly if they have significant leverage.

Heteroskedasticity in a model produces estimates that are not efficient but are consistent. The likelihood ratio test for Heteroskedasticity will be used. It is superior to the general

approach for testing for Heteroskedasticity because it is nested and is based on the behavior of the residuals (Green, 2003). Those showing heteroskedasticity will be corrected using the White's heteroskedasticity consistent variances and standard errors.

4.3.3 Autocorrelation

Serial correlation refers to the correlation between the errors in different time periods. In a time series data models the explanation of serial correlation is that in each time period there contains a time-constant omitted factor (Wooldridge, 2002). The Woodridge test for autocorrelation will be used to detect the presence of autocorrelation and will be corrected using the Cochrane-Orcutt procedure.

4.3.4 Stationarity of Variables

A series is said to be stationary if its mean and variance are constant over time and the value of the covariance between the two time periods depends only on the gap between the two time periods and not the actual time at which the covariance is computed (Enders, 2015). However, macroeconomic time series are mostly not stationary. This could lead to spurious regression and therefore the data needs to be checked for stationarity. Use is be made of the Augmented Dickey Fuller test which assesses if the time series has unit root or not. If variables are found to be non-stationary, the time series will be differenced.

4.3.5 Lag Structure

To determine lag structure of unrestricted VAR, several criteria are used. First criterion ensures that number of lags should be such that the resulting model has non-auto correlated residuals, (Charemza & Deadman, 1997). The second criterion emphasizes the importance of the information criteria in the choice of lag structure, which means that a balance between goodness of fit and the parsimony of the specification should be considered. The third criterion that allows discriminating between different lag structures is the forecast potential of the model. Thus, the choice of the criterion depends on the goal of the analysis. In the current case, the main criteria is used to determine the number of lags the use of information criterion.

CHAPTER FIVE

PRESENTATION AND INTERPRETATION OF RESULTS

5.1 Introduction

This chapter presents and interprets the results of the study. The chapter is presented in five sections. The first section (5.1) presents the descriptive analysis. Section 5.2 presents results from the market model analysis and section 5.3 presents results from the Fama and French three factor model. Momentum strategies results are presented in section 5.4 and section 5.5 concludes the chapter.

5.2 Descriptive Results

5.2.1 Day of the week effect and Month of the year effect

Table 3: Daily mean and CV of return for the market index

Market return	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**
Mean	0.000636	0.0020791	0.0008067	0.0010994	0.0007378
CV	6.840976	4.963697	6.368891	4.077599	7.437432

Table 4 gives the daily mean and risks measured by the Coefficient of Variation (CV) for the five trading days of the week for market index (MASI). Thursday has been observed to have the highest daily return followed by Tuesday. However, these days have the lowest risks in terms of CV with Thursday having the lowest risk followed by Tuesday. This indication of an anomaly as the higher returns on Thursday and Tuesday cannot be explained by higher risks on these days. These results prompt a further analysis on the daily market return by month and thus Table 5 gives the daily mean and CV for the market index by month of the year. May and August, exhibit lower risks and higher returns as compared to other months of the year. May has higher returns followed by August, September and April respectively. The existence of higher returns and lower risks means their exist anomalies in the market.

Table 4 Daily market return by month

Month	**January**	**February**	**March**	**April**	**May**	**June**
Daily mean	0.0003536	0.0001279	0.0008636	0.0008903	0.007856	0.000652
CV	5.73554	9.668203	7.071414	3.088249	3.10984	4.305172
Month	**July**	**August**	**September**	**October**	**November**	**December**
Daily mean	0.0006302	0.0028142	0.0009585	0.001258	0.0007517	0.0002413
CV	4.305172	3.75656	3.614409	5.765078	7.391391	11.54708

5.2.2 Momentum Strategies

Table 6 gives the mean excess returns on the momentum portfolios sorted based on returns only ranging from 0.77% (for the 6/6 month strategy) to 1.42% (for the 12/12 month strategy). The 12/12 month strategy exhibits higher returns than the other strategies which show that the 12/12 month strategy is more profitable than the other strategies.

Table 5: Mean excess returns for momentum portfolios based on returns only

P3 less P1			
Strategy	**6/6 Months**	**6/12 Months**	**12/12 Months**
Mean	0.0076735	0.0116251	0.0142694
Std. dev.	0.0417964	0.0332304	0.0479639

Sorting the portfolios based on size, the small market capitalization stocks exhibit excess returns ranging from 1.4% (for the 6/12 month strategy) to 1.9% (for the 6/6 month strategy). However, for the big market capitalization they have negative excess returns for all the strategies. However, this conforms to the previous knowledge about the size effect, which suggests that small market capitalization portfolios tend on average to outperform portfolios with big market capitalization.

Table 6:Mean excess returns for momentum strategies based on Size

	Small market capitalization stocks		
SP3 less SP1			
Strategy	**6/6 months**	**6/12 months**	**12/12 months**
Mean	0.0196386	0.0143034	0.0164795
SD	0.0417964	0.0332304	0.0479639
	Big market Capitalization stocks		
BP3 less BP1			
Strategy	**6/6 months**	**6/12 months**	**12/12 months**
Mean	-0.0136004	-0.0140465	-0.106006
SD	0.0282936	0.0211991	0.0202844

Investigating the portfolios sorted on value (book-to-market equity) it is observed that for stocks with low book to market equity (BE/ME), they exhibited negative excess returns for all strategies. This is different from what other studies have found (Fama and French, 1993; Bundoo, 2011) However, for stocks with high BE/ME the mean excess return ranged from 2.1% (for the 6/6 month strategy) to 2.85% (for the 12/12 month strategy). Therefore, it is shown that momentum is positive for some stocks and portfolios and it is pervasive.

Table 7: Mean excess returns for momentum strategies based on Book to Market equity

Low BE/ME stocks			
LP3 less LP1			
Strategy	**6/6 months**	**6/12 months**	**12/12 months**
Mean	-0.0036356	-0.008254	-0.0077958
SD	0.0408968	0.0284118	0.0241638
High BE/ME stocks			
HP3 less HP1			
Strategy	**6/6 months**	**6/12 months**	**12/12 months**
Mean	0.0218187	0.0223103	0.0284978
SD	0.0295399	0.027144	0.0267352

5.3 Diagnostic Test Results

Diagnostic tests were carried out to check that estimation, hypotheses testing and statistical inferences of the model are made with accuracy. By allowing for robust standard errors in the command, any potential heteroscedasticity in the model is resolved. There was no serious case of multicolinearity amongst the explanatory variables since the correlations do not exceed the suggested rule of thumb of 10.

Visual observation suggests that most of the series are stationary at levels because of the outright upward trend they follow. However, to confirm this, use was made of the

Augmented Dickey Fuller (ADF) unit root test which showed that BHL, FMB, STANDARD BANK, NBS, MPICO and NITL were stationery in levels. However the rest of the variables were stationery at first differences.

In Vector Auto Regression (VAR), one of the crucial things in estimation is to establish the appropriate lag length. As discussed in the previous chapter, use is made of lag length criteria to determine the optimal lag length. Standard lag length selection criteria used were the sequential modified likelihood ratio (LR) test, the Alkaike Information Criterion (AIC), the Final Prediction Error (FPE), the Hann-Quinn Information Criterion (HQ) and the Schwarz Information Criterion (SC). The Lag Exclusion criteria test was done to find the lags that were statistically significant given that the test results different lag lengths as optimal. In this regard, optimal lag length is 3.

5.4 Day of the week effect and Month of the year effect using the market model

5.4.1 Investigation of the day of the week effects

Table 9 presents results when analyzing day of the week effects on the market index level. When the MASI is run on the trading days of the week, it has been found that all days of the week have a positive and statistically significant effect on the market return. However, Thursday has a significantly stronger effect on the market return followed by Tuesday at 99% significance level. Srinivasan & Kalaivani (2014) found positive Monday and Wednesday effects in the NSE-Nifty and BSE-SENSEX market returns which is slightly different from the results on the MASI. Analyzing these results, the study found that in terms of trading volumes, there is an increase in trade on Tuesdays

and Wednesday on the MSE. Thus to say, due to the weekend, ivestors place orders on Monday after the trading hours awaiting changes in prices and news that could be given on Monday that could affect the listed companies and their profits.

When analyzing day of the week effect on the market level it is unknown as which companies determine these anomalies. It is therefore interesting to investigate which companies registered on the MSE do drive the anomalies on the MSE.

Table 8: Day of the week effect at Market level

Code	Monday	Tuesday	Wednesday	Thursday	Friday
MASI	0.000636*	0.0009791***	0.0008067*	0.0010994***	0.0007378*

With a small population of companies it is possible and interesting to investigate the performance of returns at the micro and industry level that drive the anomalies on the MSE and vice versa. Table 10 gives the results of the day of the week effect on the return of individual stocks.

