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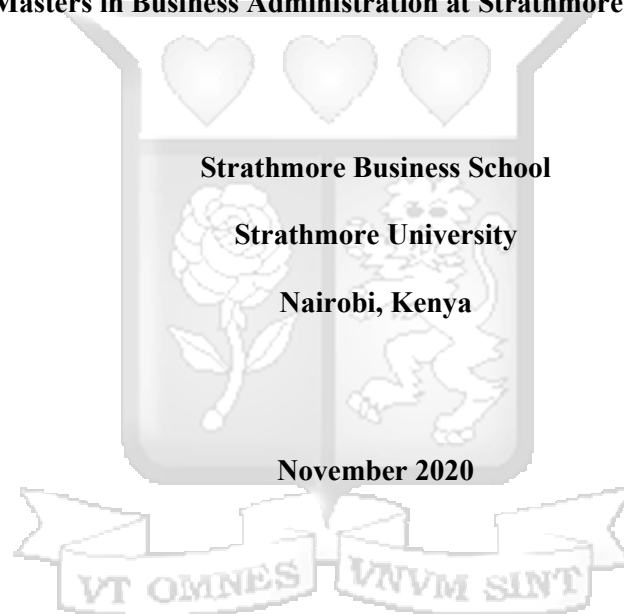
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**IMPACT OF FINANCIAL GLOBALISATION ON EQUITY RETURNS IN THE
NAIROBI SECURITIES EXCHANGE**

Karanja Gichiri

MBA/46579/2015

**A Dissertation Submitted in Partial Fulfilment of the Requirements for the Degree of
Masters in Business Administration at Strathmore University**



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Abstract

This study tests the impact of financial globalisation on equity returns in Kenya using daily and monthly data between 2002 and 2019. First, the study measures the degree of integration of the Kenyan equity market represented by the NSE-20 share index with the world equity markets proxied by the MSCI World Index and the MSCI Frontier Index. The time-varying attributes of integration were studied using monthly returns in USD from January 2002 to December 2019. Based on multiple linear regressions, the study establishes that the NSE returns is partially integrated with the MSCI Frontier markets returns and MSCI World All Countries. The data analysis also showed that the MSCI Frontier index had a higher coefficient of determination relative to MSCI World All Countries. The NSE 20 returns had a weak negative relationship with economic openness and a weak, positive relationship with foreign investor participation, both of which are measured as global aggregates. The higher coefficient of determination between the NSE 20 with the MSCI Frontier index relative to MSCI World All Countries implies that there could exist different levels of stock market intergration that can be attributed to the varying degree of Kenya's trades with countries in Frontier markets compared to those in the developed markets. The findings of this study show that improving globalisation, represented by improved foreign investor participation and improving global trade is not of statistical significance while determining monthly NSE 20 returns.

Key words: *Globalization, Equity market integration, Frontier Markets, Kenya*

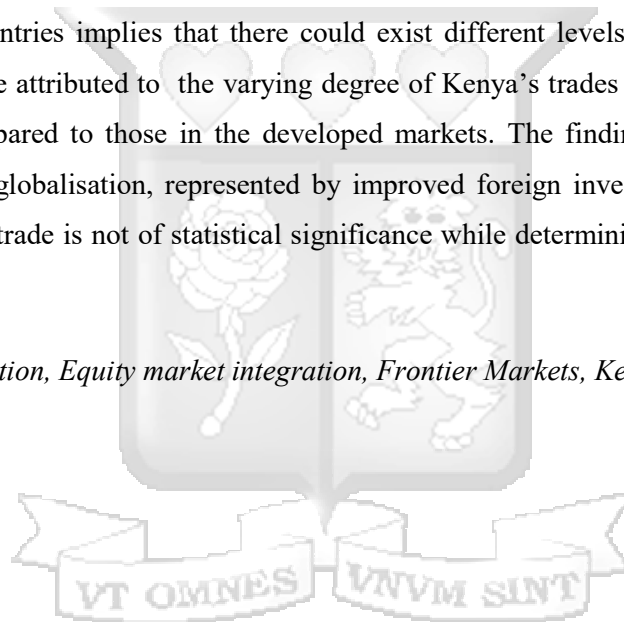


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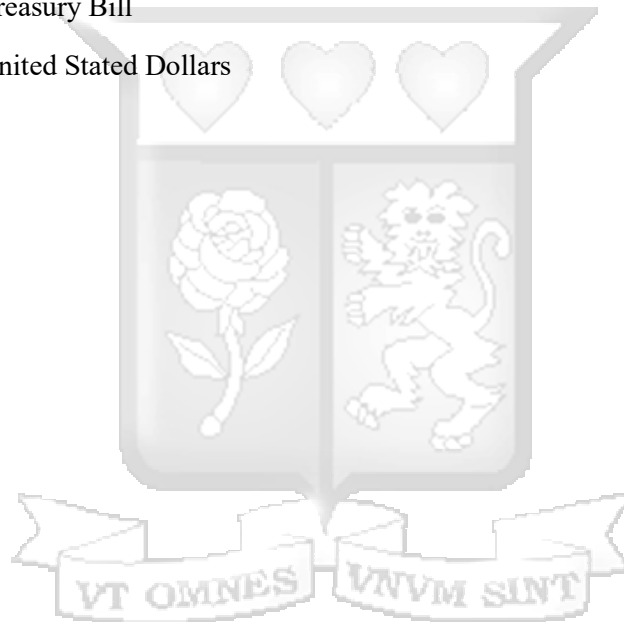
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List of Abbreviations

APT	Arbitrage Pricing Theory
CAPM	Capital Asset Pricing Model
FDI	Foreign Direct Investment
Fx	Foreign Exchange return
GDP	Gross Domestic Product
GEMS	Growth Enterprise Market Segment
KES	Kenya Shillings
MIMS	Main Investment Market Segment
MSCI	Morgan Stanley Capital International Frontier
NSE	Nairobi securities exchange 20 Share Index
T-bill	Treasury Bill
USD	United States Dollars



Chapter 1: Introduction

1.1. Background to the study

Financial integration continues to play an increasing role in determining equity asset prices across emerging markets. Studies by Claessens and Kose (2017) indicate that over the past two decades, global factors have been attributed to 68% of asset price movements. The authors also note increasing correlation of asset prices among advanced countries and emerging markets. Authors such as Carrieri, Errunza and Hogan (2007) and Pukthuanthong and Roll (2009) all note that the level of integration with global markets across emerging markets has been increasing. A case in point is in Vietnam where studies by Hussainey and Ngoc (2009) showed that the volatility of Vietnamese stock prices changed 13.17 times on when the volatility of US' GDP changed by 1 percent.

Financial globalization and integration are closely related and used interchangeably since, of necessity, increasing financial integration requires financial globalization (Prasad, Rogoff, Wei, & Kose, 2007). Prasad et al (2007) define financial globalization as “an aggregate concept that refers to the increasing global linkages created through cross border financial flows”. Bekaert and Harvey (2002) define financial integration as “free access of foreigners to local capital markets and local investors to foreign capital markets”. Schuler (2004) defined financial integration as “the as the integration of a country's local financial system with international financial markets”. In this study, financial globalization will also encompass financial integration.

A country's financial globalisation takes place in two aspects. The first is the cross-border flows associated with the movement of goods and services which is captured by the country's current account. The Trade to GDP ratio measures a country's economic openness and is computed as a sum of the exports and imports divided by the GDP (Bekaert et al. 1996, Jaumotte, Lall, & Papageorgi, 2013 Shah & Patnaik, 2011). The second aspect of financial globalisation is the cross-border flow of debt and equity in a country. This movement of capital is represented by the country's capital account and is measured using three key metrics. The first is the Foreign Assets and Liabilities to GDP which is a sum of all foreign assets and liabilities as a ratio to GDP. A key advantage of using this measure is the correction of valuation effects since it measures the cumulative valuation of flows over the period at the current exchange risks. A downside of this measure is the frequency of calculation, which is often annual/semi-annual in emerging markets (Kose, Prasad, Rogoff, & Wei, S. 2006; Kose, et al., 2009, Kalemli-Ozcan, Papaioannou, & Peydró, 2009). A second measure that denotes capital account movement is the correlation of equity returns of two or

more equity returns. This measure carries the advantage of being frequently measured; many equity markets post their returns daily through key index movements. However, this measure it is subject to currency exchange risk which should be accounted for while using it (Adam, Jappelli, Menichini, Padula, & Pagano, 2002; Kose, et al., 2009). The third measure that denotes movement in the capital account is the Foreign Investor Participation which measures of the cross-border trading by foreign investors in a country. It is the average of the ratio of foreign purchases and sales to equity market turnover (Stulz, 2005; Kariguh, 2012). This measure carries the advantage of frequent measurement. That said empirical review by Kose, et al., (2009) established that equity portfolio movements are smaller relative to other capital movements in emerging markets.

There are several drivers to a country's financial globalisation. The first is improving trade a country has with the rest of the world. Pretorius (2002) noted that a countries with improving bilateral trade ties have higher levels of equity market integration over time. Boamah (2016) observed that in Africa, the degree of a country's stock market integration depends on its trade diversification. Trade between countries facilitates financial integration in various ways. It generates cross boarder financial flows and instruments such as letters of credit and export insurance. Critically, it facilitates exchange of information about a country to the investor community of the trading country thus increasing willingness to invest in its foreign assets (Lane & Milesi-Ferretti, 2008).

A second driver of financial globalisation is the capital control policies adopted by a country. Lane and Milele-Ferrtti (2008) note from their study that a history of capital account has a negative effect on financial globalisation measured by the sum of foreign assets and liabilities in a country. In India, the government began implementing policies to decontrol the capital account in the early 1990's. This resulted to foreign direct investments, measured as a sum of equity and debt, improved from 2% of GDP in 1990 to 4.55% in 2010 (Shah & Patnaik, 2011).

The third driver of financial globalisation is country specific macro-economic factors such as exchange rates, inflation, interest rates and money supply which affect the valuation of a stock using the cash flow model (Pretorius (2002). The improvement of country specific variables spurs a county's financial globalisation. A case in point is with European Union which created a single economic block and adopted use of the Euro which replaced the member countries' national currencies. The impact was elimination of currency risk among member countries which reduced home market bias and increased financial trade within the EU region (Lane & Milesi-Ferretti, 2008).

There are several benefits that accrue to a country when it improves its financial globalisation. There are several benefits that accrue to a country when it improves its financial globalisation. The first is the lowering of cost of capital and consequently increase the total value of the equity markets (Bekaert & Harvey 2000b). Another benefit is the transfer of managerial and technological expertise with transfer of equity and foreign direct investment flows (Kose, et al., 2009). A third benefit of financial globalisation is the development of the country's financial system through two avenues. First, it increased the aggregate sum of funds available in the market and secondly, improved governance of equity markets as governments seek to attract foreign investments (Schmukler, 2004).

A downside of financial globalisation is the increased risk of a financial crisis and contagion. The increasing stock market intergration implies that events in one market can have a significant impact on other markets (Schmukler, 2004; Agyei-Ampomah, 2011). This contagion effect can have adverse effects on an economy, especially when there are sudden withdrawals of foreing investors from domestic equity markets. This can have a destabilizing effect on economies as evidenced by the Mexican and Asian financial crisis in the 1990s (Al Asad Bin Hoque, 2007). A country's improving financial globalisation could also expose it to increased probability of a currency crisis. Research by Kose, et al., (2009) indicates that a higher level of FDI is associated with higher likelihood of an foreign exchange crisis. Financial Globalisation has also been criticised for not contributing to economic growth. Authors such as International Monetary Fund (2009) and Kose, et al., (2009) point there is little evidence to support the notion that improved foreign investor participation leads to improved economic performance. Research by the International Monetary Fund (2009) shows that countries that have experienced rapid growth relied less on capital inflows.

