



EFFECTS OF MACROECONOMIC FACTORS ON STOCK MARKET DEVELOPMENT IN SUB-SAHARAN AFRICA

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Abstract: Studies on the factors determining stock market development and economic growth have been increasing in recent years. This study sought to examine the effect of macroeconomic factors on stock market development in Sub-Saharan Africa. The study was guided by the specific objectives focusing on the effects of income levels, banking sector development, stock market liquidity and institutional quality. The study adopted an explanatory research design so as to explore the macroeconomic factors surrounding the development of stock markets in SSA. The study targeted on all the companies listed and active at the selected ten Sub-Saharan African economies covering the period from 2001 to 2015. Using pooled cross sectional data from the selected sub-Saharan African countries, the study employed a panel data analysis technique with Stata (14) which has a rich variety of panel analytic procedures. Furthermore; the study used Time Series Regression model to examine the effect of the macroeconomic factors on stock market development in SSA. For stock market development indicators, market capitalization, listed companies and total value traded was considered. This study found that banking sector development influences the development of stock market development in Sub-Saharan Africa most, followed by stock market capitalization (in dollars), corruption perception index and GDP per capita in US dollars. Stock market liquidity was found to have a positive and statistically significant effect on stock market development. Similarly, income level was found to be positive and statistically significant in explaining the stock market development. As expected, the higher the income, the more likely it is for investors to save and invest because disposable income increase. Banking sector development was found to be positive and statistically significant. This study recommends that countries in Sub-Saharan Africa should improve their institutional capacity by reducing corruption. This should be done through development and strict implementation of policies. This study also recommends that countries in Sub-Saharan Africa should improve their banking sector by developing monetary and fiscal policies that support the growth of the banking sector.

Key words: Stock market, Capital market, Market Capitalization, Economic Growth

Introduction

Stock markets in Sub-Saharan Africa were started at different years in different countries. For instance, The Egyptian Exchange (EGX) was founded in 1883 followed closely by the Johannesburg Stock Exchange (JSE) Limited in 1887. The Casablanca Stock Exchange of Morocco was founded in 1929 while Zimbabwe stock exchange was founded in 1948. Other countries adopted stock exchange very recently. Among them are Seychelles Securities

exchange, Rwanda stock exchange, Libya stock exchange and the Cameroon's Douala stock exchange which were founded in 2012, 2008, 2007 and 2001 respectively. World Bank stock exchanges report in Africa (2015)

The stock market development is a significant part of the economy of a country. It plays a pivotal role in the growth of the industry and commerce that eventually affects the economy of a particular country to a great extent. This is the reason, that the government, industry and even the central banks of any country keep a close watch on the happenings of the stock or securities market. The stock market is one of the most reliable sources for companies to raise funds. This allows businesses to be publicly traded, or raise additional capital for expansion by selling shares of ownership of the company in a public market. The stock markets are essential for economic growth as they ensure the flow of resources to the most productive investment opportunities (Kiriara, 2006)

Stock market development plays a fundamental role and are the intermediary link in facilitating the flow of funds from savers to investors. By providing an institutional mechanism for mobilizing domestic savings and efficiently channeling them into productive investments, they lower the cost of capital to investors and accelerate economic growth of the country. Stock market development signals the future trend of the economy. Furthermore, it works as an indicator of the overall health of the economy. Stock market development can be assessed by using the stock market integration, size, level of income and volatility.

Stock market development in Sub-Saharan African shows that markets are small with few listed companies and low market capitalization. South Africa, Nigeria, Egypt and Kenya are the exceptions with listed companies of 402, 81, 833 and 64 respectively. The average number of listed companies on sub-Saharan African markets excluding South Africa is 39 compared with 113, with the inclusion of Egypt and South Africa. As pointed out by (Yartey & Adjasi, 2007) Market capitalization as a percentage of GDP is as low as 1.4 in Uganda. The Johannesburg Securities Exchange in South Africa has about 90 percent of the combined market capitalization of the entire continent. Excluding South Africa and Zimbabwe the average market capitalization is about 27 percent of GDP.