Table 9: Day of the week effects at company level by Industry

Code	Market return	Monday	Tuesday	Wednesday	Thursday	Friday
Agriculture& manufacturing						
ILLOVO	0.818***	0.047***	0.049***	0.050***	0.050***	0.051***
	(0.177)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Real estate						
MPICO	-0.277	0.024***	0.020***	0.015***	0.015***	0.020***
	(0.149)	(0.004)	(0.002)	(0.005)	(0.005)	(0.002)
Hospitality						
SUNBIRD	0.182	-0.899***	-0.000	0.019**	0.020**	0.025***
	(0.109)	(0.222)	(0.006)	(0.006)	(0.006)	(0.001)
BHL	-0.332***	0.060***	0.059***	0.059***	0.059***	0.059***
	(0.061)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Banking						

NBM	0.620*	0.068***	0.068***	0.069***	0.070***	0.069***
	(0.247)	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)
STANDARD	1.459***	0.063***	0.061***	0.062***	0.063***	0.064***
	(0.258)	(0.003)	(0.002)	(0.002)	(0.003)	(0.003)
FMB	0.334	0.045***	0.045***	0.047***	0.046***	0.046***
	(0.289)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
NBS	-0.562**	0.043***	0.036***	0.037***	0.038***	0.036***
	(0.217)	(0.004)	(0.002)	(0.003)	(0.004)	(0.004)
Insurance & investments						
OLD MUTUAL	0.496	0.035***	0.037***	0.038***	0.038***	0.040***
	(0.316)	(0.004)	(0.001)	(0.001)	(0.001)	(0.002)
NICO	-0.342*	0.045***	0.046***	0.046***	0.045***	0.046***
	(0.155)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Insurance only						
REAL	-0.086	0.107	0.001	0.001	0.002*	-0.000
	(0.112)	(0.316)	(0.002)	(0.002)	(0.001)	(0.001)

Telecommunications						
TNM	0.428	-0.163*	0.026***	0.034***	0.033***	0.039***
	(0.321)	(0.083)	(0.004)	(0.003)	(0.003)	(0.002)
Investment trust						
NITL	-0.078	-0.037**	-0.023	-0.010	-0.000	0.009
	(0.098)	(0.014)	(0.012)	(0.010)	(0.008)	(0.006)
Conglomerate						
PCL	0.102**	-0.164	0.020***	0.023***	0.022***	0.024***
	(0.040)	(0.094)	(0.002)	(0.002)	(0.002)	(0.000)

NB: Standard errors in parentheses $^{*}p< 0.1$, $^{**}p< 0.05$, $^{***}p< 0.01$

The market index level has a positive and significant influence on only four companies, a conglomerate (PCL) and two commercial banks (NBM and Standard) and an Agriculture and Manufacturing company (ILLOVO).Three companies record a negative influence from the market level index and the market level index has no significant influence on seven companies in diverse industries within the tertiary sector. This is attributed to the fact that, the four companies positively affected by the MASI were the major price movers in the period of the study while the three companies that recorded a negative MASI influence were the major losers in the period of study. Only two companies show no significant Monday influence, three companies show no significant Tuesday effect. This has been attributed to the time zone hypothesis which suggests that investors learn and this leads to a migration of the Monday effect to Tuesday. Thus, investors know that there exist negative returns on Monday as such they shift their trading to Tuesday. These results are consistent with the results of Bundoo (2011). Two companies recorded no significant Wednesday effect, only one company with no Thursday effect and lastly two companies with no significant Friday effect. This could be due to the fact that most of the shares are bought by institutions and thus rarely sold on the secondary market thus registering no activity in these counters.

5.4.2 Investigating the month of the year effect

Table 10: Month of the Year effect at company level

Code	Constant	Market return	January	May	August
BHL	0.059***	-0.338***	-0.002	0.000	-0.001
	(0.001)	(0.061)	(0.002)	(0.001)	(0.001)
FMB	0.046***	0.276	-0.009***	0.000	0.005
	(0.001)	(0.279)	(0.001)	(0.002)	(0.003)
ILLOVO	0.049***	0.818***	0.002*	0.002	-0.000
	(0.001)	(0.182)	(0.001)	(0.002)	(0.002)
MPICO	0.018***	-0.255	0.001	0.009*	-0.005
	(0.002)	(0.144)	(0.003)	(0.004)	(0.003)
NBM	0.068***	0.524*	-0.005**	0.010***	0.012**
	(0.001)	(0.248)	(0.002)	(0.002)	(0.004)
NBS	0.037***	-0.547*	0.005	0.002	-0.003
	(0.002)	(0.223)	(0.004)	(0.004)	(0.004)
NICO	0.044***	-0.347*	0.001	0.016***	0.001
	(0.001)	(0.158)	(0.003)	(0.003)	(0.003)
NITL	0.045***	0.462*	0.000	0.006**	-0.000
	(0.002)	(0.209)	(0.002)	(0.002)	(0.002)
PCL	0.023***	0.069*	-0.002	0.004***	0.003**
	(0.001)	(0.032)	(0.001)	(0.001)	(0.001)

REAL	0.000	-0.109	-0.000	0.000	0.003
	(0.001)	(0.127)	(0.001)	(0.001)	(0.004)
STANDARD	0.061***	1.382***	-0.003	0.014**	0.009*
	(0.001)	(0.257)	(0.003)	(0.005)	(0.004)
SUNBIRD	0.021***	0.162	0.004	0.011***	0.002
	(0.003)	(0.088)	(0.003)	(0.003)	(0.003)
TNM	0.035***	0.370	-0.001	0.009**	0.006*
	(0.002)	(0.302)	(0.002)	(0.003)	(0.003)
OLD	0.038***	0.537	0.006*	0.000	-0.005**
MUTUAL	(0.001)	(0.315)	(0.003)	(0.002)	(0.002)

NB: Standard errors in parentheses $^{*}p< 0.1$, $^{**}p< 0.05$, $^{***}p< 0.01$

When investigating the month of the year effect, it has been noted that only four companies had a statistically significant January effect at 10% significance level or better. However, due to the results from the descriptive analysis, we noted that anomalies were recorded in the months of May and August thus prompted an investigation into these months. Eight companies recorded a positive effect from the month of May and only 5 companies had a positive August effect at 10% significance lever or better. The constant term captured the effect of the remaining nine months. Only Real Insurance Company recorded a non-significant constant term. This could be attributed to the fact that Real Insurance counter did not register any activity in the period of the study. We further investigated the effect of the month of year effect on the market level and table 11

gives the results. Table 12 shows there is no existence of the January effect on the market index level.

Table 11: Investigating month of the year effect on the MSE

Month	Coefficient
January	0.000 (0.000)
February	0.000 (0.000)
March	0.001 (0.001)
April	0.001** (0.000)
May	0.001** (0.000)
June	0.001* (0.000)
July	0.001* (0.000)
August	0.003** (0.001)
September	0.001** (0.000)
October	0.001 (0.001)
November	0.001 (0.001)
December	0.000 (0.000)

NB: Standard errors in parentheses $^{*}p< 0.1$, $^{**}p< 0.05$, $^{***}p< 0.01$

This is contrary to the tax loss selling hypothesis. However, it has been noted that the MSE requires that registered companies publish interim (half yearly) reports within three months after the end of the interim period which could explain the highest effect of the

month of August and September. Bundoo (2011) found similar results when investigating the effects of the month of year on the Market level.

5.5 Investigating stock market anomalies using the Fama and French Three-factor model

5.5.1 The standard Fama and French three factor model

To investigate the possibility of earning abnormal profits the standard Fama and French three-factor model is run to determine whether the constant term is significant. Table 13 shows the results for the Fama and French (1993) three factor model for the MSE. Despite that beta is less than one it is significant for all the portfolios. The SMB coefficient is significant for small market capitalization stocks (SL and SH) and insignificant for big market capitalization stocks (BL and BH). The h coefficient is negative for the low book to equity portfolios (SL and BL) but positive for high book to equity portfolios. This is consistent with Bundoo (2011), Fama and French (1993) and Drew and Veerraghavan (2002) as the constant term was found to be significant for all portfolios**.** The results confirm the existence of the size and value premium on the MSE.

Table 12: Results for the standard Fama and French three factor model

Model: $(R_p t) - R_f = \alpha + \beta(R_{m,t} - R_f) + s(SMB_t) + h(HML_t) + \varepsilon_t$

Portfolio excess returns	α **coefficient**	β **coefficient**	***s* coefficient**	***h* coefficient**
SL	0.0300***	0.9722***	1.6267***	-0.5751817***
SH	0.0446***	0.9863***	1.2326***	0.7019736***
BL	0.0446***	0.9863***	-0.2673	-0.2980263*
BH	0.0300***	0.9722***	0.1267	0.4248***

NB: $^{*}p< 0.1$, $^{**}p< 0.05$, $^{***}p< 0.01$

Note: SL is a portfolio of companies with small market capitalization (market size) and Low book equity to market equity(BE/ME; SH is a portfolio with companies with small market capitalization (market size) and High book equity to market equity (BE/ME); BH is a portfolio of companies with big market capitalization and high book equity to market equity(BE/ME) and BL is a portfolio of companies with big market capitalization and low book equity to market equity (BE/ME). (See appendix 16 - 20)

5.5.2 Analyzing the day of the week effect using the Fama and French three factor model

Analyzing day of the week effect based on the Fama and French three factor model framework, it was noted that all the trading days of the week are statistically insignificant (table 4). We can deduce that the Fama and French three-factor model is quite robust in explaining day of the week effect on the MSE.