1.2. Overview of the Nairobi Securities Exchange

The Nairobi Securities Exchange (NSE) is Kenya's sole public securities trading platform for listed securities in Kenya. The NSE is Africa's 4th largest exchange and is East and Central Africa's largest exchange (Odero, Reeves, & Kipyego, 2015). There are 66 companies listed with a daily average trading volume of USD 10 million and a market capitalisation of USD 23 billion (Kestrel Capital, 2020).

The Nairobi Securities Exchange (2016) lists seven indices to track market activity. They are NSE All Share Index, NSE 20 Share Index , NSE 25 Share Index, FTSE NSE Kenya 15 Index, FTSE NSE Kenya 25 Index, FTSE NSE Kenya Govovement Bond Index and the FTSE ASEA Pan African Index. The study will use the NSE 20 share index as the main proxy of market activity. The NSE 20 share index is defined by the Nairobi Securities Exchange (2015) a price weight index calculated as a mean of the shares of 20 public listed

companies that are blue chip with a strong profitability and dividend record. The index incorporates trading activity measures i.e. market capitalization, shares traded, deals/liquidity and turnover during the period under review are weighed in the ratio of 4:3:2:1 respectively. Given the study seeks to review the entire market's activity, an all encompassing index such as The Nairobi All Share Index (NASI) would be preferable to the NSE 20. However, a study by Osoro and Ambrose (2013) did not find any significant difference in the daily trend or movement of both indices; the two had a positive correlation of 0.807.

Investors in the Nairobi Securities Exchange (NSE) have had negative returns on their investments in 2020. As at 2nd of May 2020, the NSE 20 index posted a negative annual return of -23.5% with year to date (YTD) returns at -26.5%. The index moved from 2,795 on 2nd May 2019 to 1,967 on 2nd May 2020 (Bloomberg, 2020). The MSCI Kenya index is designed to measure in US Dollars the performance of the large and midsize caps in Kenya and covers 85% of the securities listed on the NSE. As at 31st March 2020, the MSCI Kenya index posted a negative annual return of -8.9% with negative YTD performance of -24.8%. This performance mirrors the MSCI Frontier markets annualised negative returns of -18.9% with YTD performance of -26.6%. Since May 31 2002, the MSCI Kenya index has posted annualised returns of 19.2% compared to the MSCI Frontier markets' return of 5.85% (MSCI, 2020). The negative performance has also taken place in a relatively stable inflationary and exchange rate environment. The Kenya government has an inflation target of 5%, with a target range of 2.5% on either side of the inflation target as at February 2020, the annual inflation rate was 5.48% while the 12 month inflation of 6.37% (Central Bank of Kenya, 2020). Since March 2019 to March 2020, the average monthly exchange rate between Kenya Shilling and US Dollar depreciated marginally by 3.4% to KES 103.74 to 1 USD (Central Bank of Kenya, 2020).

1.3. Problem Statement

Kenya's financial markets are becoming increasingly global. Kenya's overall financial globalization, as measured by the KOF index improved from a score of 32.01 in 1970 to 55.93 in 2017 (Gygli, Haelg, Potrafke, & Sturm, 2018). Another pointer to Kenya's increasing globalization has been the growth of foreign investor participation at the NSE. The average foreign participation to total equity turnover from January 2019 to December 2019 was 68.50%. This was an improvement from the 2014 average foreign investor participation which stood at 51.1% (Central Bank of Kenya, 2020).

In completely segmented markets expected returns are a product of local market beta and local market return. However, expected returns in integrated markets depend on world market beta and the world risk premium (Bekaert & Harvey, 2002). Wang and Ye (2016)

argue that generally, developed markets are more integrated in the global market while emerging markets are partially segmented. Studies by Bekaert and Harvey (2000a) and Bekaert, Harvey and Viskanta (1996) provide evidence that a key impact of globalization on emerging market equity returns is the loading of global factors while determining local equity returns.

Bekaert and Harvey (2000a) highlight that a key impact of globalization on emerging market equity returns is the loading of global factors while determine local equity returns. Studies by Boamah (2016) and Kodongo and Ojah (2011) show that the African equity markets, including Kenya's, are partially integrated with global stock markets. The two authors also noted that both global and local factors are loaded while determining stock prices in Africa. Boamah (2016) also notes rising levels of integration with global markets from 1997 to 2013. The loading of global factors has several key implactions on global asset allocation, risk managment and on market policy and regulation(Boamah, 2016).

Studies in Kenya mainly focus on the impact of local macro-economic variables on equity returns (Ouma & Muriu, 2014; Mugambi & Okech, 2016; Kirui, Wawire and Onono, 2014). The focus on local macro-economic factors negates the role of financial globalisation and economic openness in Kenya. Several authors such as Boamah (2016), Kodongo and Ojah (2011) provide evidence of Kenya's integration with global equity markets. Studies by Bilson, Brailsford, and Hooper (2001) on emerging market returns from January 1985 to December 1987 in twenty emerging markets in Latin America, Africa, Asia and Europe show that local macroeconomic returns carry a higher significance in explaining emerging equity returns compared to global factors. That said, regional emerging market returns have a higher level of commonality as compared to global equity returns, suggesting that the equity market integration is tiered, with regional markets taking precedence over global markets.

The NSE has been identified to be partially integrated with global equity markets and consequently, global and local factors can explain the NSE Returns. This study seeks to assess the role of both global factors and local macro-economic factors in determining NSE returns using the approach recommended by Bekaert et al., (1996) and Bilson, et al., (2001). The study assesses the time varying nature of this relationship of the NSE's financial integration with global markets. It will also assess whether the integration occurs in different levels as observed in other emerging markets by Bilson, et al., (2001).

The study on NSE 20 integration to global equity markets used daily data between June 2002 and December 2019 when MSCI World and Frontier index data is available. The study on economic openness used data from January 2009 to December 2019 owing to rebasing of the GDP in 2009. Data on foreign investor participation is available from 2010. The

macroeconomic factors used in the study include inflation, 91-day Treasury bill rates, money supply (M2) and the USD KES exchange rate. Foreign investor participation and economic openness represent the global factors.

1.4. Research Objectives

The broad objective of this research was to establish the extent to which globalization affects the equity returns in Kenya. Three specific objectives were formulated:

1. To determine the extent to which the NSE 20 is integrated to global financial markets;
2. To determine the extent to which economic openness affects NSE 20 returns; and
3. To determine the extent to which foreign investor participation affects NSE 20 returns.

1.5. Research Questions

1. To what extent is the NSE 20 is integrated to global financial markets?
2. How does economic openness affect NSE 20 returns?
3. How does and foreign investor participation affect NSE 20 returns?

1.6. Study's Scope

The study analysis NSE's integration with the MSCI Frontier and MSCI All World Index using daily data from June 2002 to December 2019. Analysis on Economic openness is done using trade data from March 2009 to December 2019 owing to rebasing of Kenya's GDP in 2009. Analysis on foreign investor participation done January 2010 to December 2019 since foreign investor participation data is available from January 2010.

1.7. Justification of the Study

The findings of this research are important to global investors, Kenyan equity investors and in the formulation of monetary policy. The Nairobi Securities Exchange has shed 25.5% of its value (KES 630 Billion) from January 2014 to December 2016 (Nairobi Securities Exchange, 2017). The value lost is equivalent to 10% of Kenya's GDP in 2016 (Central Bank of Kenya, 2016). Kenya's retirement benefits sector had KES 186.8 billion in equities which accounted for 23% of the total assets in the sector. In 2015 alone, there was a 9.6% decline in the value of equities which was attributed to the poor performance of the NSE (Retirement Benefits Authority, 2016). It is thus imperative for both global and local investors to understand the factors that affect NSE's returns in order to formulate appropriate portfolio allocation strategies to mitigate future losses. Global investors who are seeking to diversify from developed equity markets will be keen to understand the extent to which the NSE is integration to the global financial markets.

Regulatory and monetary policies can no longer ignore the impact of globalization while formulating local macroeconomic policies. Studies into the Asian financial crisis highlights that that Asian equity markets had become so highly integrated with the global financial markets that developed markets exerted a strong influence on them(Rao, 2008). In an economy such as Kenya with liberalized foreign exchange regime, capital flight presents a key risk in the overall stability of the exchange rates. Findings from this paper will help policy markers anticipate potential shocks to the exchange rates and provide guidance on the adequate level of FX reserves to address the flight risk.



Chapter 2: Literature Review

2.1. Introduction

The chapter looks into prior research on impact of globalisation and selected macro economic variables on emerging market. The review also defines globalization and presents empirical evidence on its impact on emerging market equity markets. The chapter will conclude on the gaps identified in the literature and a conceptual framework of the study.

2.2. Theoretical background

2.2.1. Capital Asset Pricing Model (CAPM)

The Capital Asset Pricing Model is a model that is used to determine an appropriate rate of return an investor would require for a given asset (Elbannan, 2015). The model was developed by William Sharpe (1963) and John Linter (1965) based on Harry Markowitz's (1952) study, the "Mean-Variance" model.

The model has several assumptions. One of the key assumptions is that there exists a risk-free security bearing a positive return. The model also assumes that the investor can borrow funds to invest in risky assets at the risk-free rate of interest. In CAPM, the investor is not restricted on the fraction of capital they can invest on a finite type of security, the time they can trade the security nor on the amount of funds that can be borrowed. The market is assumed to be one with no transaction costs or taxes. While making an investment, the investor will have specified an expected value and variance to every return and a covariance or correlation to every pair of returns. The investor computes the expected value and variance on any possible portfolio by forming the appropriate weighted average or sum of the components expected returns, variances and covariance. Based on the above assumptions, (Sharpe, 1963) and (Lintner, 1965) developed the CAPM equation expressed as follows:

$$E(R_i) = R_f + \beta[E(R_m) - R_f] \quad (2.2-1)$$

Where market Beta:

$$\beta_{iM} = \frac{Cov(R_i R_M)}{\sigma^2(R_M)} \quad (2.2-2)$$

Where:

- $E(R_i)$ is the expected return on asset (i)
- R_f is the risk-free return

- $E(R_M)$ is the expected market return

β is a measure of the sensitivity of the asset's return to variation in the market return. (Sharpe, 1963) and (Lintner, 1965) defined this as the covariance of the asset return to the market return divided by the variance of the market return.

CAPM is one of most frequently used asset pricing models in applications such as estimating the cost of capital for a firm and evaluating the performance of investment portfolios (Fama & French, 2004), (Elbannan, 2015). Despite its wide use, various studies have pointed out CAPM's drawbacks and limitations which include its unrealistic assumptions of unrestricted risk-free borrowing and lending and unrestricted short selling and failure to take into consideration various additional variables (Elbannan, 2015), (French & Fama 2004).

2.2.2. Arbitrage Pricing Theory

The Arbitrage Pricing Theory (APT) was introduced by Stephen Ross in 1976 as an alternative to CAPM. The theory assumes that asset returns can be estimated asset returns can be estimated through a stochastic process with various number of risk factors included in the liner model (Elbannan, 2015). Based on the assumption that random returns are governed by a k-factor model, Roll and Ross (1980) developed the algebraic expression of the APT model as follows:

$$R_i = E_i + b_{i1}\beta_1 + b_{i2}\beta_2 + \dots + b_{ik}\beta_k + \epsilon_i \quad (3)$$

Where:

- R_i is the Return on asset i^{th} asset
- E_i is the expected return on i^{th} asset/ the risk-free rate of return
- β_1 denotes the mean zero i^{th} factor common to the returns of all assets under consideration
- The coefficient b_{i1} quantifies the sensitivity of asset i 's return to the movements of the common factor β_1
- ϵ_i is a noise term. i.e., an unsystematic risk component, idiosyncratic to the i^{th} asset.