Sub-Saharan African stock market performance across the region has remained fairly buoyant in 2015 for instance, at the end of April 2015 for local investors. The exceptions were that Mauritius (depreciated by 5.7%), Zimbabwe (lost 4.0%), Egypt (declined by 2.8%) and Zambia (down by 0.5%). It ended, however, in the negative region for Foreign exchange adjusted returns (in US dollar) due to the depreciation of most African currencies against the US dollar during the period under review. This depreciation is attributed to a fall in commodity prices and the end of a five-year Quantitative Easing stimulus programme by US Federal Reserve Bank (Omotolani, 2015).

Recent evidence by Filer, Hanousek, and Campos, (2000) and N'Zué (2006) suggests that stock market development contributes positively to the economic development in a number of ways like capital formation, risk diversifications, savings mobilization, liquidity creation and corporate governance. Further, a study done by (Adjasi & Biekpe, 2006) suggests that stock markets reduce the financing constraints of investors by creating an alternative to bank financing. However, stock markets in developing countries possess a number of weaknesses compared to stock markets in developed countries

Ologunde and Elumilade (2014) investigated the problems affecting stock markets in Sub-Saharan Africa. Despite the problems of small size and low liquidity, African stock markets continue to perform remarkably well in terms of return on investment for example, the Ghana Stock Exchange was adjudged as the Africa's best-performing market at end of 2014 with a year return of 114 percent in US dollar terms compared with 30 percent return by Morgan Stanley Capital International Global Index (Databank Group, 2014). Within the continent itself five other bourses namely Uganda, Kenya, Egypt, Mauritius and Botswana were amongst the best performers in the year. Zimbabwe Stock Exchange was the worst performing equities market in Sub-Saharan Africa.

According to Yarley and Adjasi (2007) the stock market development is of immense importance to economic growth because it is an alternative vehicle of financing investments. Stock market has become an essential market playing a very important role in economic prosperity thus fostering capital formation and sustaining an increase in the economic output of a country. Kanu (2014) stated that both developed and developing countries have benefited from stock markets by enabling firms to access cheaper source of capital which contribute to economic development through efficient allocation of resources to productive sectors of the economy. Stock markets enable diversification of funds for those who are interested in saving and investment. Ozurumba (2013) further indicated that sound macroeconomic environment, well developed financial intermediary, transparent and accountable institutions, and shareholder protection are necessary preconditions for the efficient and functioning of stock markets in Africa.

Cherif and Gazdar (2010) define stock market development as an essential part of financial development. Exploring what determines stock market development of a particular country has become an eminent area of research in recent years. More recent studies has been restricted to country case studies mainly and among them features Enisa and Olufisayo (2009), N'Zué (2006) for the case of Ghana, Osamnwunyi and Osagie (2012) for the case of Nigeria, Aduda, Masila and Onsongo (2012), Kemboi and Tarus (2012) for the case of Kenya and Msangi (2015) for the case of Tanzania. Both studies have emphasized more on the relationship between macroeconomic determinants and stock market development without much regard on the wider regional scope. This knowledge gap is the motivating factor towards this research study. By considering beyond individual country level, this study therefore, seeks to bridge this gap by looking at the effects of macroeconomic factors on stock market development in Sub-Saharan Africa.

In Sub-Saharan Africa, stock markets are characterized by thin and small sizes, low liquidity and slow growth while in some other countries stock markets are nonexistent for instance Angola, Liberia and Ethiopia do not have stock markets in their economies. This could explain the smallness of investment and economic growth in these countries. Despite the problems of small size and low liquidity, Some African stock markets continue to perform remarkably well in the region in terms of return on investment. Five bourses from in Sub-Saharan Africa region were among the best performers in 2014 for instance Ghana, Kenya, Uganda, Mauritius and Nigeria (Databank Group, 2014). The factors of stock market development vary from one country to the other depending on the nature of economic policies, regulatory mechanisms and institutional structures as pointed out by (Kemboi, 2012).