Table 13: Investigating day of the week effect at portfolio level

Dependent Variable:	**SL**	**SH**	**BL**	**BH**
Regressor	**Coefficient**	**Coefficient**	**Coefficient**	**Coefficient**
Excess market return	0.9694***	0.9830***	0.9830***	0.9694***
SMB	1.6281***	1.2352***	-0.2647	0.1281
HML	-0.5748***	0.7026***	-0.2973*	0.4251***
Monday	0.0243	0.0456	0.0325	0.0295
Tuesday	0.0272	0.0438	0.0252	0.0297
Wednesday	0.0196	0.0444	0.0654	0.0299
Thursday	0.0202	0.0432	0.0347	0.0295
Friday	0.0117	0.0434	0.0965	0.0292

NB: $^{*}p< 0.1$, $^{**}p< 0.05$, $^{***}p< 0.01$

This is not consistent with the results from the market model where Tuesday and Thursday were significant. However, SMB coefficient remains insignificant in the augmented model for portfolios with a big market capitalization.

5.5.3 Investigating the month of the year effect using the Fama and French three factor model

When the Fama and French three factor model was augmented to investigate the January effect, it was found that the variable was not significant for any of the portfolios. There existed no January effects on the MSE. This is consistent with the earlier results when investigating the January effect with the market model and with Bundoo (2011) who found no January effect on the Mauritius stock exchange.

Table 14: Investigating the month of the year effect at portfolio level

Portfolios	Constant	Excess market return	SMB	HML	January	May	August
SL	0.0296***	0.9734 ***	1.6273***	-0.5815***	0.0029	0.0060***	-0.0015
SH	0.0443***	0.9873***	1.2306***	0.7070***	-0.0015	0.0055***	0.0024
BL	0.0421***	0.9741***	-0.6510	-0.2929*	-0.0001	0.00654**	0.0052
BH	0.0222***	.9232***	0.1073	0.4123***	.0015	0.0012***	-.0010

NB: $^{*}p< 0.1$, $^{**}p< 0.05$, $^{***}p< 0.01$

Given the previous knowledge of anomalies existing in the month of May and August, the Fama and French three factor model is augmented to incorporate this effect and it was noted that only May was significant. All portfolios were found to have a significant May effect. This entails that for the given period of study, in May investors made profits above the market. This is due to the fact that during this month, companies usually are trading with trading statements. This makes the market to be bullish.

5.6 Investigating momentum strategies on the MSE

5.6.1 Momentum portfolios sorted by return only

Table 15: Momentum portfolios sorted by return only regressed on the Fama and French three factors

Portfolio	Constant	Market excess return	SMB	HML
P1	0.0441***	1.0301***	0.8579***	0.5082***
P3	0.0374***	0.9532***	0.5045*	-0.0416

NB: $^{*}p< 0.1$, $^{**}p< 0.05$, $^{***}p< 0.01$

Note: P1 is the winner's portfolio and P3 is the loser's portfolio.

Given that the 12/12 month strategy was significant in earning abnormal profits, it is interesting to analyze how the momentum factor affects momentum portfolio returns in the 12/12 month strategy. Table 16 gives results when momentum portfolios were regressed on the Fama and French three factors. The value premium factor (HML) was insignificant for the loser's portfolio signifying that values of the stocks do not determine

the return in the momentum. This is because for the loser's portfolio, investors do sell irrespective of the value of the firm. The company's performance affects the selling or buying decision of the investors rather than the value of the company.

5.6.2 Investigating momentum portfolios using the Cahart model

However, when comparing the results from the Fama and French three factor model to the results from the Cahart (1997) Model (Table 17) for portfolios based on returns only, it should be noted that the value premium factor (HML)is insignificant for both groups of portfolios (losers and winners). The momentum factor is significant for both groups of portfolios based on returns only but was negative for the loser's portfolios. This is so because as the difference between the winner's portfolio and loser's portfolio increases, it negatively affects the returns from a winner's portfolio but positively affects returns from a loser's portfolio as the winners buy up the losers' portfolios.

Table 16: Investigating momentum effects using the Carhart (1997) model

Based on return only					
Portfolio	**Constant**	**Market excess return**	**SMB**	**HML**	**WML**
P1	0.0400***	0.9833***	0.6428**	0.1735	-0.6085***
P3	0.0433***	0.8798***	0.6554*	0.1909	0.3914**
Small Market Capitalization portfolios					
Portfolio	**Constant**	**Market excess return**	**SMB**	**HML**	**WML**
SP3	0.0221***	0.7659***	0.8765***	0.3019***	-0.5455***
SP1	0.0360***	0.9785***	0.9166***	0.2024***	0.4544***
Big Market Capitalization portfolios					
Portfolio	**Constant**	**Market excess return**	**SMB**	**HML**	**WML**
BP3	0.0408***	1.0221***	-0.7500***	-0.3283***	-0.9653***
BP1	0.0578***	1.4930***	-0.8821***	-0.4528***	0.0346
Low book equity to market equity portfolios					
Portfolio	**Constant**	**Market excess return**	**SMB**	**HML**	**WML**
LP3	0.0365***	0.8674***	-0.2671***	-0.6739***	-0.9281***
LP1	0.0369***	0.9917***	-0.4182***	-0.5457***	0.0718**
High book equity to market equity portfolios					
Portfolio	**Constant**	**Market excess return**	**SMB**	**HML**	**WML**
HP3	0.0298***	0.9644***	0.7150***	0.8487***	-0.3748***
HP1	0.0327***	0.8932***	0.7730***	0.7891***	0.6251***

NB: $^{*}p< 0.1$, $^{**}p< 0.05$, $^{***}p< 0.01$

When investigating the momentum portfolios sorted by size, it was found that the momentum factor was significant for all portfolios based on small market capitalization but for the big market capitalization portfolios, the momentum factor was insignificant for the winners (BP1) portfolios. The size premium and value premium factors were negative for the big market capitalization while for the small market capitalization they were positive. This is consistent with literature which suggests that small market

portfolios tend to outperform big market portfolios thus the size and value premium of small market portfolios positively determine the momentum portfolio returns.

Investigating the momentum portfolios sorted by value, it has been seen that the momentum factor was significant for all portfolios in the low and high BE/ME portfolios with all signs as expected. The size premium and value premium factors were positive for the high BE/ME portfolios and negative for the low BE/ME momentum portfolios.

5.7 Conclusion

The results show that anomalies exist on the MSE. Days such as Tuesday and Thursday have higher returns than the other trading days and retain the lowest risk. There is no existence of the January effect on the MSE. However, anomalies were found to dominate in the month of May which has the highest return compared to other months. Momentum strategies exist on the MSE and are pervasive in all strategies considered in the study.

CHAPTER SIX

CONCLUSIONS AND POLICY IMPLICATIONS

6.1 Summary and conclusion of results

The efficient market hypothesis suggests that stock markets are rational and that stock prices reflect fully all available information whether private or public. Thus, share prices do quickly adjust to new information as it is made available. However, evidence has shown that certain markets are inefficient thus leading to certain market players earning profits above the market (abnormal profits). Market anomalies are the unusual occurrence or abnormality in smooth pattern of a stock market. This paper has investigated the existence of such anomalies and opportunistic or momentum strategies by participants on the Malawi Stock Exchange within the asset pricing models for the period of January 2011 to December 2015. The market model and the Fama and French three factor model were adopted in the analysis. The market model was used to analyze the day of the week and the month of the year effects at company level and market level while the Fama and French three factor model was used to analyze anomalies and momentum strategies at portfolio level.

The study found that Tuesday and Thursday which had the lowest risk recorded the highest positive returns. At the market level, the returns for Tuesday and Thursday were statistically positive and stronger than the other trading days. However, there is variation

in day of the week effect when investigating individual listed companies. Analyzing day of the week effect at portfolio level, the study found that none of the days of the week was significant in explaining the day of the week effect. The January effect was minimal at Company level and none both market level and portfolio level. Companies are required to publish their end of year results in May which records the highest return and the lowest risk. Small market capitalization portfolios as well as high book equity to market equity were found to be with strong momentum profits. In addition, the 12/12 month strategy was found to be significant and retained the lowest risk than the other momentum strategies. The momentum factor was also statistically significant when considering momentum portfolios using the Cahart (1997) model, in addition to the size effect and value premium. Thus, stock market anomalies exist on the Malawi Stock Exchange as the study observed day of the week effects and month of the year effect.

6.2 Policy Implications

One of the most important sustainability requisite for the accelerated development of the economy in Malawi is the existence of a dynamic financial market. Therefore this study has several policy implications with regards to this.

Firstly, evidence of the day of the week effect on the MSE does suggest that the market is not efficient. One of the reasons for such inefficiencies is information asymmetry. Institutional traders have more market information than individual investors. As such individual investors and tourist investors have information from media pundits which is not enough to base an investment decision on. Institutional investors can carry out

research to obtain more market information to base their investment decisions. Policies to deal with information asymmetry should be made. Member and non-member institutions of the MSE should have research departments which would be able to research the stock market and supply the information to their investors, both institutional, individual and tourist investors. Availability of information to investors and potential investors will lead to the disappearance of the day of the week effect.

In addition, regulators of the Malawi Stock Exchange should institute mechanisms of preventing self-dealing amongst the small number of dominant players on the Malawi Stock Exchange as this results in massive accumulation of wealth amongst a small section of the community which effectively diminishes the market confidence as a large percentage of participants in an economy cannot trust the stock market as a tangible investment. The market can reduce the exploitation of the profitable trading rules by increasing the number of listed stocks and the volume of trading. This can be done by establishing larger investment houses with the capacity to organize complex financial information.