Roll and Ross (1980) highlight that the APT theory is like CAPM since both are based on a liner generating process. The two authors also highlight that APT is different to CAPM since it is not restricted to a single period. In addition, APT allows for more than one generating factor unlike CAPM. Finally, APT demonstrates that since at market equilibrium there are no arbitrage profits, the equilibrium is characterised by a liner relationship between each asset's expected return and its return's response amplitudes or loadings on the common factors. One key criticism of the APT by scholars such as Elbannan (2015) is that the model does not specify the number of risk factors to be considered.

2.3. Empirical Literature

2.3.1. Integration of the NSE and Global Financial Markets

Portfolio theories such as CAPM and APT highlight that in order to adjust risk adjusted returns, investors should diversify their portfolio by holding assets with low correlation of returns. This provides impetus to review the long run relationship between different equity markets and identify least integrated markets that offer diversification to investors (Thomas & Yadav2017).

Frontier markets, which include the NSE, are partially integrated with global markets(Wang & Ye, 2016;Boamah (2016);Kodongo & Ojah). Research by Bekaert and Harvey (2000a) and Bekaert, Harvey and Viskanta (1996) provide evidence that a key impact of globalization on emerging market equity returns is the loading of global factors while determining local equity returns. Studies on African equity markets, including Kenya's, show that they are partially integrated with global stock markets. Boamah (2016) noted that both global and local factors are loaded while determining stock prices in Africa.

Studies by Bilson, et. al (2001) reveals that the nature of integration between emerging market and global markets shows a tiered, whereby a frontier market will have a higher level of integration with regional markets compared to global markets. The study was done by on emerging market returns from January 1985 to December 1987 in twenty emerging markets in Latin America, Africa, Asia and Europe showed that regional emerging market returns have a higher level of commonality as compared to global equity returns. In addition, the study evidenced that local macroeconomic returns carry a higher significance in explaining emerging equity returns compared to global factors.

There are several schools of thought on whether frontier market integration has improved or worsned with time. Boamah (2016) notes rising levels of integration with global markets from 1997 to 2013. Berger, Pukthuanthong & Yang (2011) note that frontier markets have low integration with global markets with no suggestion the integration improving over time. Research by Chan-Lau (2012) concluded that frontier equity markets have low correlation with global markets during periods of normalcy where global markets experience growth. However, there is a substantial increase in correlation during market correction periods such as the global financial crises.

Research on the NSE's integration with global equity markets paints a mixed picture. On one hand, studies by Kodongo and Ojah (2011), Boamah(2016) and Boamah (2017) show that the African stock markets, including Kenya's, are partially integrated with global stock markets. The three papers also noted rising levels of integration from March 1997 to January

2015. On the contrary, an analysis of equity returns for ten African countries from 1998 to 2007 (including Kenya) did not find any evidence of integration with global equity markets except for South Africa. The study also pointed out that asset prices in most African countries, including Kenya, were largely determined by country specific factors. This conclusion is similar to that of Boamah (2017) where a significant component of Kenya's equity returns could not be explained by world and emerging market factors.

Whilst various authors may differ on the extent of the NSE's integration with global markets, the authors on this topic share the view the NSE lacks full integration with global equity markets. A notable gap in the studies on NSE's integration was the fact that they do not address the role of economic openness in promoting regional and global integration.

2.3.1.1. Role of politics in NSE integration with global equity markets

Political risk is a broad concept that generally describes risks that government actions or from influential domestic sources could change the expected future cash flows thus changing the value of a company (Bilson, Brailsford, & Hooper, 2002). Butler and Joaquin (1998) view political risk as the risk that governments could unexpectedly change the "rules of the game" in which companies operate in. They also view political risk as the possibility of adverse consequences arising from political risks.

The International Country Risk Guide (ICRG) views political risks from a point of political stability with twelve components. Five components contribute 60% of the total political risk score of a country with each contributing 12%. The first component is Government Stability defined as ability to carry out intended programs and stay in office. The second is Social-Economic Conditions that fuel social unrest such as high unemployment and wide spread poverty. The third component is Investment Profile which relates to governments' policy on profit repatriation, payment delays and expropriation of private resources. The fourth component is internal conflict from terrorism, civil strife and military coups. The fifth component is external conflict which includes wars, cross border conflict and foreign pressures. Other components of political risk include corruption, role of military in politics, religious tensions, law and order, ethnic tensions, democratic accountability and the quality of bureaucracy (PRS Group Inc, 2020).

The period before an election is characterised by heightened policy uncertainty as economic actors grapple with the uncertainty on the outcome of an election (Fowler, 2006). The policy uncertainty affects political risk in several ways such as government stability, potential social unrest and strife should the results be disputed and heightened risk that the incoming

government may not honour contracts signed by prior regimes (Fowler, 2006; Durnev, A. 2013).

Research by authors such as Bekaert et al., (1996) provides evidence that emerging and frontier markets are partially integrated with global equity markets and attribute returns to a mix of country specific and global factors. The political risk is seen as a leading cause of varying returns in emerging markets by Bekaert et al., (1996). This is supported by research by Bilson, et al., (2001) that established in a framework that accounts for both global and local factors, political risk is more important in explaining return variation in emerging markets compared to developed markets. The importance of political risk is also underscored by PRS Group Inc, (2020) who give political risk a 50% weight when evaluating country risk in their monthly International Country Risk Guide (ICRG).

Reflecting on market integration, political risk can be viewed as a key barrier to market integration with macro-economic factors adding to this barrier Bilson, et al., (2001). Considering the role of elections in accentuating political risk, it is paramount to consider its role in determining market integration and equity returns. Research by Amoro (2019) and Kabiru, Ochieng, D. E., and Kinyua (2015) highlights that political events, namely elections, are statistically significant in determining equity returns in the NSE. It can thus be inferred that election occurrence would reduce the covariance between global returns and NSE returns thus reducing NSE's integration with global equity markets.

2.3.2. Impact of Economic Openness on Equity Returns

Economic openness has been defined by several authors as the Trade to GDP, with trade being a sum of the exports and imports (Bekaert et al. 1996, Jaumotte, Lall, & Papageorgi, 2013 Shah & Patnaik, 2011). Caivano and Coniglio 2016 identify two key drivers that enhance trade between different countries. The first is the movement of the real exchange rate between two or more currency pairs affects the level of trade. The appreciation of the real exchange rate makes goods produced in one country more expensive relative to the foreign goods this limiting the volume of international trade. The second driver is the savings rate in a country. Countries with higher savings rate consume less and as such, have lower import demands compared to countries with low savings rate. Demographics affects the savings rate through reduced expenditure as societies age. Studies by Idris, Yusop, and Habibullah, (2016) show that trade openness can promote economic growth through improved knowledge sharing, economies of scale enhancing productive sectors whilst shunning less productive sector in a bid to enhance a country's exports.

Economic openness is a driver of financial globalisation. Studies by Pretorius (2002) noted that a countries with improving bilateral trade ties have higher levels of equity market

integration over time. Boamah (2016) observed that in Africa, the degree of a country's stock market integration depends on its trade diversification. Trade between countries facilitates financial integration in various ways. It generates cross boarder financial flows and instruments such as letters of credit and export insurance. Critically, it facilitates exchange of information about a country to the investor community of the trading country thus increasing willingness to invest in its foreign assets (Lane & Milesi-Ferretti, 2008).

The theory forwarded by Pretorius (2002) is that with increased trade ties, there should be a higher integration between stock markets in the two countries. As such, broader economic integration between two countries is a driver of financial integration. Pretorius (2002) identified two broad categories of macroeconomic variables that influence the degree of stock market integration. The first category of variables is country specific macro-economic indicators such as inflation, interest rates and money supply which affect the valuation of a stock using the cash flow model. The second category relates to the bilateral trade ties between two countries. This had been observed by Bracker, Docking and Koch(1999) who studied nine developed equity markets and established that rising trade levels resulted to increased market intergration. Boamah (2016) observed that in Africa, the extent of a country's stock market segmentation depends on a its trade diversification.

2.3.3. Impact of Foreign Investor Flows on Equity Returns

The increase in capital flows to markets defined as either emerging or frontier can be attributed to both financial liberalization and improved macroeconomic indicators. Key macro-economic factors that lead to improved capital flows include an improved GDP per capita, increasing external trade, low sovereign debt, lower inflation and reduced foreign exchange volatility (Bekaert & Harvey, 2000a).

One key impact of financial globalization through foreign investor flows is the lowering of cost of capital and consequently, an increase in the valuation of the equity markets. Bekaert and Harvey (2000b) studied the cost of equity capital defined as dividend yields in 20 emerging markets after they were liberalized. The authors established that dividend yields lowered upon liberalization of the stock markets.

Another key impact of globalization through foreign investor flow is the loading of global factors in while determining local equity returns (Bekaert & Harvey 2000b).A study by Richard (2005) on six Asian emerging market equities revealed that global equity returns was deemed to be as important as local equity returns by foreign investors. Wang and Ye (2016) studied 23 emerging equity markets to understand how global and local economic variables affected the returns on size-based portfolios in the respective countries. They concluded that large capitalisation equities are priced by global variables whereas mid to

small size equities relative to aggregate market capitalisation are influenced by domestic variables.

Foreign investors have been attributed to cause substantial price movements in emerging markets. A study by Richard (2005) showed that assuming no change in the portfolio preference of local investors, decisions by foreign investors to buy/sell were deemed to demand shocks that result to a shift in the demand curve leading to a change of prices. A study by Chandra (2012) showed that in the long run, equity returns determine the level of foreign investor participation in India. That said, foreign investor activity level can cause short lived changes in domestic equity returns when there are particularly heavy foreign trading volumes. Foreign portfolio investments have also been associated with sudden withdrawals from emerging and frontier markets at the first sign of trouble, leading to large negative equity returns. A case in point is during the 2008 financial crisis where most emerging markets experienced withdrawals by foreign investors leading to large negative returns (Agudelo & Castaño, 2011).

2.3.4. Impact of Macro Economic Factors on Stock Market Returns

This section reviews studies in selected emerging and frontier markets that review the impact of country specific macro-economic factors, namely, inflation, 91-day Treasury bill rates, money supply (M2) and the exchange on equity market returns. A summary of review is presented in Appendix 1.

Various scholars in Kenya have adopted the Arbitrage Pricing Theory (APT) to review the impact of various macroeconomic variables on the stock market returns. In most studies, the return on NSE 20 share index was used as the proxy for stock market return. Ouma and Muriu (2014) reviewed the impact of the country specific macro-economic factors on the NSE's returns while Mugambi and Okech (2016) narrowed their focus to equity returns within the banking sector. The two authors used Ordinary Least Square (OLS) Method to identify the direction and significance of relations between returns on the NSE. The two studies concluded that there exists a negative and significant relationship between the NSE returns and exchange rates. Mugambi and Okech (2016) also noted a positive and significant relationship between inflation and banking sector returns while a negative yet significant relationship was noted with 91 Day T-bill rates. This contradicts Ouma and Muriu (2014) who did not establish any noteworthy relationship linking inflation and 91-day T-bill rates. This can be attributed the fact that Mugambi and Okech (2016) focused on the banking sector whose direct costs are affected by movement in the variables whilst Ouma and Muriu (2014) focused on the NSE 20. The two studies did not establish any significant relationship between the NSE and GDP.