Over the years, developing countries have provided several ways to attain sustainable economic growth. Among this is stimulation of investment. (Kanu & Ozurumba, 2014) showed that investment also called capital formation raises the level of national income and economic

growth. According to Bakare (2011) to finance investment, equity or debt markets are often used as a source of capital. Stock markets for instance have been established as important to the economy because countries such as Kenya, Nigeria and Ghana have reported among the highest levels of development in their stock markets.

This study investigated the effect of macroeconomic factors on stock market development and whether income levels, banking sector development, stock market liquidity and institutional quality would have a significant determining effect on the suppose stimulation on stock market development in SSA region.

The research hypotheses of the study were;

H₀₁: There is no significant effect between and income levels stock market development in Sub-Saharan Africa.

H₀₂: There is no significant effect between banking sector development and stock market development in Sub-Saharan Africa.

H₀₃: There is no significant effect between stock market liquidity and stock market development in Sub-Saharan Africa.

H₀₄: There is no significant relationship between institutional quality and stock market development in Sub-Saharan Africa.

Theoretical Review

There are three basic theories of stock market development namely; Efficient Markets Theory (EMT), Inter-temporal Capital Asset Pricing Model (ICAPM) and the Calderon-Rosell theory.

Efficient Market Theory

The Efficient Markets Theory (EMT) is a theory that explains the stock market development. This theory was developed by Fama in 1965 and was used by Ewahet (2009) it states that the price of an asset reflects all relevant information available about the intrinsic value of the asset known as present value of the cash flows the owner of the security expects to receive. However, the profit opportunities represented by the existence of undervalued and overvalued, stocks motivate investors to trade and their trading moves the prices of stocks toward the present value of future cash flows. Again, Fama E. (1991) pointed out that market efficiency is in a continuous series because the lower the transaction costs in a market including the cost of obtaining information and trading, the more efficient the market. The informational efficiency of stock prices matters in two ways. First, investors care about whether various trading strategies can earn excess return that is to say beat the market. Consequently, if stock prices accurately reflect all information, new investment in the market goes to its highest-valued use as a result the stock market development goes up. There are three different forms of market efficiency such as weak form, semi-strong form and strong form. Each form of efficient market theory has ability to rule out the possibilities of consistent outperformance by a certain group of investors who use certain type of information as the tool in their trading activities. However, under assumption of efficient Capital markets, all investors are risk averse and completely rational in making their decisions (Hodnett & Hsieh, 2012).

Inter-temporal Capital Asset Pricing Model

Inter-national capital asset pricing model is a financial model that extends the concept of the capital asset pricing model (CAPM) to international investments. The standard CAPM pricing model is used to help determine the return investors require for a given level of risk. When

looking at investments in an international setting. The CAPM is static, or single –period models. As such, it ignores the multi-period nature of participation in the stock markets. Merton's (1973) inter-temporal capital asset pricing model (ICAPM) was developed to capture this multi-period aspect of financial market equilibrium. The ICAPM framework recognizes that the investment opportunity set might shift overtime, and investors would like to hedge themselves against unfavorable shifts in the set of available investments. If a particular security tends to have high returns when bad things happen to the investment opportunity set, investors would want to hold this security as a hedge. This increased demand would result in a higher equilibrium price for the security. One of the main insights of the ICAPM is the needed in SSA to reflect this hedging demand in the asset pricing equation which in turn will boost the development of stock markets in the SSA region.

Calderon-Rosell Theory

Calderon-Rosell (1991) developed a model or theory which explored the main determinants of stock market development. To date, this model represents the most earnest attempt to build up the foundations of financial theory of stock market development. In this model, stock market liquidity and economic growth are considered as main indicators. Yartey (2008) tailored the Calderon-Rosell model to incorporate other factors that might influence the capital market development. The determinants are categorized into two sets known as macroeconomic and institutional factors. Macroeconomic factors include savings, income level, the banking sector development, private capital flows, investment, stock market liquidity and macroeconomic stability. The Institutional variables are political risk, corruption, rule of law, democratic accountability and quality of bureaucracy and therefore the basic Calderon-Rosell model is being modified to reflect the interest and the variables of this study.