Secondly, formulation of policies to develop the infrastructure and improvement in the services offered by the exchange are crucial to boost operational efficiency and attract both local and foreign investors. There should be major improvements in the trading infrastructure such as a central depository and settlement system, which is a computerized system to speed up clearing and settlement.

Lastly, fund managers without a momentum mandate may inadvertently or purposefully expose the portfolio to the momentum factor. This can be seen by the estimation of the momentum factor in the Carhart model (1997).The reserve bank should consider establishing in the investment policy statement explicit guidelines on the role of momentum investing by fund managers.

6.3 Study Limitations and Area for Further Research

It is important to recognize that though it has been evidently proven that market anomalies do exist on the Malawi stock exchange, it does not constitute proof that existing paradigms are wrong. It must be recognized that there might exist issues of data snooping as much of the research done on financial market anomalies is prone to data snooping. More research is needed to resolve these issues. In addition, investigation of anomalies on sector level was not possible due to unavailability of data on sectors.

Well-established asset pricing paradigms are significantly challenged by the evidence of the existence of market anomalies in Malawi. However, there is but little consensus on alternative theoretical models. Due to this problem, the focus of future research should be on the development of such models.

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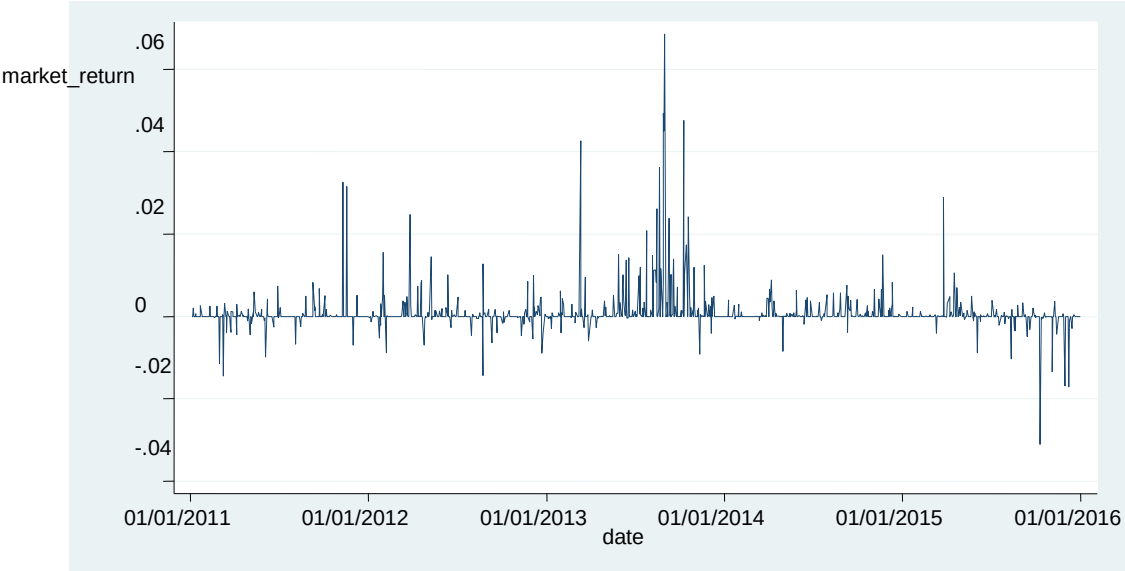
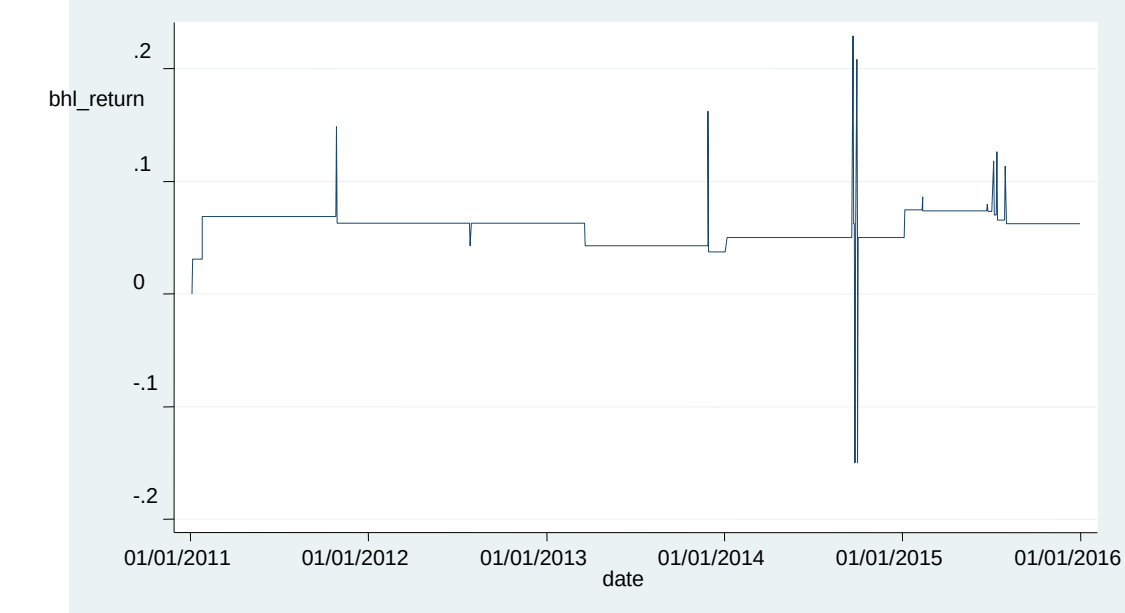
APPENDICES