Kirui et al. (2014) studied the relationship of the NSE 20 share index returns using five macroeconomic variables, made use of quarterly observations from January 2000 to June 2012 and used the Engle-Granger two step method to examine long run relationships between variables. The results showed only Exchange Rates influenced the NSE returns; the other macroeconomic variables were not important in explaining the stocks' return. The relationship between exchange rates and was negative and significant. A similar study by Dziwornu and Awunyo-Vitor (2013) on the annual Ghana Stock Exchange (GSE) equity returns from 1990 to 2012 supports findings on GDP's lack of significance in determining stock market returns. In fact, they established that the performance of equity returns in a given year is a precursor to the economic growth.

A study by Maku and Atanda (2010) in Nigeria contradicts the findings highlighted in Kenya and Ghana with regards to the role of GDP in affecting long term equity returns. The two authors sought to determine the long-run macroeconomic determinants of stock market performance in Nigeria between 1984 and 2007. The study used The Augmented Engle-Granger Co-integration test to determine the long run relationship. Five macroeconomic variables were considered, namely, Money supply (M2), Interest Rates (T-Bill), Real GDP growth rate, Inflation, and Exchange Rates. The study found that all the variables were co-integrated; all the macroeconomic variables have a long run and simultaneous effect on the returns of the Nigerian Stock Exchange All Share Index (NSEASI). However, the authors also mentioned that in the long run, returns on the NSEASI were more responsive to exchange rate, inflation, money supply and real GDP growth.

A similar study was carried out in Jordan by Alraimony and El-Nader (2012) to understand how macroeconomic factors affect equity returns on the Amman Stock Market. The economic variables considered were Real Money Supply, Real Gross Domestic Product, Consumer Price Index, Real Exchange rates and Weighted Average Interest Rates (WAIR) on Loans and Advances. The authors used monthly data between 1991 and 2010 and applied two unit root tests, Augmented-Dickey -Fuller and Phillips-Perron, and used two models, OLS and ARCH/GARCH, to establish the long-term trends in the variables. The results showed Real Money Supply, Inflation, Real Exchange Rates and WAIR on Loans and Advances had a negative and significant impact on the stock market returns. However, an increase in Real GDP had a positive impact on the Amana Securities Exchange Returns. The role of GDP is similar to what was observed in Nigeria but contradicts findings in Kenya and Ghana.

Studies in India continue to highlight the importance of exchange rates as seen in studies done in Nigeria, Jordan and Kenya. Pal and Mittal (2011) carried out a study to determine the long run association between the returns on Indian Equity Markets and four

macroeconomic variables, namely, Interest Rates, Inflation Rates, Exchange Rates and the Gross Domestic Savings of the Indian economy. The authors used quarterly time series data from January-1995 to December 2008 and applied ADF unit root tests, Engle-Granger Co-integration test and Error Correction Mechanisms (ECM) were applied to derive long run and short-term statistical dynamics. The results showed that inflation had a significant negative impact on equity returns across all counters. Interests Rates had a noteworthy positive effect on the returns of the BSE Sensex while US dollar exchange rate had a major negative influence on the S&P CNX Nifty only. Total domestic savings had an insignificant impact on both indices. Patel (2012) undertook a study similar to Pal and Mittal (2011) but expanded the scope of data from 15 to 20 years from January 1991 to December 2011. In addition, Patel (2012) used monthly series data instead of the quarterly data used by Pal and Mittal (2011) and expanded the macro economic variables to eight, namely, short term interest rates, inflation, USD/INR exchange rate, index of industrial production, money supply, gold price, silver price and oil price. The results established that there exists a long run relationship between the stock market and all the economic variables. The study also evidenced causality running from exchange rates to the equity markets.

Studies in Pakistan and Bangladesh paint a contrary picture to findings in other selected emerging markets. Ismail, Pervaz, Ahmed and Iqbal, (2016) sought to investigate the relationship between stock market returns in Pakistan and selected macroeconomic variables, namely Exchange Rate, Real Interest Rate, GDP and Money Supply. The authors used monthly data from 2003 to 2013 and applied Phillips-Perron Unit Root Test and Auto Regressive Distributive Lag(ARDL) approach to co-integration. The results showed that only GDP had a significant positive impact on the Karachi Stock Exchange Returns (KSE 100 Index). The findings are similar to those in Nigeria and Jordan but contradict findings in Ghana and Kenya. The other variables had no impact on the overall returns, a contrast to the trend established in other markets such as Kenya, Ghana, India and Nigeria.

Quadir (2012) undertook a study in Bangladesh to review the influence Treasury Bill Rates and Industrial Production had on returns on the Dhaka Stock Exchange. The author used monthly data from January 2000 to February 2007 and applied both the ADF and Phillips-Perron tests to establish the data was not stationery. The results indicated that both Treasury Bill and Industrial Production had a positive but statistically insignificant impact on stock market returns.

2.3.5. Conclusion

The Arbitrage Pricing Theory (APT) provides an appropriate theoretical framework to assess the NSE returns by incorporating various risk factors. Literature on integration of the NSE and other frontier markets with global equity markets paints a mixed picture. Some authors such as Kodongo and Ojah (2011) highlight that NSE integration has improved over time while Berger, Pukthuanthong & Yang (2011) note that frontier markets have low integration with global markets with no suggestion the integration improving over time. Chan-Lau (2012) offers a different that frontier equity markets have low correlation with global markets during periods of normalcy but the correlation substantially increases during market correction periods like the global financial crisis. Political risk is a key consideration when reviewing emerging and frontier market integration. Elections heighten political risks owing to policy uncertainty and heighten the likelihood of potential civil unrest. Prior studies in Kenya point to the important role elections have in determining equity market returns in Kenya.

Economic openness, defined as the ratio of total Trade (imports and exports) to GDP fosters financial globalisation and equity market integration through exchange of information and generation of cross boarder flows through wire transfers, insurance and letters of credit. Studies by authors such as Pretorius (2002) show that improving trade ties between countries enhances the integration of their equity markets.

Foreign investors into an equity market enhance the equity returns through lowering of the cost of capital and subsequently increasing the valuation of the equity markets. The entry of foreign investors also leads to loading of global factors while determining equity market returns. Foreign investors are also associated with sudden price movements although research in countries such as India shows this is short-lived.

Literature reviewed on macroeconomic factors affecting equity market returns all concur on the significant effect of exchange rates on equity returns. The impact of FX rates on equity returns is negative and significant in most markets reviewed except for the Karachi Stock Exchange in Karachi. In Kenya, all authors have established that FX rates have a negative and significant impact on equity returns. Appendix 1 gives a summary of the findings by various authors in Kenya and around the world.

2.4. Research Gap

A review of literature did not provide substantive conclusion on the nature and evolution of NSE's integration with global equity markets. It is known that the NSE is integrated with global markets but it is not clear which strata of the global markets is the NSE integrated. Study by Bilson, et al., (2001) shows that equity integration in frontier markets is limited to frontier markets and not global or emerging markets.

The literature review shows that macroeconomic factors impact equity returns in a different ways, this highlighting the varying structures of the selected emerging markets. In addition, the macro-economic variables in each country did not fully explain equity return, thus suggesting the role global factors play in determining equity returns.

Studies on how globalization affects returns on emerging markets point out that increased global flows reduce the cost of capital and consequently increase the value of equity prices. Another key impact is that investors load global factors while evaluating emerging market returns. Global factors affecting equity returns include survey based measures that gauge the perception future macroeconomic conditions of each country, the trade to GDP ratio and country specific measures such as inflation and price to book value relative to global measures. The review of literature did not show how global factors affect the performance of the NSE.

2.5. Conceptual Framework

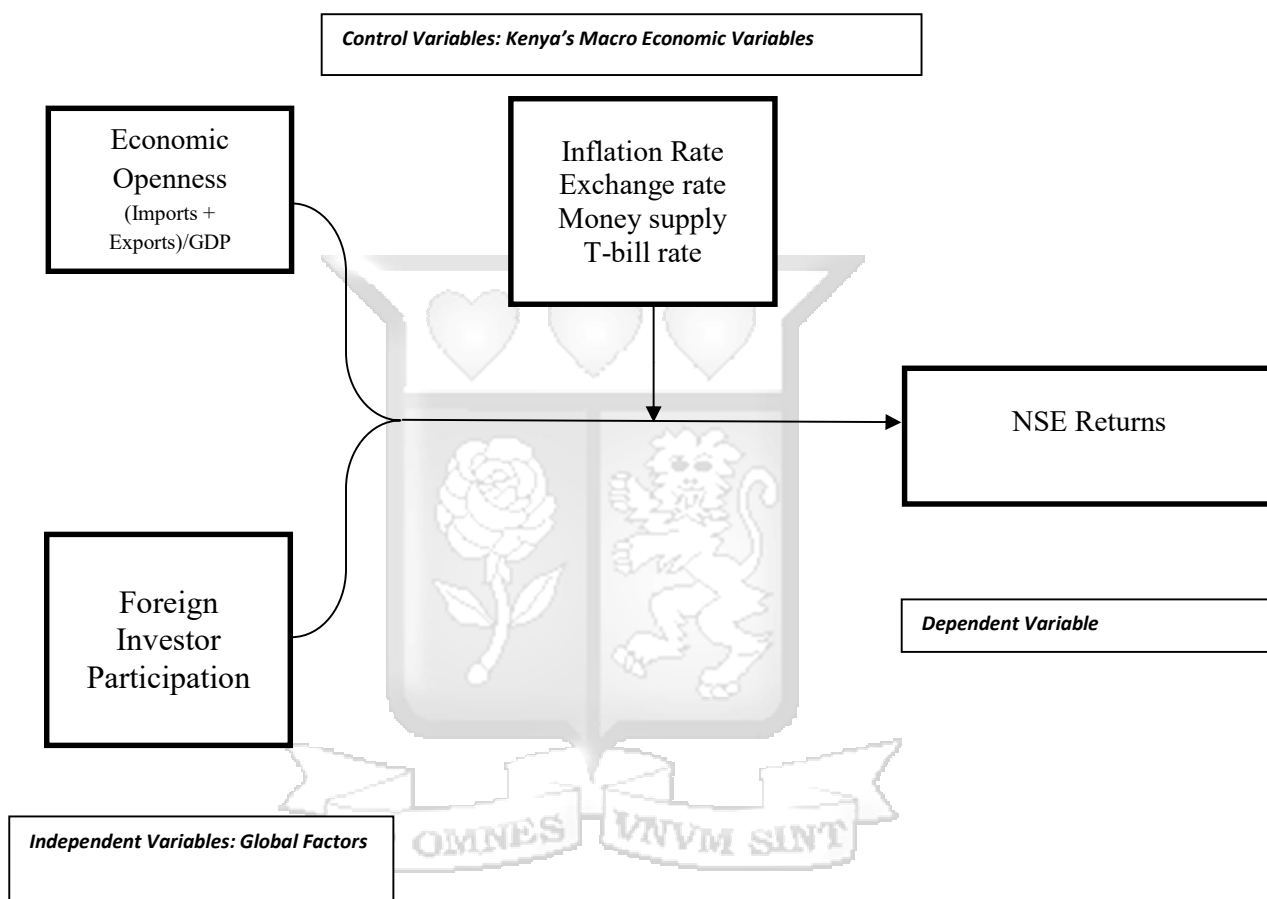
From the review, one key macroeconomic variable that considerably affects the performance of equity markets in Kenya and across several emerging markets is the exchange rate. Kenya is part of the world economy as evidenced by its improving KOF globalization index and its inclusion in key global indices such as the MSCI Frontier 100 index. Bekaert and Harvey (2014) and Bekaert et al. (2011) have demonstrated evidence that Kenya, alongside other emerging markets, are not fully integrated with global equity markets and as such, CAPM cannot be applied. The study thus tests the integration between the NSE equity returns and the global equity market represented by the MSCI return. Kenyan politics has been used as a dummy variable when testing the integration of the NSE with the global equity market. This is to see the effect of political stability on the integration.