Macroeconomic Factors of Stock Market development

Banking Sector Development

The banking sector is a crucial player in the economic development process and in the stock market development as it offers investors with liquidity by advancing credit, and facilitating savings and investment. Garcia and Liu, (1999) and Nacueret (2007) recognized that there is a positive relationship between banking sector development and stock market development. At the early stages of its establishment stock market is a complement rather than a substitute for the banking sector. Developing the financial intermediary sector can promote stock market development in Sub-Saharan Africa. Many East Asian countries are successful examples. Support services from the banking system contribute significantly to the development of the stock markets in both developing and developed economies.

Demirguc-Kunt and Levine (1996) have found that most stock market indicators are highly correlated with banking sector development. Countries with well-developed stock markets tend to have well-developed banking sector. Masoud and Hardaker (2012) investigated the relationship between financial development and economic growth in 42 emerging markets, including South Africa, over 12 years using an endogenous growth model. Amongst other findings, banking sector and stock market development, as measured by market capitalization and total value traded, were found to play a significant role in the economic growth processes of these emerging markets.

Income Level

According to Naceur (2007) real income has been found to be highly correlated with the stock market size. Higher volume of intermediation through stock markets causes higher real income growth. High income growth in turn promotes development in the stock market. As income increases, its cyclical component should impact the size of the stock market and its price index. In addition, because higher income usually goes hand in hand with better defined property rights, better education, and a better general environment for business, we expect it to have a positive effect on the stock market size. We use real GDP in U.S. dollars to measure the income level and calculate the real income growth rate. The institutional approach of La Porta (1996) sheds some light on the rationale for positive income effect on stock market size. Usually the larger the savings, the higher the amount of capital flows through stock markets and thus greater development.

Stock Market Liquidity

According to Arun Kumar (2015) Liquidity is said to be the lifeblood of stock markets. Market liquidity refers to the ease with which one is able buy and sell financial assets in the market, without adversely affecting the price, and best expressed as a ratio of value of shares traded to size of the economy. The more liquid the markets are the better, given that liquid markets may make participants take on more risk with an assumption that they can liquidate their positions quickly and at fairly predictable prices. A stock market with a high degree of turnover is said to be highly liquid. Economists have debated for a long time on whether developing countries should seek to promote liquid stock markets as a means of advancing economic growth due to its considerable policy relevance with conflicting results.

Levine and Zervos (1998) established that stock market liquidity is a robust predictor of physical capital, productivity and real per capita GDP growth. It is one of the most important functions the stock markets as provided by (Miller, 1991). Many high-return projects require a long-run commitment of capital, which bears higher default and liquidity risks. Investors are generally reluctant to take these risks. Thus, without liquid stock markets less investment may occur to the high-return projects. One of the most important aspects of stock market development is liquidity. A liquid market makes financial assets more attractive to investors, who can transact in them more easily. In addition, liquid markets allow investors to switch out of equity if they want to change the composition of their portfolio, liquid markets permit financial institutions to accept larger asset-liability mismatches, they also allow companies to have permanent access to capital through equity issues, subsequently, liquid markets allow a central bank to use indirect monetary instruments and generally contribute to a more stable monetary transmission mechanism. This is according to a study carried out by Sarr and Lybek, (2002). With liquid markets, the initial investors do not lose access to their savings for the duration of the investment project for they can easily, quickly and cheaply sell their stake in the company. Consequently, more liquid markets could ease investment in long-term, potentially more profitable projects, thereby improving the allocation of capital and enhancing prospects for long-term growth. In other words, the more liquid the stock market, the larger the amount of savings that are channeled through stock markets.