Appendix 1:Market return



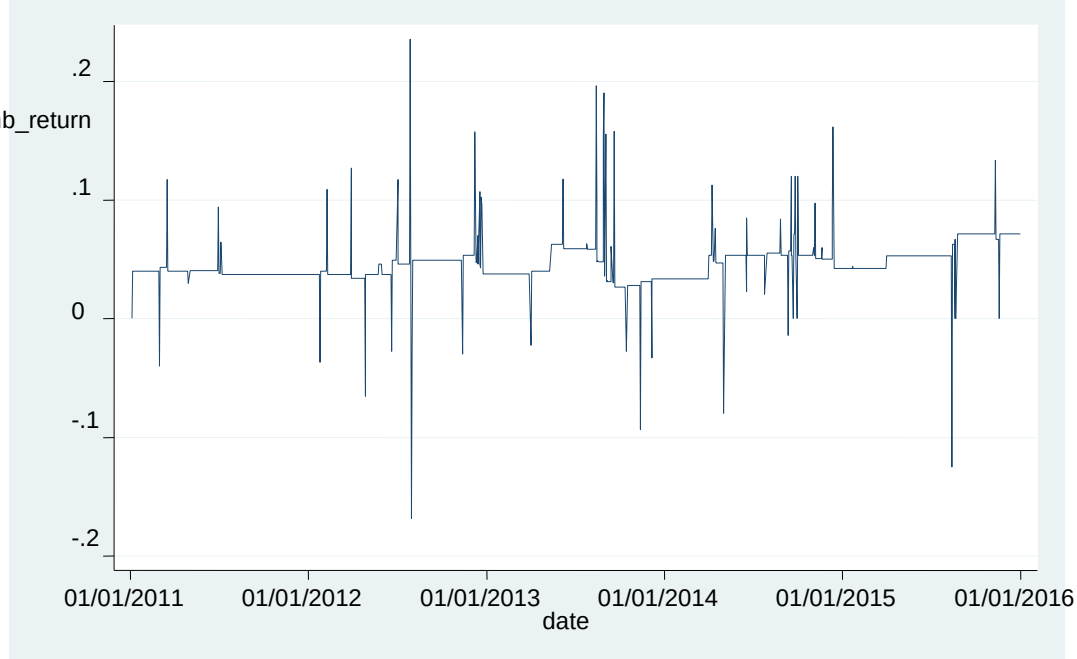
Source: authors own computation

Appendix 2: BHL Return



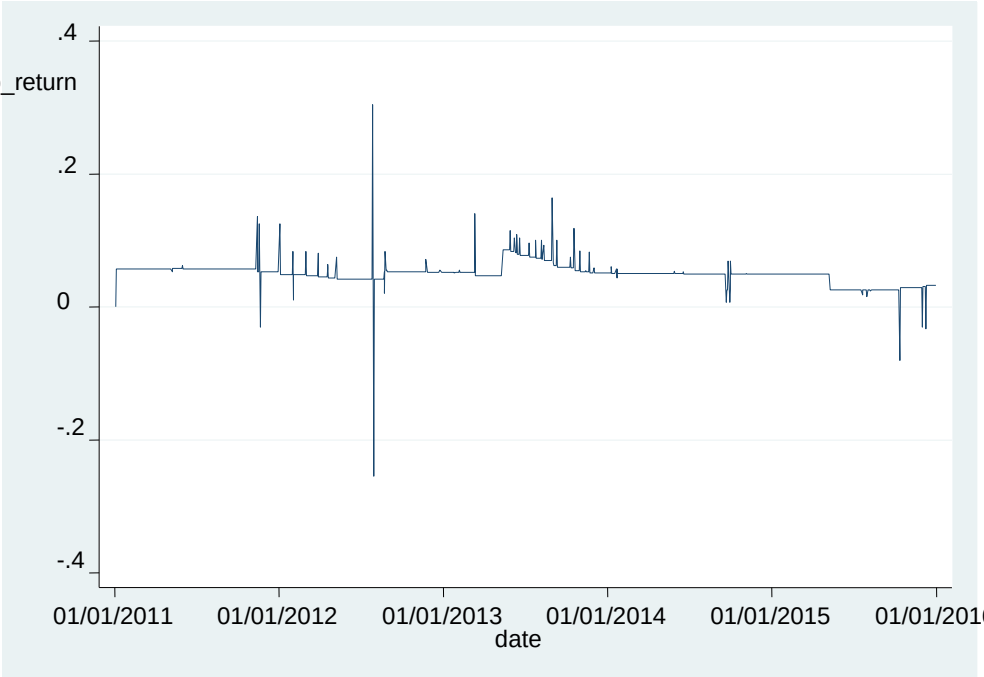
Source: authors own computation

Appendix 3: FMB Return



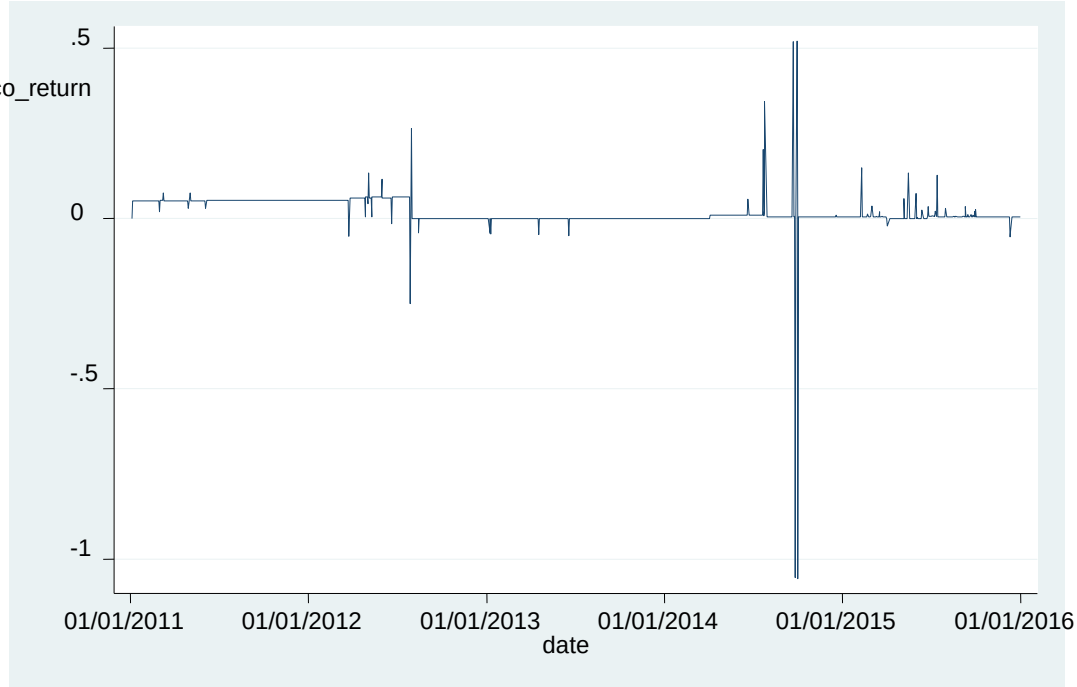
Source: authors own computation

Appendix 4: Illovo Return



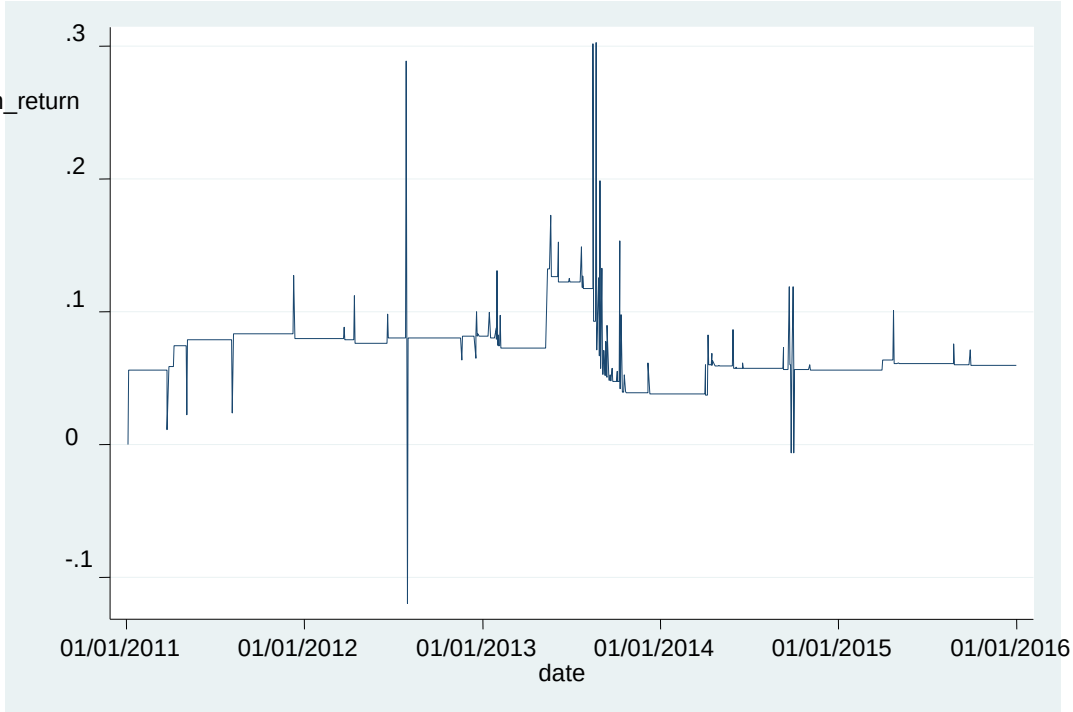
Source: authors own computation

Appendix 5: Mpico Return



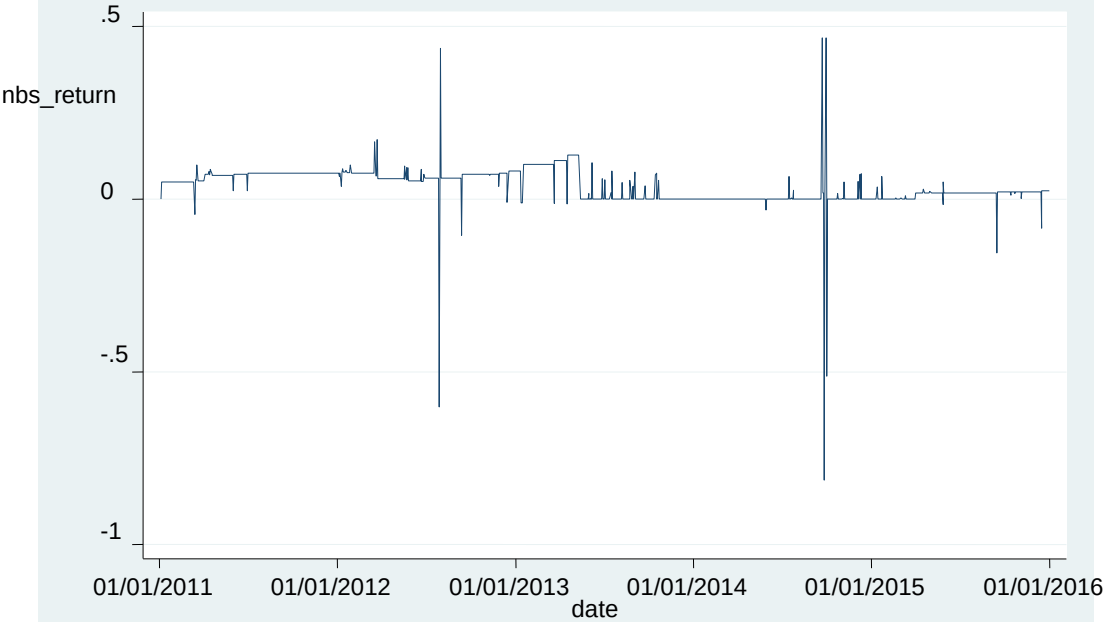
Source: authors own computation

Appendix 6: NBM Return



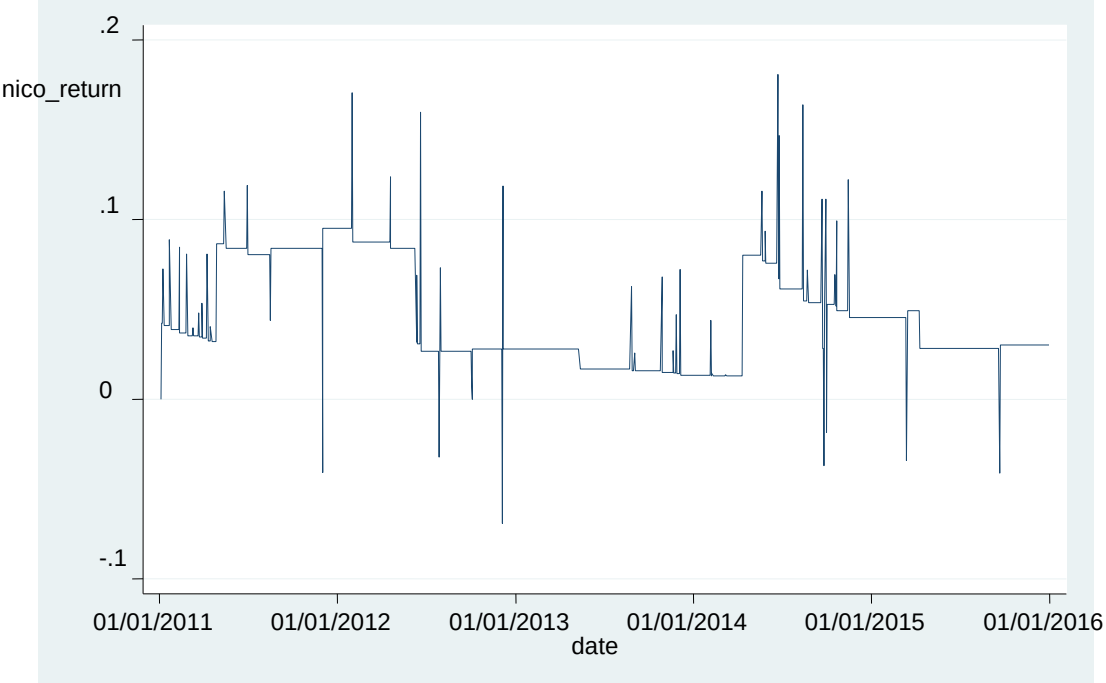