The conceptual framework adopts the innovation by Koutoulas and Kryzanowski(1994) where both domestic/national factors international macroeconomic factors were intervening variables were used to explain the integration of the Canadian stock market using APT. The authors adopted this framework given the absence of widely accepted theories linking stock market performance and specific macro-economic variables. The proposed conceptual

framework incorporates the findings of Bekaert et al. (1996) and the innovation from Koutoulas and Kryzanowski (1994).

The independent variables will be the Trade to GDP and the foreign participation. The exchange rate (USD/KES), money supply, inflation rate and 91-day T-Bill will be taken as the control variables. The dependent variable is the NSE 20 returns.

Figure 2.1 Conceptual Framework



2.5.1. Operationalization of the variables

Economic Openness was measured as trade to GDP ratio.

Foreign investor participation was measured as the of the ratio of foreign investor participation to total market activity.

Inflation, exchange rate money supply and T-Bill rates were measured in their monthly equivalent rate.

The NSE 20 and MSCI Frontier return data were transformed to their daily returns.

Chapter 3: Research Methodology

The study looked at the impact of globalization on equity returns in the Nairobi Securities Exchange. The impact of the variables was determined using a multiple-linear regression.

3.1. Research Design

A research design can take a qualitative or quantitative approach. Qualitative research is one where analysis focuses on subjective meaning or social production of events by collecting non-standardised data and analysing text and images rather than numbers and statistics (Rahman,2017). The quantitative research focuses on quantifiable aspects of social behaviour called variables and seeks to establish patterns and associations between the different variables using statistical techniques (Rahman,2017).

The approach taken for this research was quantitative. This is because the study focused on establishing patterns of NSE's integration with regional and global integration. In addition, it also sought to understand the relationship between different variables, namely, NSE Returns, several local macro economic variables and two globalisation variables through a multi-linear regression.

The quantitative approach to research has several advantages. The approach can develop a single exploratory model that can be generalised to a whole population since it collects a larger sample (Libarkin & Kurdziel, 2002; Rahman, 2017). During interpretation of the data, quantitative research approach is free from the researchers' bias and often devoid of their personal belief systems. In addition, the validity and reliability of the data and analysis is highly controlled since variables are established statically (Libarkin & Kurdziel, 2002).

The approach carries with it several disadvantages. Libarkin and Kurdziel, 2002 note that quantitative research fails to ascertain deeper meaning and interpretations of the trends established. In addition, it measures variables at a specified range of time and can easily miss the bigger picture by excluding other variables or not extending the timeframe of measuring the variables.

3.2. Population and sampling

The objective of the study is to determine the extent to which global factors and Kenya's macroeconomic factors affect the performance of the NSE. The population of the study are 66 companies listed on the NSE sampled using the NSE 20 share index.

The NSE 20 share index is defined by the Nairobi Securities Exchange (2015) a price weight index calculated as a mean of the shares of 20 public listed companies that are blue chip with a strong profitability and dividend record. The index incorporates trading activity measures i.e. market capitalization, shares traded, deals/liquidity and turnover during the period under

review are weighed in the ratio of 4:3:2:1 respectively. Given the study seeks to review the entire market's activity, an all encompassing index such as The Nairobi All Share Index (NASI) would be preferable to the NSE 20. However, a study by Osoro and Ambrose (2013) did not find any significant difference in the daily trend or movement of both indices; the two had a positive correlation of 0.807.

The population also includes equity returns from 28 frontier markets, namely Bahrain, Bangladesh, Burkina Faso, Benin, Croatia, Estonia, Guinea-Bissau, Ivory Coast, Jordan, Kenya, Kuwait, Lebanon, Lithuania, Kazakhstan, Mauritius, Mali, Morocco, Niger, Nigeria, Oman, Romania, Serbia, Senegal, Slovenia, Sri Lanka, Togo, Tunisia and Vietnam. The equity returns from the 28 markets will be sampled using the MSCI Frontier Markets Index which includes 93 constituents covering 85% of the free float adjusted market capitalisation in each country (MSCI, 2016).

The population also includes equity activity from 23 developed market countries and 26 emerging markets to represent global equity activity. The developed market countries include: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Hong Kong, Ireland, Israel, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, the UK and the US. The emerging market countries include: Argentina, Brazil, Chile, China, Colombia, Czech Republic, Egypt, Greece, Hungary, India, Indonesia, Korea, Malaysia, Mexico, Pakistan, Peru, Philippines, Poland, Qatar, Russia, Saudi Arabia, South Africa, Taiwan, Thailand, Turkey and United Arab Emirates. The equity returns from the 49 markets will be sampled using the MSCI All World Country Index (MSCI-AWCI) which includes 3044 constituents covering 85% of the global investible equity opportunities (MSCI Inc, 2020).

3.3. Data Collection Methods

The period used in the research will be a 18-year quarterly period between 2002 and 2019. Panel data was collected as it entailed collection of data on several variables over a period of time in line with prior studies in this field such as that of Bekaert et al., (1996), Bilson, et al., (2001) and Kodongo and Ojah (2011). Daily data was used to analyse the level of integration between the NSE 20 and MSCI Frontier and MSCI World Index while monthly data was used to analyse the impact of economic openness and foreign investor participation. The daily and monthly data analysis was done to align with the frequency of data production. It is worth noting GDP data is produced on a quarterly basis and each month's GDP value was derived making the assumption that there was consistent month on month growth in each quarter. The research used secondary data and the data sources are Kenya National

Bureau of Statistics (KNBS), Central Bank of Kenya (CBK), World Bank, MSCI and Nairobi Securities Exchange.

3.3.1. Variables used in the Study

The variables used in the study can be classified in two broad categories. Globalization factors affecting equity returns including the ratio of trade (imports plus exports) to GDP ratio, which represents the economic openness of the country and the foreign participation in the NSE. Given the fact that emerging/frontier markets are not integrated with global markets, the MSCI Frontier Markets' return is taken as the proxy of the global return to test the integration of NSE and the global equity market. The MSCI Frontier has also been compared with the MSCI World All Countries Index to compare which index has an impact on the Kenyan Market. A binary function of the Kenyan politics has been taken as a dummy variable. The second category of variables consists of Kenyan macro-economic variables that affect equity returns at the NSE.

Table 3.1: Description of the Globalization Variables to be used in the study

Globalization factors affecting Equity Returns			
Variable	Description	Transformation	Reference
Trade to GDP	This is the measure of the country's economic openness.	$\frac{Exports + Imports}{GDP}$	Bekaert et al. (1996)
Foreign participation	Investment by foreigners in the Kenya equity market	$\frac{(FP + FS)/ET}{2}$ FP: Foreign purchases FS: Foreign sales ET: Equity market turnover	(Stulz, 2005)

Table 3.2: Description of the Kenya macroeconomic variables to be used in the study

Kenyan Macro Economic Variables			
Variable	Description	Transformation	Reference
Inflation	A continued increase in the broad level of prices for goods and	Quarterly inflation %	(Mugambi and Oketch, 2016)

	services.		
T-Bill Rate	A short-term debt obligation backed by the Government with a maturity of less than one year.	3-month treasury bill yield	(Gan, Lee and Yong, 2006)
Money Supply	The total sum of currency and other liquid instruments in a country's economy at a time.	$\frac{M2}{GDP}$	(Gan et al., 2006)
Currency exchange rate	The price of a nation's currency in terms of another currency.	Quarterly KES/USD return	(Ouma and Muriu, 2014)

3.3.2. Sources of Data

Data on NSE 20 Index, MSCI World and Frontier index was derived via the Reuters dealer platform from the NSE and MSCI Company respectively. Data on macro economic variables was derived from Kenya Bureau of statistics. Table 3.3 shows the sources of data, frequency of collection by the relevant source and how the data collected was transformed to quarterly observations.

Table 3.3 Sources of Data

Variable	Description	Source	Frequency of Collection	Data used in Study
Total Exports	Sum of domestic exports and re-exports	Kenya National Bureau of Statistics –Leading Economic Indicators	Monthly	Sum of quarterly exports
Total Imports	Sum of domestic imports	Kenya National Bureau of Statistics -Leading Economic Indicators	Monthly	Sum of quarterly imports
Foreign	Sum of purchases and	Nairobi Security exchange via	Monthly	Sum of monthly foreign purchases

participation	sale by foreigners in the NSE	Reuters dealer platform		and sales in a quarter
Inflation	Kenya CPI	Kenya National Bureau of Statistics -Leading Economic Indicators	Monthly	Average inflation in the quarter
T-Bill Rate	Average 91-Day T-Bill Interest Rate	Central Bank of Kenya –T Bill auction results	Weekly	Average of the weekly 91 day-t-bill interest rates in a quarter
Money Supply	Sum of currency in circulation, quasi money in banks and NBFIs	Kenya National Bureau of Statistics -Leading Economic Indicators	Monthly	Sum of M2 in a quarter
Currency exchange rate	Mean Foreign Exchange rates of Kenyan Shilling against the US Dollar at the end of the Month	Kenya National Bureau of Statistics -Leading Economic Indicators	Monthly	Average of the monthly exchange rates in a quarter
GDP	Quarterly Gross Domestic product-seasonally adjusted	Kenya National Bureau of Statistics-Quarterly GDP Reports	Quarterly	Quarterly GDP
NSE 20	Quarter end NSE Return	NSE via Reuters dealer platform	Daily	Quarterly change in NSE 20 Index

MSCI-Frontier Index	Quarter end MSCI-Frontier Index Return	MSCI Company via Reuters dealer platform	Daily	Quarterly change in the MSCI-Frontier Index
MSCI World All Countries Index	Quarter end MSCI- World All Countries Index Return	MSCI Company via Reuters dealer platform	Daily	Quarterly change in the MSCI-World All Countries Index

3.4. Modeling Impact of Globalization on Equity Returns

To study the impact of globalization on the performance of NSE this work first determines the level of integration between the NSE return and the global equity market. This is tested using the regression of the NSE return to the MSCI Frontier market returns and MSCI World All Country Index as the proxies of the global equity market.

$$R_{NSE} = \alpha + \beta R_{MSCI_F} + \varepsilon_{NSE} \dots\dots\dots \text{Equation 3-1}$$

$$R_{NSE} = \alpha + \beta R_{MSCI_{AC}} + \varepsilon_{NSE} \dots\dots\dots \text{Equation 3-2}$$

If $\beta = 0$, the NSE is segmented from global market. If $\beta > 0$, the higher the deviation of β from 0 the higher the degree of integration. If $\beta < 0$, the farther away β is from 0, the higher the degree of segmentation. Kenyan politics is added to the equation, which takes a binary form of 1 during election periods and 0 in non-election periods. The equation will be:

$$R_{NSE} = \alpha + \beta_{MSCI_F} R_{MSCI_F} + \beta_{Ke_pol} Ke_Pol + \varepsilon_{NSE} \dots\dots\dots \text{Equation 3-3}$$

Another objective of this study was to evaluate the impact of local macroeconomic variables on the NSE return in order to observe whether addition of global factors had an impact whatsoever. The study borrows from the Arbitrage Pricing Theory (APT) of Ross (1976) which assumes a linear relationship between expected return of an asset and its response loadings on the systematic factors. In this study, it is the linear relationship between NSE's expected return and its response loadings on the macroeconomic variables. The relationship can be shown in Equation (4):

$$r_i = a_i + b_{i1}F_1 + b_{i2}F_2 + \dots + b_{in}F_n + \varepsilon_i \dots\dots\dots \text{Equation (3-4)}$$

Where, a_i is the constant for asset i , b_{in} is sensitivity of the i^{th} asset to the factor n , also called factor loading, F_n is the systematic factor and ε_i is the risky asset's idiosyncratic random shock with zero mean.

The regression used is:

$$R_{NSE} = \alpha + \beta_{fx}Fx + \beta_{infl}Infl + \beta_{Tbill}Tbill + \beta_{M2}M2 + \varepsilon_{NSE} \dots \dots \dots \text{Equation 3-5}$$

The third objective was to determine the relationship between the global factors and the NSE return, the regressions used are:

$$R_{NSE} = \alpha + \beta_{Econ}Econ_{open} \dots \dots \dots \text{Equation 3-6}$$

$$R_{NSE} = \alpha + \beta_{FP}For_Part \dots \dots \dots \text{Equation 3-7}$$

Finally, the global factors, i) economic openness and then ii) foreign participation were added to the macroeconomics variables regression. If the Adjusted R^2 will be higher than when local macroeconomic variables are used, then the conclusion would be global factors affect the NSE return. R^2 measures the fraction of the dependent variable explained by the independent variables. However, R^2 never decreases as you add more regressors, thus we will use the adjusted R^2 which penalizes the R^2 for the addition of regressors which do not contribute to the explanatory power of the model. The regressions used are:

$$R_{NSE} = \alpha + \beta_{Econ}Econ_{open} + \beta_{fx}Fx + \beta_{infl}Infl + \beta_{Tbill}Tbill + \beta_{M2}M2 + \varepsilon_{NSE}$$

Equation 3-8

$$R_{NSE} = \alpha + \beta_{FP}For_Part + \beta_{fx}Fx + \beta_{infl}Infl + \beta_{Tbill}Tbill + \beta_{M2}M2 + \varepsilon_{NSE}$$

Equation 3-9

Given that the data being used was time series data, stationarity of the data was tested using the Augmented Dickey Fuller (ADF) unit root tests. To solve for non-stationarity, the data was transformed to its first differentiation to make the data stationary. A summary of each regression has been put in each section for the reader to be able to see the robustness of the model using the likes of t-distribution.

3.5. Research Quality

The validity of research findings was achieved by ensuring data was collected from credible sources and cross checked with publicly available secondary data sets. To ensure reliability, the data was evaluated using a variety of statistical tests. The Jarque-Bera test statistic used to assess whether the series is normally distributed. In addition, multiple regression assumption tests were done to determine if there was a relationship between any two independent variables. The Variance Inflation Factor assessed whether there was any precise linear relation between any two or more independent variables. The Breusch-Godfrey Serial Correlation LM Test was used to assess if the error term was correlated while Heteroskedasticity was tested using the Breusch-Pagan-Godfrey Test.

3.6. Ethical Considerations

Ethical standards were observed while conducting the study. Plagiarism in the study was avoided by citing all sources of information and data used. The data used is freely available from internet sources and dealer platforms and as such, permission for further use and analysis was not sought from relevant authorities. It is worth noting that ownership of the original data has been acknowledged. The results and interpretations of the findings were done with reference to the objectives and comparisons made to prior research in an objective manner free from bias.



Chapter 4: Findings and Results

4.1. Introduction

The chapter presents the empirical findings and results of the application of the variables and models described in chapter three. The chapter provides descriptive statistics of the data used and an analysis of the data in line with each specific objective and a conclusion of the analysis.

4.2. Descriptive Statistics

During the period 1st June 2002 and December 2019, the NSE daily returns range between -10.8% to 12.14% mean average daily return being 0.01%. The quarterly return ranges between -13.13% and 14.41% with a mean quarterly of 0.05%. The NSE's mean daily return is lower compared with the MSCI Frontier and MSCI World All Countries at 0.02%. It can also be noted that the 91-day T-bill had a higher mean monthly return of 0.7% and lower risk levels measured by the standard deviation of 0.28% compared with the NSE's 4.79%.

Table 4.1 Summary of Descriptive Statistic
Daily Observations

	NSE 20	MSCI Frontier	MSCI All
Mean	0.0001	0.0002	0.0002
Median	-	0.0006	0.0004
Maximum	0.1214	0.0910	0.0463
Minimum	(0.1080)	(0.0733)	(0.0914)
Std. Dev.	0.0105	0.0098	0.0074
Skewness	0.1863	(0.4420)	(1.4481)
Kurtosis	23.0722	12.2389	19.8508
Jarque-Bera	77,030	16,463	55,873
Probability	-	-	-
Sum	0.6525	0.8907	0.8060
Sum Sq. Dev.	0.5046	0.4367	0.2527
Observations	4,587	4,587	4,587

Monthly Observations

	NSE 20	M2	Inflation	FX	91 day T-Bill	Foreign Participation	Economic Openness
Mean	0.0005	0.0102	0.0060	0.0019	0.0070	0.0024	0.1195
Median	0.0058	0.0098	0.0053	0.0013	0.0068	0.0016	0.1182
Maximum	0.1441	0.0365	0.0164	0.1253	0.0180	0.1253	0.1948
Minimum	(0.1313)	(0.0464)	0.0027	(0.1457)	0.0013	(0.1457)	0.0740
Std. Dev.	0.0479	0.0122	0.0031	0.0242	0.0028	0.0249	0.0271
Skewness	(0.1481)	(0.6722)	1.7199	(1.2188)	1.2399	(1.2636)	0.3293
Kurtosis	3.6878	5.6028	5.5226	20.3299	6.7374	19.6603	2.2994
Jarque-Bera	3.0379	46.4868	98.5629	1,658.9420	108.9737	1,420	5.0073
Probability	0.2189	-	-	-	-	-	0.0818
Sum	0.0701	1.3298	0.7815	0.2420	0.9140	0.2934	15.5342
Sum Sq. Dev.	0.2957	0.0193	0.0012	0.0755	0.0010	0.0740	0.0949
Observations	130	130	130	130	130	120	130

Jarque-Bera test statistic used to assess whether the series is normally distributed. The null hypothesis is that the data is normally distributed, thus, reject null hypothesis if the test statistic is greater than 5% significance level. The test fails to reject the assumption of normally distributed returns at the 5% significance level with the exception of foreign exchange return and inflation. Inflation, 91 day T-bill and economic openness show positive skewness meaning they have a long right tail and the other variables have a negative skewness meaning they have a long left tail. Kurtosis reviews the extent to which a distribution differs from normal distribution. The Kurtosis of all variables are leptokurtic, that is, the distribution is peaked relative to normal with the exception of economic openness which is platykurtic, that is, the distribution is flat relative to normal.

The multiple regression assumption tests in Appendices 2 show that there is no exact relationship between any two independent variables. The expected value of the error term conditioned on the independent variables is 0 while the variance of the error term is the same for all observations. The error term is also normally distributed.

4.3. Relationship between the NSE and Global Financial Markets

The first objective of the study was to assess whether the NSE 20 is integrated with global equity markets proxied by MSCI World and MSCI Frontier markets. A comparison of the daily and monthly NSE-20 Returns from June 2002 to December 2019 was done and monthly NSE 20 returns were preferred for the study. This is owing to the daily NSE-20 return's high Kurtosis and Jarque-Bera of 23.0722 and 77,030 respectively, implying lack of normal distribution of the data. Monthly returns of the NSE-20, MSCI Frontier and MSCI World Index were obtained from June 2002 to December 2019 and used to run the regression whose results are found in table 4.2

Table 4.2: Level of Integration Regression Analysis

	NSE and MSCI Frontier		NSE and MSCI All	
	Model 1	Model 2	Model 1	Model 2
C	0.0007	(0.0024)	0.0003	(0.0060)
Standard error	[0.0041]	[0.0048]	[0.0042]	[0.0049]
p-value	0.8594	0.6202	0.9485	0.2249
MSCI	0.62***	0.6105***	0.6683***	0.6821***
Standard error	[0.0792]	[0.0795]	[0.0966]	[0.0957]
p-value	-	-	-	-
KE Politics		0.0111		0.0218**
Standard error		[0.0091]		[0.0092]
p-value		0.2232		0.0184
R-squared	0.2267	0.2322	0.1863	0.2078
Adj R-squared	0.2230	0.2248	0.1824	0.2002

Significant at	
***	1%
**	5%
*	10%

The results above are the regression for the NSE returns on the conditional MSCI Frontier market returns represented by the equation $R_NSE = \alpha + \beta_MSCI + \epsilon$. Model 1 is a regression of the NSE return and economic openness. Model 2, is a regression of the NSE return, economic openness and macroeconomic variables. The two regressions are estimated via OLS. ***, **, * denotes significance at the 1%, 5%, and 10% levels, respectively for two-tail tests. Standard errors are shown in square brackets.

The MSCI World index has a higher coefficient of 0.6683 compared to MSCI Frontier index of 0.62. The two variables in the model have very low P-values, thus rejecting the null hypothesis. The MSCI Frontier index has a higher R-squared of 22.67% compared to MSCI World's 18.63%, implying that the MSCI Frontier index has a higher statistical significance in determining the NSE 20 monthly returns.

A further regression was done to include Kenya politics and to see the impact it has on the NSE 20 return. A binary function was used to represent the quarters during and after an election, where 1 represent elections period and 0 represent a non-election period. The resulting regression is in *table 4.2*. The R-squared and adjusted R-squared improved with the addition of Kenyan Politics, implying that politics does have a statistical importance in determining NSE 20 monthly returns. Kenya politics has a low P-Value of 1.8% in the MSCI World model, rejecting the null hypothesis that politics does not affect the NSE 20 monthly returns.

4.4. Economic Openness and NSE Return

The second objective of the study was to assess the relationship between economic openness and NSE return. Findings of this review are summarised in *table 4.3* - NSE return and Economic openness and Macroeconomic Variables regression.

The results in *table 4.3* are the regression for the NSE returns on the economic openness represented by the equation $R_NSE = \alpha + \beta Econ_Opend1 + \epsilon$. Model 1 is a regression of the NSE return and economic openness. Model 2, is a regression of the NSE return, economic openness and macroeconomic variables. The two regressions are estimated via OLS. ***, **, * denotes significance at the 1%, 5%, and 10% levels, respectively for two-tail tests. Standard errors are shown in square brackets. The economic openness data was non-stationary and thus transformed to become stationary by getting the first difference of the series.

The results indicate that economic openness is not a significant variable in determining the NSE return. The low R-squared and negative adjusted R-squared imply a poor fitting model,

thus providing credence to the weak relationship between the NSE 20 returns and Economic openness.