Source: authors own computation

Appendix 7: NBS return



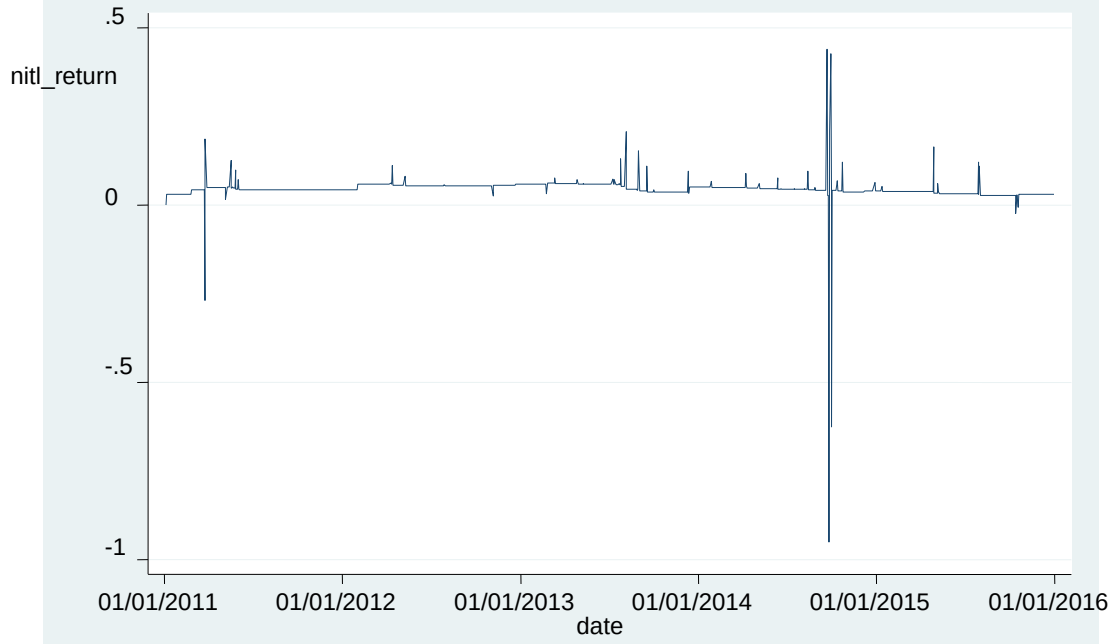
Source: authors own computation

Appendix 8: NICO return



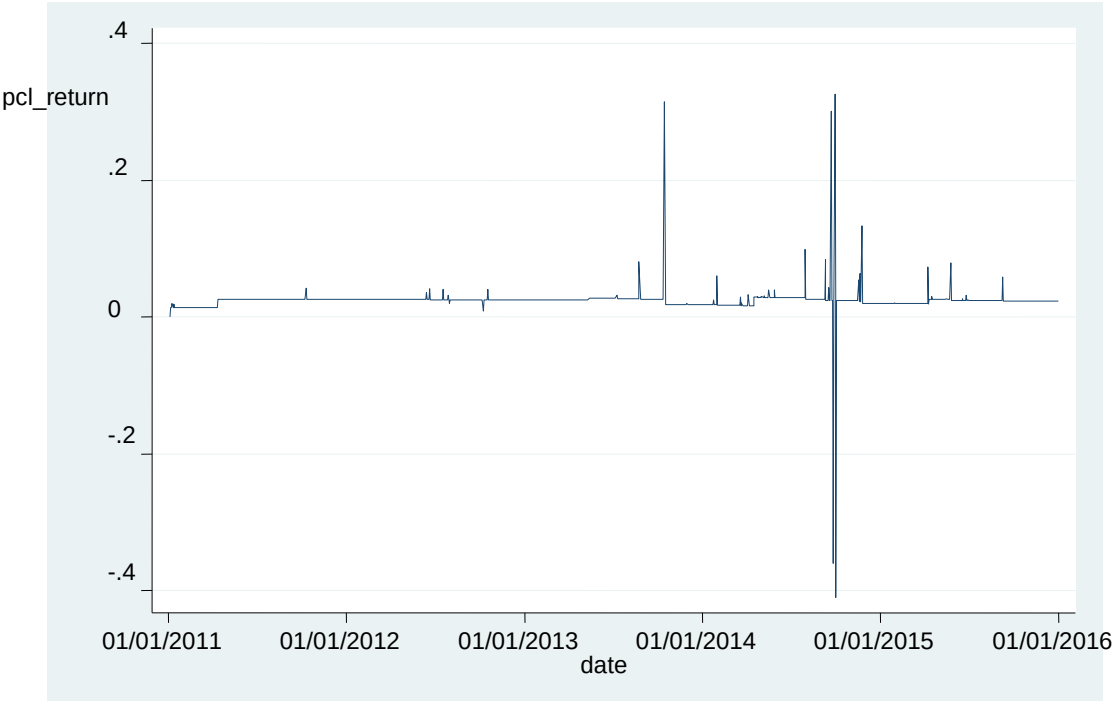
Source: authors own computation

Appendix 9: NITL return



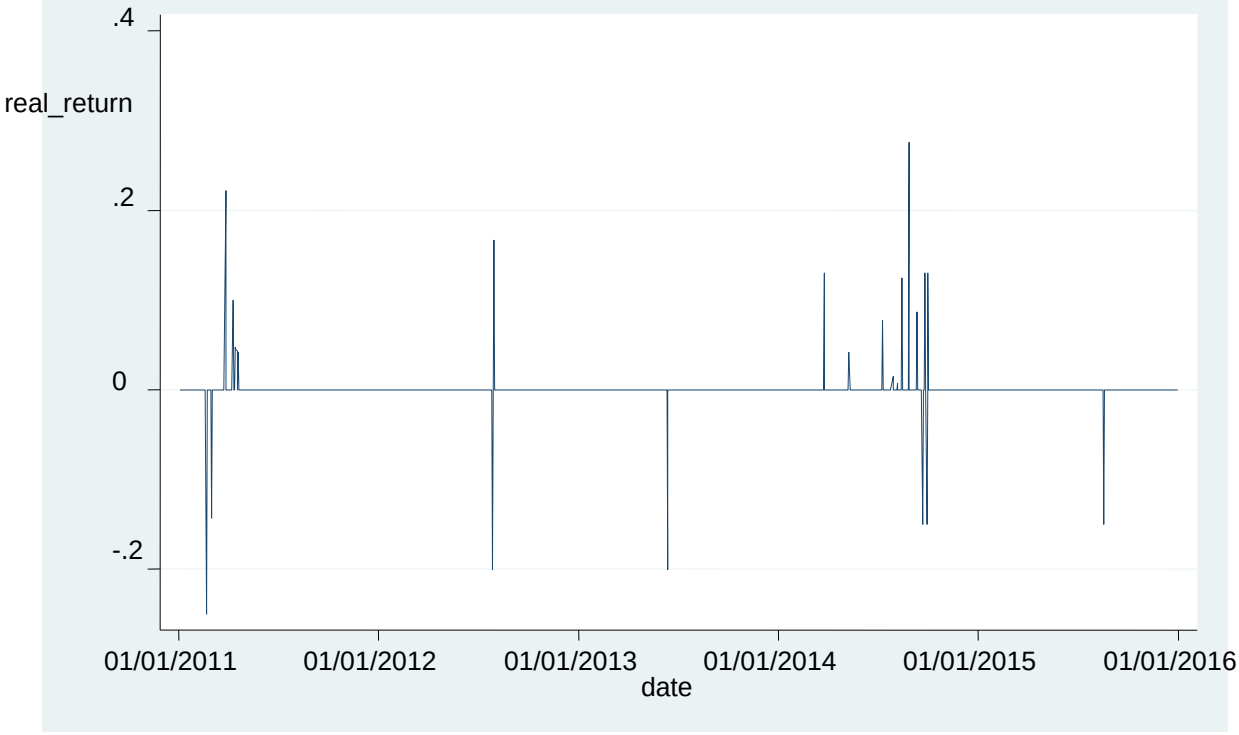
Source: authors own computation

Appendix 10: PCL return



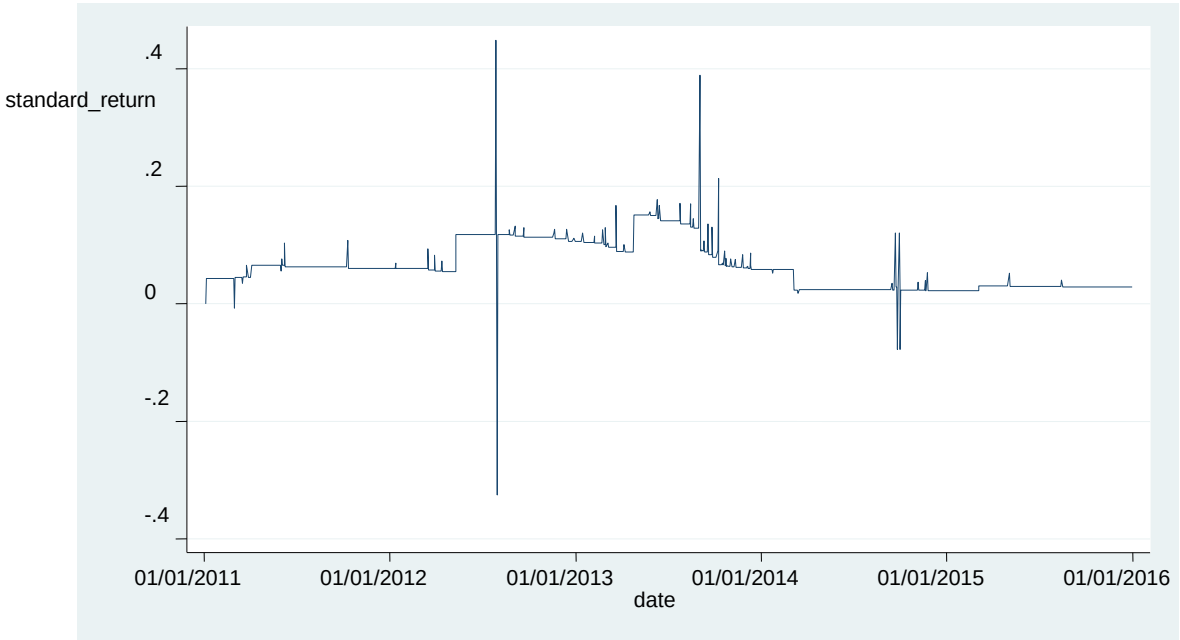
Source: authors own computation

Appendix 11: REAL return



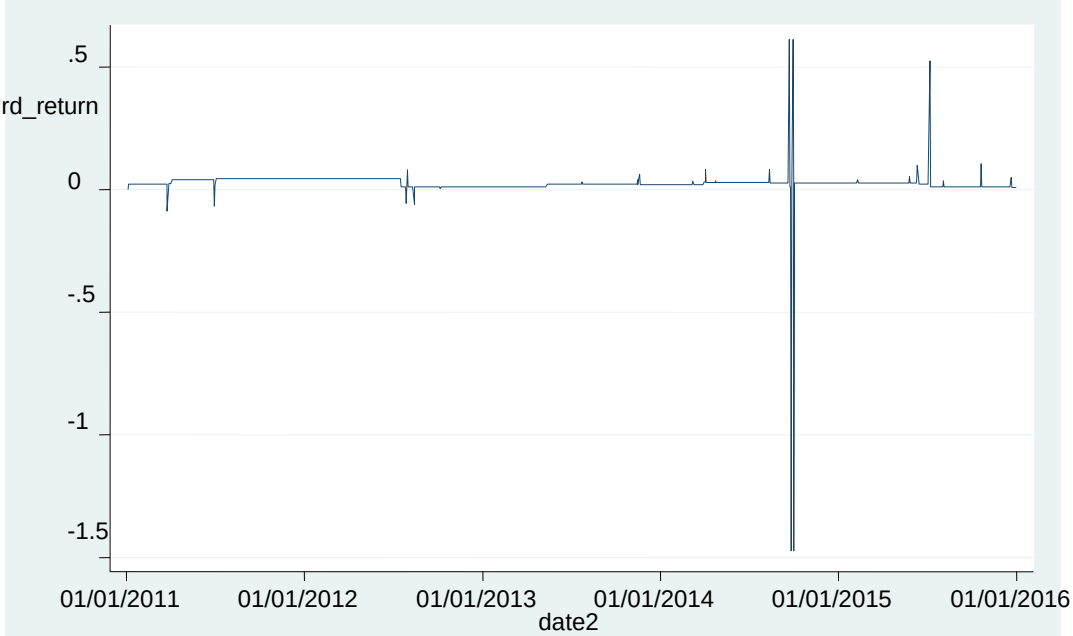
Source: authors own computation

Appendix 12: STANDARD return