Table 4.3: NSE return and Economic openness and Macroeconomic Variables regression

NSE, Economic openness and Macro variables		
Variable	Model 1	Model 2
C	(0.0047)	(0.0047)
Standard error	[0.0053]	[0.0053]
p-value	0.8984	0.2249
Economic Openness	(0.2666)	(0.3443)
Standard error	[0.2982]	[0.2973]
p-value	0.3730	0.2491
Inflation		(7.4514)
Standard error		[4.6915]
p-value		0.1148
T-bill		-6.8594**
Standard error		[3.1509]
p-value		0.0314
Fx		0.0730
Standard error		[0.1692]
p-value		0.6667
M2		0.3541
Standard error		[0.3329]
p-value		0.2896
R-squared	0.0063	0.0810
Adj R-squared	(0)	0

Economic openness factor was then added to the regression with the macroeconomic variables to see if a different conclusion would be drawn. The method used was a Robust Least Squares which shows the regression results of the model as well as the robustness of the model by addressing the outliers in the variables. The regression output is shown in table 4.3. The results show a negative relationship between NSE 20 return and Economic openness, similar to the previous equation 1. The Adjusted R-squared decreased with the addition of the economic openness variable to the local macroeconomic variable's regression; therefore, as concluded for model 1, the addition of economic openness doesn't improve the model fit significantly. This does provide further credence to the weak relationship between the NSE 20 returns and Economic openness.

4.5. Foreign Investor Participation and NSE Return

The third objective of the study was to assess the relationship between foreign investor and NSE return. Findings of this review are summarised in table 4.4- NSE return and Foreign Participation and Macroeconomic Variables regression.

Table 4.4: NSE return and Foreign Participation and Macroeconomic Variables regression

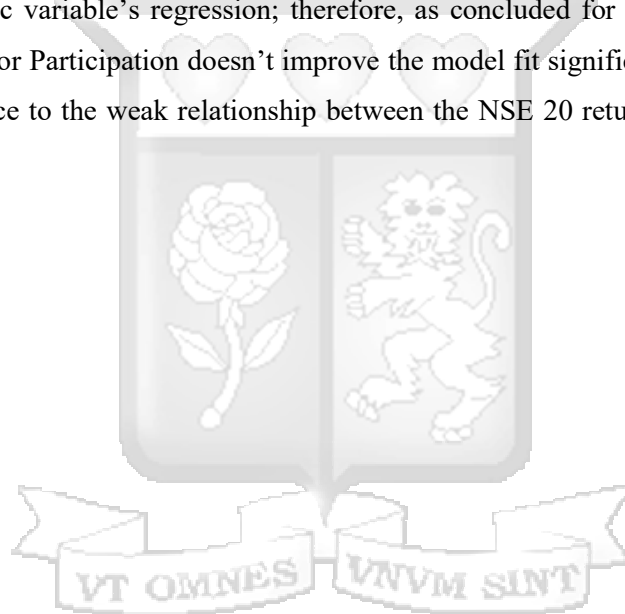
NSE, Foreign participation & Macro variables		
Variable	Model 1	Model 2
C	(0.0025)	(0.0042)
Standard error	[0.0042]	[0.0052]
p-value	0.5545	0.4147
Foreign Participation	0.0018	0.0034
Standard error	[0.04]	[0.0396]
p-value	0.9646	0.9308
Inflation		-9.8828**
Standard error		[4.9997]
p-value		0.0505
T-bill		-6.2484**
Standard error		[3.0691]
p-value		0.0441
Fx		0.0587
Standard error		[0.165]
p-value		0.7227
M2		0.1601
Standard error		[0.3305]
p-value		0.6290
R-squared	-	0.0812
Adj R-squared	(0.0085)	0.0406

The results above are the regression for the NSE returns on the foreign participation represented by the equation $R_{NSE} = \alpha + \beta For_Partd1 + \varepsilon$. Model 1 is a regression of the NSE return and foreign participation. Model 2, is a regression of the NSE return, foreign participation and macroeconomic variables. The two regressions are estimated via OLS. ***, **, * denotes significance at the 1%, 5%, and 10% levels, respectively for two-tail tests. Standard errors are shown in square brackets. The economic openness data was non-stationary and thus transformed to become stationary by getting the first difference of the series. The Robust Linear Regression was also used as the regression method. The relationship between foreign participation and NSE return is as shown in table 4.4

The results indicate that economic openness is not a significant variable in determining the NSE return. The low R-squared and negative adjusted R-squared imply a poor fitting model, thus providing credence to the weak relationship between the NSE 20 returns and Economic openness.

The regression shows a weak positive relationship between the NSE monthly returns and foreign participation. The results indicate that economic openness is not a significant variable in determining the NSE return. The low R-squared and negative adjusted R-squared imply a poor fitting model, thus providing credence to the weak relationship between the NSE 20 returns and Foreign Investor Participation.

Foreign Investor Participation factor was then added to the regression with the macroeconomic variables to see if a different conclusion would be drawn. The method used was a Robust Least Squares which shows the regression results of the model as well as the robustness of the model by addressing the outliers in the variables. The regression output is shown in table 4.4. The results show a positive relationship between NSE 20 return and Foreign Investor Participation, similar to the previous equation 1. The Adjusted R-squared decreased with the addition of the Foreign Investor Participation variable to the local macroeconomic variable's regression; therefore, as concluded for model 1, the addition of Foreign Investor Participation doesn't improve the model fit significantly. This does provide further credence to the weak relationship between the NSE 20 returns and Foreign Investor Participation.



Chapter 5: Discussion, Conclusion and Recommendations

5.1. Introduction

The study sought to answer three research questions as outlined in section 1.5. This chapter will discuss each objective's findings and compare it with previous studies. This will be followed by a conclusion of the study, recommendations and areas of further study.

5.2. Discussion

5.2.1. Integration of the NSE with global financial markets

The first objective of the study was to assess the integration of the NSE with and global financial markets proxied by two indices, namely the MSCI World All Countries index and MSCI Frontier Index. The NSE 20 monthly returns had a positive relationship with both the MSCI Frontier Index and MSCI World All Countries index. That said, the MSCI Frontier Index had a R-squared relative to the MSCI World All Countries index. From the analysis, the NSE's integration with global markets can be concluded to have a higher level of integration with frontier markets represented by the MSCI Frontier Index relative to the global markets represented by the MSCI World All Countries index. When Kenya election cycles were considered, the elections were statistically insignificant in explaining NSE 20 returns.

The R-squared and adjusted R-squared of 23.22% and 22.48% for the MCSI Frontier Markets Index affirms Kenya's inclusion in the MCSI Emerging and Frontier Markets Index (MSCI INC, 2017). MSCI World All Country Index covers over 95% of the world's equity market as measured by market capitalization. The R-squared of 20.78% and adjusted R-squared of 20% indicate that the NSE has some level of integration with the MSCI World All Country Index. The finding supports conclusions by Kodongo and Ojah (2011), Boamah(2016) and Boamah (2017) the NSE is partially integrated with global stock markets. This is contrary to findings from Agyei-Ampomah (2011) whose ten-year study (1998-2007) on African markers, (including Kenya), showed no evidence of African equity markets being integrated with global stock markets.

The R-squared of 23.22% for the MCSI Frontier Markets Index and 20.78% MSCI World All Country Index implies that a significant component (76.88%-79.22%) of the NSE 20 monthly returns could not be explained by world factors. The findings support those of Boamah (2017) who concluded that a significant component of Kenya's equity returns could not be explained by world market factors.

The NSE's higher level of integration with the MSCI Frontier index relative to the MSCI World All Countries implies that there exists different levels of stock market intergration. The different levels of intergration can be explained by the different levels of external trade Kenya

has with Frontier and Developed markets. Pretorius (2002) put forth the theory that an increase in trade levels should lead to higher equity market integration between two countries. This was observed by Bracker, Docking and Koch(1999) in nine developed countries any by Boamah (2016) in several African markets. Although rising trade levels were observed by Gygli et.al. (2018) and confirmed by the data collected, close to 80% of Kenya's trading volume is with emerging or frontier markets. The poorer integration with the MSCI World All Countries Index can thus be attributed to the reality that most of Kenya's external trade is not with developed countries which constitute the bulk of the MSCI World All Countries index. United States, Japan, United Kingdom and France constitute 80.8% of the country weights with the US contributing 63.96% of the total country weights.

5.2.2. Impact of Economic Openness on NSE Returns

The second objective of the study was to analyse the impact of Economic openness on NSE 20 returns using two models. An inverse and weak relationship was established between macroeconomic openness and NSE 20 returns. The first model was a regression of economic openness and NSE returns and it showed economic openness is not a significant variable in determining the NSE return. The low R-squared and negative adjusted R-squared imply a poor fitting model. The second model added macro economic variables to the initial regression model. Results indicated the Adjusted R-squared decreased with the addition of the economic openness variable to the local macroeconomic variable's regression; therefore, the addition of economic openness doesn't improve the model fit significantly. From the analysis, economic openness does not have any statistical significance in determining the NSE returns.

Kenya's macro economic variables, namely USD/KES exchange rate, T-bill rate, inflation, money supply and general election were used as control variables in the study. An inverse relationship was established between NSE 20 monthly returns and inflation alongside 91 T-bills. The NSE 20 monthly returns have a positive relationship between USD/KES exchange rate and money supply.

91-day T-bill had an inverse relationship with NSE 20 returns and had a low P-Value of 3.14%, thus rejecting the null hypothesis that it lacks statistical significance in determining NSE 20 monthly returns. The results support the findings of Mugambi and Oketch (2016) that 91-day T-bill rates has an inverse relationship with the NSE 20 returns. Contrary to this research's findings, Mugambi and Oketch (2016) found a positive relationship between inflation and NSE 20 returns and an inverse relationship with foreign exchange rate. Ouma and Muiro (2014) also found a positive relationship between money supply and NSE 20 returns which is consistent with the findings. However, the authors established a positive relationship between inflation and NSE 20 returns.

When compared to studies in selected emerging markets, the results are consistent with findings by Alraimony and El-Nader (2012) in Jordan who evidenced that inflation and exchange rates had a negative and significant impact on returns in the Amman Stock Market Returns. Pal and Mittal (2011) found that there is an inverse relationship between inflation and the returns on Indian Capital Markets, which is also consistent with the findings found in this paper. The findings contradict those of Ismail, Pervaz, Ahmed and Iqbal, (2016) who found that Exchange Rates, Real Interest Rate and Money Supply had no impact on the overall returns in the Karachi Stock Exchange. Findings from this paper indicate that Money supply has a positive correlation with NSE returns which is contrary to Alraimony and El-Nader (2012) who established a negative correlation with the returns in Amman Stock Market. It is also worth noting the impact of politics on the NSE 20 returns daily. A statistically insignificant relationship was noted between Kenyan Politics and the NSE 20 return.

5.2.3. Impact of Foreign Investor Participation on NSE Returns

The third objective of the study was to analyse the impact of foreign investor participation on NSE 20 returns using two models. A weak positive relationship was established. The first model was a regression of foreign investor participation and NSE returns and results show that foreign investor participation was statistically insignificant in determining NSE returns. The second model added macro economic variables to the initial regression model. Results indicated the Adjusted R-squared decreased with the addition of foreign investor participation variable to the local macroeconomic variable's regression; therefore, the addition of foreign investor participation doesn't improve the model fit significantly.

Literature review on the impact of foreign investor participation shows that their entry results to improved equity returns (Bekaert & Harvey (2000b); Chandra (2012) and Richard (2005). Conversely, their withdrawal from the frontier market can cause large negative returns as evidenced during the 2008 global financial crises (Agudelo & Castaño, 2011). The weak relationship between NSE monthly returns and foreign investor participation could be attributed to the double effect of investor participation in emerging markets where they can improve equity returns and erode them depending on circumstances such as global economic shocks.

The macro-economic factors were used as control variables while establishing the impact of foreign investor participation on NSE returns. Inflation and 91-day T-bill were statistically significant in determining the NSE 20 returns as was the case for economic openness.

5.3. Conclusion

The study focused on the impact of globalization on the NSE equity returns. The study established the NSE is partially integrated with the MSCI Frontier Index and MSCI All

World Share index. The higher levels on integration of the MSCI Frontier Index relative to the MSCI All World Share index support the notion that there exist different levels of NSE's integration with global equity markets. This could be attributed to the fact that Kenya's external trade is predominantly countries classified as frontier equity markets.

Bekaert, Harvey and Viskanta (1996) recommend that given the segmented nature of emerging markets, one should consider both global factors and local macro-economic variables to determine equity returns in emerging markets. A key impact of globalisation is the loading of global factors in determining local equity returns (Bekaert & Harvey 2000b). However, this study has evidenced that local factors are a better determinant of NSE 20 returns relative to global factors, namely economic openness and foreign investor participation.

5.4. Recommendations and Implications

The study showed that the NSE is partially integrated with global equity markets. The implication is a risk of market contagion from developed and frontier markets to the Nairobi Securities Exchange. It is this important for policy makers such as the Central Bank of Kenya and various regulators of the NSE to remain vigilant of market turbulences in foreign markets and ensure mitigating factors such as sufficient FX reserves are put in place to avoid an adverse impact on the economy in case of a capital flight.

The study has evidenced that the NSE has a higher degree of integration with the MSCI Frontier Index compared to MSCI World All Countries Index. An investor can thus achieve a higher degree of portfolio diversification by investing in the constituents or funds tracking the MSCI World All Countries Index.

A policy recommendation from this study is to disaggregate foreign investor participation by measuring participation from the country of the investor's origin. This will assist in correlating the level of trade and economic openness to equity trading activity originating from the countries. In addition, the disaggregation will assist determine whether changes in the macro-economic variables in the home country of the foreign investors has a bearing to the performance of the NSE, thus determining if there exists elevated contagion risk to specific countries.

5.5. Areas of Further Study

An area of further research a study of the large and small cap stocks in the NSE to understand if there exists different levels of integration global equity integration in each category. In addition, the research could also inquire if equity returns in category are affected by improving global trade and foreign investor participation.

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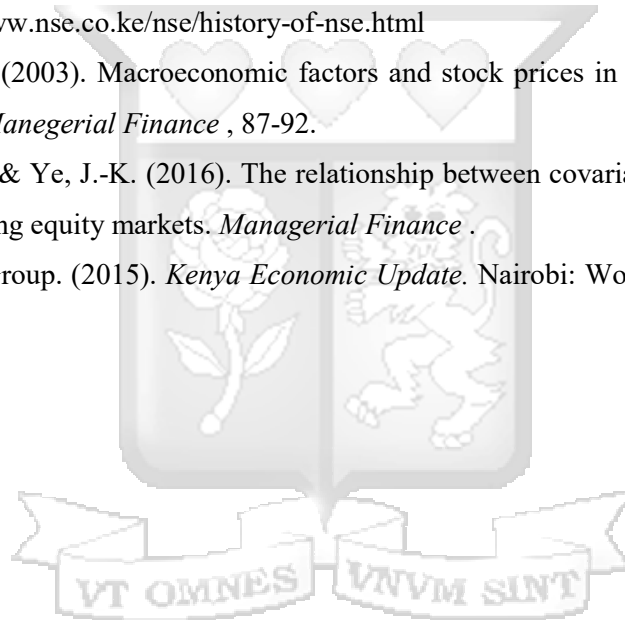
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Appendices

Appendix 1: Impact of various macro-economic variables on Stock Market Returns

Author	Money Supply	Exchange Rates	Inflation	T-Bill Rate	GDP	Country
Ouma and Muriu (2014)	Positive & Significant	Negative & Significant	Positive & Significant	Insignificant Relationship	Not Reviewed	Kenya
Mugambi and Okech (2016)	Not Reviewed	Negative & Significant	Positive & Significant	Negative & Significant	Insignificant	Kenya
Kiruietal..(2014)	Insignificant	Negative & Significant	Insignificant	Insignificant Relationship	Insignificant	Kenya
Dziwornu and Awunyo-Vitor (2013)	Not Reviewed	Significant & Unidirectional	Not Reviewed	Not Reviewed	Not Reviewed	Ghana
Maku and Atanda (2010)	Significant	Significant	Significant	Insignificant	Significant	Nigeria
Pal and Mital (2011)	Not Reviewed	Negative & Significant	Negative and significant	Positive and significant	Insignificant	India
Ismail et.al (2016)	Insignificant	Insignificant	Not Reviewed	Insignificant	Positive and significant	Pakistan
Quadir (2012)	Not Reviewed	Not Reviewed	Not Reviewed	Insignificant	Insignificant	Bangladesh
Alraimony and El-Nader (2012)	Negative & Significant	Negative & Significant	Negative & Significant	Not Reviewed	Positive & significant	Jordan

Appendix 1: Impact of various macro-economic variables on Equity Returns

Appendix 2: Multiple Regression Assumption Tests

The relationship between the dependent variable and the independent variables is linear

$$R_{NSE} = \alpha + \beta_{Econ}Econ_Opend1 + \beta_{fx}Fx + \beta_{infl}Infl + \beta_{Tbill}Tbilld1 + \beta_{M2}M2d1 + \varepsilon_{NSE}$$

$$R_{NSE} = \alpha + \beta_{For_par}For_Part + \beta_{fx}Fx + \beta_{infl}Infl + \beta_{Tbill}Tbilld1 + \beta_{M2}M2d1 + \varepsilon_{NSE}$$

The independent variables are not random and there is no precise linear relation between any two or more independent variables. This is measured using the variance inflation factor (VIF). VIF identifies correlation between independent variables and the strength of that correlation. If the VIF is greater than 5 then there are critical levels of multicollinearity which will need corrective measures.

Variance Inflation Factors		
Variable	Coefficient Variance	Centred VIF
C	0.0003	NA
Econ_Opend1	0.0947	1.5889
Infl	0.7273	1.8113
LnfX	0.1849	1.7087
M2d1	0.0032	1.1370
T-bill	0.9642	2.0505

The centred VIF is greater than 5, therefore, there lacks multicollinearity between the independent variables.

Variance Inflation Factors		
Variable	Coefficient Variance	Centred VIF
C	0.0004	NA
For_partd1	0.0057	1.4537
Infl	0.6594	1.6678
LnfX	0.1409	1.3223
M2d1	0.0040	1.4425
T-bill	0.9516	2.0553

The centred VIF is greater than 5, therefore, there is no multicollinearity between the independent variables. The value of the error term was nill and was observed across all observations.

Tested using the Breusch-Pagan test with a null hypothesis of homoscedasticity. The results are indicated in Figure 8: Heteroskedasticity Test: Breusch-Pagan-Godfrey fails to reject the

null hypothesis, therefore, no heteroscedasticity because the probabilities are greater than 5% level of significance.

Appendix 2: Heteroskedasticity Test: Breusch-Pagan-Godfrey – Economic Openness multiple regression

Heteroskedasticity Test: Breusch-Pagan-Godfrey

Null Hypothesis: Homoskedasticity

Prob. F(5,24)	0.7889
Prob. Chi-Square(5)	0.7433
Prob. Chi-Square(5)	0.9057

Appendix 3: Heteroskedasticity Test: Breusch-Pagan-Godfrey – Foreign Participation multiple regression

Heteroskedasticity Test: Breusch-Pagan-Godfrey

Null Hypothesis: Homoskedasticity

Prob. F(5,24)	0.6011
Prob. Chi-Square(5)	0.5485
Prob. Chi-Square(5)	0.8549

The error term is uncorrelated across observations. Tested using the Breusch-Godfrey Serial Correlation LM Test with a null hypothesis of no serial correlation. The results are indicated in figure 11-Breusch-Godfrey Serial Correlation LM Test fail to reject the null hypothesis, thus, there is no serial correlation because the probabilities are greater than 5% level of significance

Appendix 4: Breusch-Godfrey Serial Correlation LM Test – Economic Openness multiple regression

Breusch-Godfrey Serial Correlation LM Test

Null Hypothesis: No serial correlation at up to 2 lags

Prob. F(2,22)	0.9453
Prob. Chi-Square(2)	0.9264

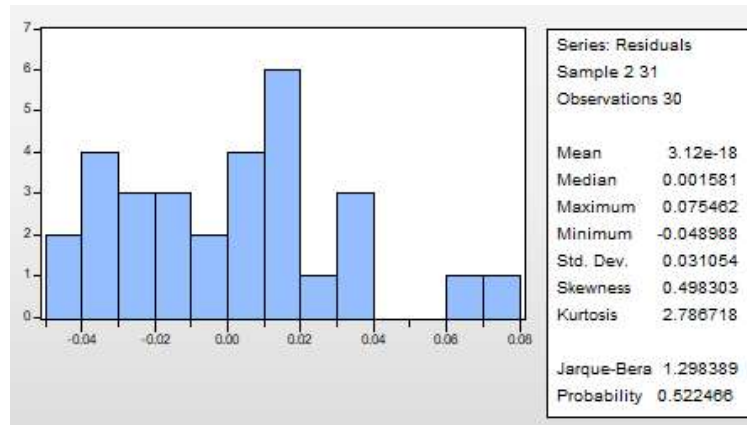
Appendix 5: Breusch-Godfrey Serial Correlation LM Test – Foreign Participation multiple regression

Breusch-Godfrey Serial Correlation LM Test

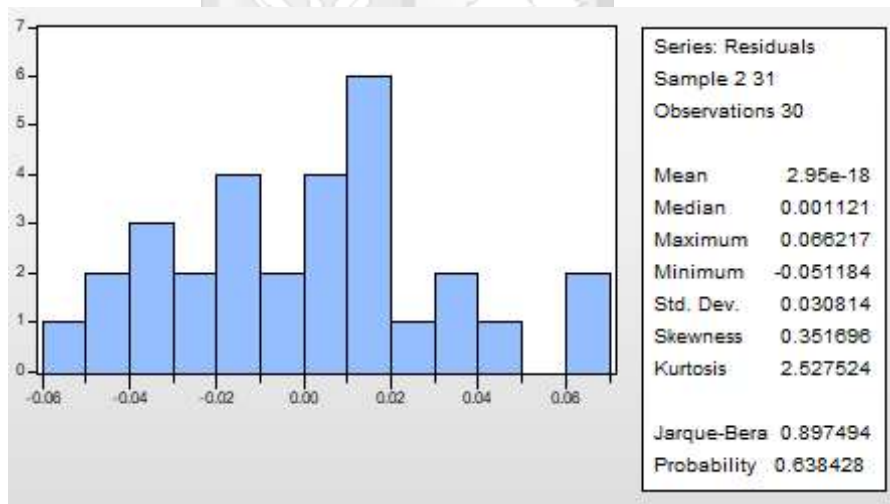
Null Hypothesis: No serial correlation at up to 2 lags

Prob. F(2,22)	0.8556
Prob. Chi-Square(2)	0.8096

Appendix 6: Distribution of Error Term – Economic Openness multiple regression



Appendix 7: Distribution of Error Term – Foreign Participation multiple regression



The error term is normally distributed as indicated in figure 10-Distribution of error term. The Jarque-Bera fails to reject the assumption of normal distribution of the residuals at the 5% significance level.