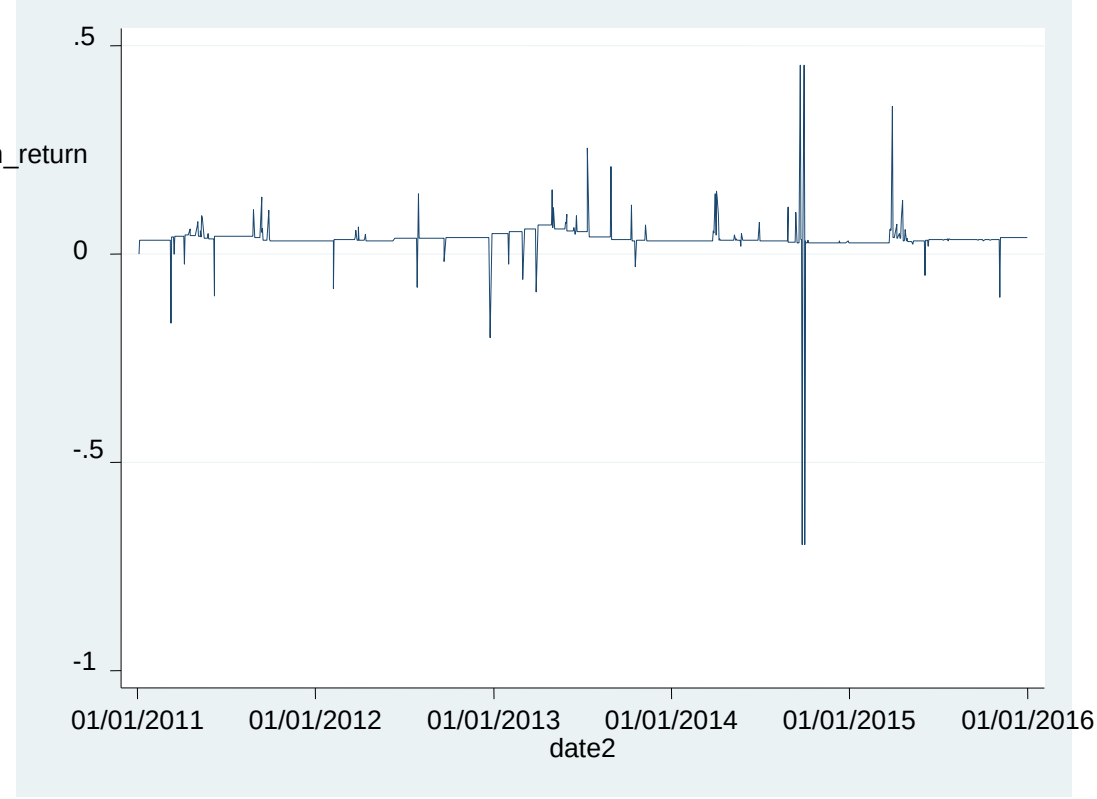
Source: authors own computation

Appendix 13: SUNBIRD return

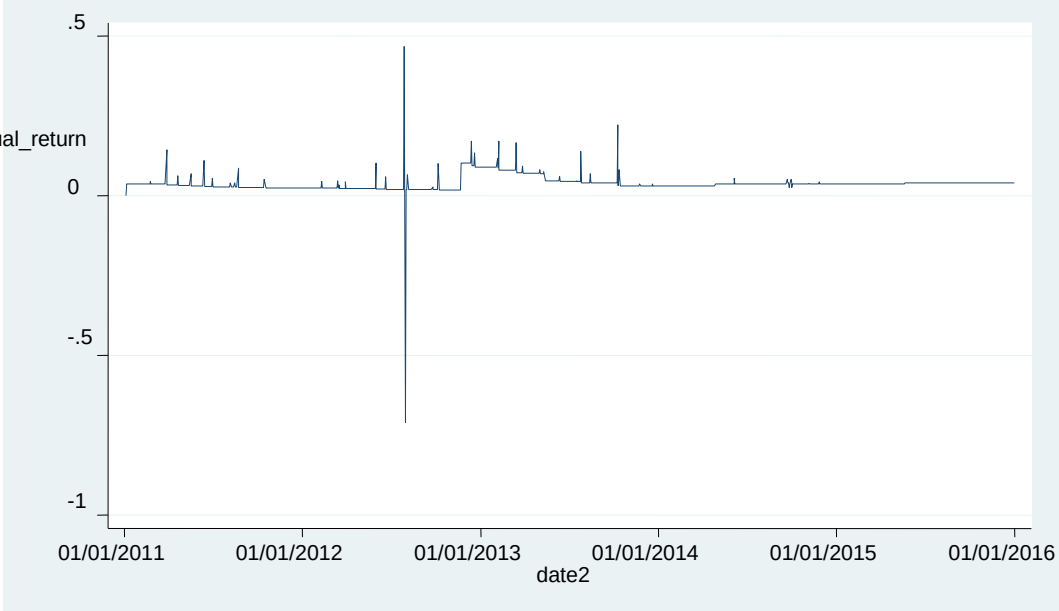


Source: authors own computation

Appendix 14: TNM return



Appendix 15: OLD MUTUAL return



Source: authors own computation

Appendix 16: Categorization of portfolios 2011

LOW-HIGH

COMPANY	30/12/2011	
ILLOVO	0.185185	
OLDMUTUAL	0.271739	
TNM	0.381679	
STANDARDBANK	0.4329	LOW
FMB	0.4623	
NBM	0.487805	
NBS	0.490196	
REAL	0.598802	
NICO	0.980392	
BHL	1.219512	
NITL	1.234568	HIGH
PCL	1.298701	
MPICO	2.325581	
SUNBIRD	2.777778	

SMALL-BIG

Company	30/12/2011	
REAL	300	
BHL	899.15	
SUNBIRD	1831.08	
NITL	2160	SMALL
MPICO	3447.07	
NBS	7276.43	
NICO	11473.45	
FMB	16353.75	
TNM	19076.86	
PCL	21646.05	
STANDARD	22400.08	BIG
NBM	24513.64	
ILLOVO	92747.77	
OLDMUTUAL	247092951	

S/L	S/H	B/L	B/H
NBS	REAL	FMB	PCL
	BHL	TNM	
	SUNBIRD	STANDARD	
	NITL	NBM	
	MPICO	ILLOVO	
	NICO	OLDMUTUAL	

Source: authors own computation

Appendix 17: Categorization of Portfolios 2012

	LOW-HIGH	
Company	**31/12/2012**	
ILLOVO	0.188679	
REAL	0.279329	
FMB	0.4329	
STANDARD	0.452489	LOW
TNM	0.584795	
NBM	0.609756	
OLDMUTUAL	0.70922	
NBS	0.813008	
NICO	0.925926	
PCL	1.408451	
NITL	1.428571	HIGH
BHL	1.515115	
SUNBIRD	3.030303	
MPICO	3.571429	

	SMALL-BIG	
Company	**31/12/2012**	
REAL	300	
BHL	904.35	
SUNBIRD	1700.29	
NITL	2295	SMALL
MPICO	2757.66	
NBS	8004.08	
TNM	14056.63	
NICO	14915.49	
FMB	19858.13	
PCL	22608.09	
NBM	25727.65	BIG
STANDARD	27355.83	
ILLOVO	109406.7	
OLDMUTUAL	3312378	

S/L	S/H	B/L	B/H
REAL	BHL	FMB	NICO
TNM	SUNBIRD	NBM	PCL
	NITL	STANDARD	
	MPICO	ILLOVO	
	NBS	OLDMUTUAL	

Source: authors own computation

Appendix 18: Categorization of Portfolios 2013

	LOW-HIGH	
Company	31/12/2013	
ILLOVO	0.160772	
STANDARD	0.192678	
NBM	0.214592	
FMB	0.346021	LOW
TNM	0.383142	
NBS	0.613497	
NICO	0.847458	
OLDMUTUAL	0.900901	
REAL	1	
PCL	1.219512	
NITL	1.369863	HIGH
BHL	1.639344	
SUNBIRD	4	
MPICO	5	

	SMALL-BIG	
Company	**31/1/2013**	
REAL	250	
BHL	1033.54	
SUNBIRD	1831.08	
MPICO	2298.05	SMALL
NITL	3982.5	
NBS	11642.29	
NICO	18566.13	
TNM	21486.56	
PCL	34272.91	
FMB	35043.75	BIG
STANDARD	8533.63	
NBM	100389.2	
ILLOVO	204758.5	
OLDMUTUAL	6659045	

S/L	S/H	B/L	B/H
NBS	REAL	TNM	PCL
NICO	BHL	FMB	OLDMUTUAL
	SUNBIRD	STANDARD	
	MPICO	NBM	
	NITL	ILLOVO	

Source: authors own computation

Appendix 19: Categorization of portfolios 2014

	LOW-HIGH	
Company	31/12/2014	
ILLOVO	0.156739	
STANDARD	0.224719	
TNM	0.241546	
NBM	0.285714	LOW
FMB	0.387597	
NBS	0.458716	
NICO	0.740741	
REAL	0.877193	
OLDMUTUAL	0.877193	
PCL	1.052632	
NITL	1.333333	HIGH
BHL	1.694915	
SUNBIRD	3.703704	
MPICO	3.846154	

	SMALL-BIG	
Company	31/12/2014	
REAL	575	
BHL	1033.54	
SUNBIRD	2092.66	
MPICO	4619.08	SMALL
NITL	5602.5	
NBS	19646.37	
NICO	33898.84	
TNM	41065.44	
FMB	44295.3	
PCL	54489.91	
STANDARD	102000	BIG
NBM	112529.3	
ILLOVO	209895.3	
OLDMUTUAL	6857622	

S/L	S/H	B/L	B/H
NBS	REAL	TNM	PCL
NICO	BHL	FMB	OLDMUTUAL
	SUNBIRD	STANDARD	
	MPICO	NBM	
	NITL	ILLOVO	

Source: authors own computation

Appendix 20: Categorization of portfolios 2015

	LOW-HIGH	
Company	31/12/2015	
TNM	0.21978	
ILLOVO	0.255102	
STANDARD	0.359712	
NBM	0.3663	LOW
FMB	0.653595	
NBS	0.699301	
OLDMUTUAL	0.892857	
NITL	1	
NICO	1.010101	
PCL	1.162791	
REAL	1.219512	HIGH
SUNBIRD	1.388889	
MPICO	1.923077	
BHL	2.857143	

	SMALL-BIG	
Company	**31/12/2015**	
REAL	500	
BHL	1240.25	
SUNBIRD	6016.4	
NITL	7425	SMALL
MPICO	9421.99	
NBS	16735.8	
NICO	29205.15	
FMB	32707.5	
TNM	60242.7	
PCL	64336.86	
STANDARD	103254	HIGH
NBM	120468.4	
ILLOVO	164092.3	
OLDMUTUAL	6906471	

S/L	S/H	B/L	B/H
NBS	REAL	FMB	PCL
	BHL	TNM	
	SUNBIRD	STANDARD	
	NITL	NBM	
	MPICO	ILLOVO	
	NICO	OLDMUTUAL	

Source: authors own computation

Appendix 21: Age and size of selected African stock markets (2002)

Stock Exchange	Year formed	Number of listed firms	Market Capitalization (US$'M)	Main stock exchange index
Algeria	1999	3	145	LA all share
Botswana	1989	19	1 717	BSE Domestic
Cote d'lvoire (BRVM)	1998	38	1 329	BRVM 10
Egypt (Cairo & Alexandria)	1903 1888	1151	26 245	CMA General
Ghana	1989	24	382	GSE all share
Kenya	1954	50	1 676	NSE 20 share
Malawi	1996	8	107	MSE all share
Mauritius	1989	40	1 324	SEM index
Morocco	1929	56	8 319	Morocco all share
Namibia	1992	13	201	NSX local companies
Nigeria	1960	195	5 989	NSE All share
South Africa (Johannesburg)	1887	472	182 616	JSE All share
Swaziland	1990	5	146	SSX all share
Tanzania (Dar es salaam)	1998	5	695	LA all share
Uganda	1997	3	52	LA all share
Zambia	1993	11	231	LuSE all share
Zimbabwe	1896	77	11 689	ZSE Industrial

Source: World Development Indicators 2002

Appendix 22: Trading arrangements on African stock markets, 2002

Stock Exchange	Trading Days	Trading hours	Trading Method	Clearing & Settlement	Settlement cycle
Algeria	Monday	9:30-11:10	Automated trading system	Electronic	T+4
Botswana	Mon- Fri	9:00-9:30 & 15:00-15:30	Call over system	Manual, T by T	T+5
Egypt	Sun- Thur	11:30-15:30	Computer based trading with automated matching	Manual, T by T	T+4
Ghana	Mon, Wed, Fri	10:00-13:00	Call over with limited auction	Manual, T by T	T +5
Kenya	Mon- Fri	10:00–12:00	Open outcry, continuous order driven system	Manual, T by T	T +5
Malawi	Mon – Fri	10:30-12:00	Call over floor based system	T by T	T+7
Mauritius	Mon – Fri	10:00-11:00	Screen based ATS, order driven & single price auction	Automated strict delivery vs payment	Rolling T+3
South Africa	Mon- Fri	9:00-16:00	JET order driven continuous auction on trading floor	Electronic strate	Rolling T+5
Tanzania	Tue, Wed, Thur	10:00-12:00	Open outcry auction system	Electronic, transaction by transaction	T +5
Zambia	Mon- Fri	10:00-11:00 &12:00-13:00	Single price auction order matching	T by T	T+5
Zimbabwe	Mon- Fri	8:00-16:30	Call over, floor based system	Automated T by T	T+7

Source: Stock exchange websites