Institutional Quality

Institutional quality is a broad concept but with reference to stock market development an institutional factor captures law and order, individual rights and high quality government

regulation and services. (Billmeier & Massa, 2007) empirically found out that institutional factor is important for stock market development. Yartey (2007) argued that good quality institutions such as law and order, democratic accountability, bureaucratic quality as important determinants of stock market development in Sub-Sahara Africa because they reduce political risk and enhance the viability of external finance. El-Wassal (2013) showed in his study that Institutional factors represent the first supporting block of stock market development and that institutional quality is an integral part of enhancing the development of stock markets in a country. Thus, institutional quality matters for stock market development.

La Porta *et al.*, (1999) provide evidence for the importance of minority rights protection by using indicators of the quality of shareholder protection as written in laws. They demonstrated that the quality of shareholder protection is correlated with the capitalization and liquidity of stock markets in 49 countries around the world. Laporta (1997) expressed that countries with lower quality of legal rules and law enforcement have smaller and narrower stock markets and that the listed firms on their stock markets are characterized by more concentrated ownership. Demirguc-Kunt and Maksimovic (1998) showed that firms in countries with high ratings for the effectiveness of their legal systems are able to grow faster by relying more on external finance because international investors are attracted to such economies with institutional stability.

Conceptual Framework

It is expected that macroeconomic factors can potentially affect the securities market development in SSA. These factors include: income level, banking sector development, stock market liquidity and institutional quality. Using the above variables, the conceptual framework can be summarized as below:

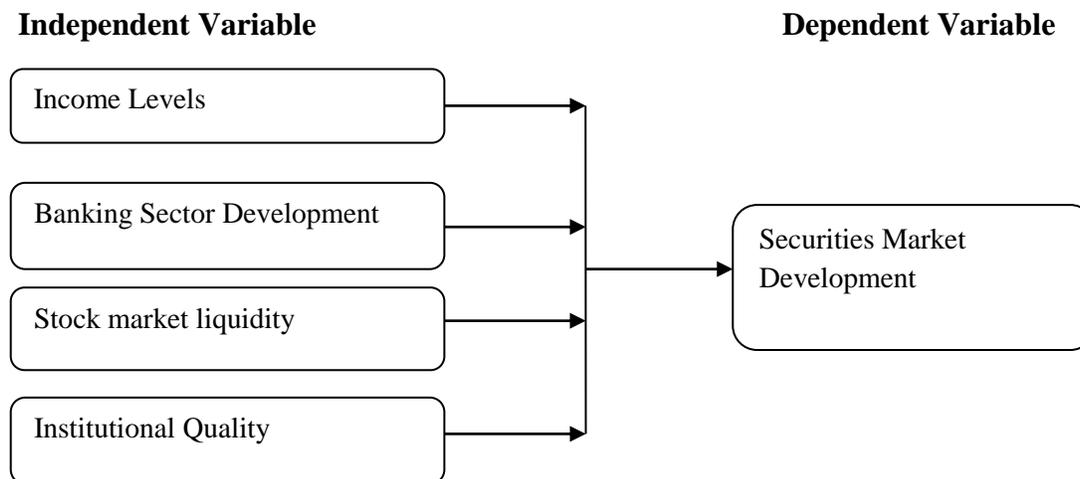


Figure 1: Conceptual Framework

Research Methodology

To empirically examine the effects of macroeconomic factors on stock market development, the study adopted an explanatory research design which depicts accurately the variables under study. An explanatory design helped to provide the explanation on the effects of the independent on the dependent variable. The target population for the study included the companies listed in all the ten selected SSA stock/securities markets considered in this study which include; Kenya, Tanzania, South Africa, Ghana, Mauritius, Nigeria, Zimbabwe, Botswana, Côte d'voire, and

Uganda. This study used secondary annual panel data. The sources of data on all of the variables in this study were collected from World Development Indicators (WDI) online database, published by World Bank for the period between 2001 and 2015.

data was analyzed using panel data technique to provide a general view of the effects and behavior of the variables in the study. The data was then coded and analyzed using statistical software package known as Stata (version 14.0) and the results were presented in tables and charts. This study adopted panel data because of its possibility to give more informative on the data required, more variability, less co-linearity among the variables, more degrees of freedom and more efficiency. Panel data is readily available in developing countries such as the Sub-Saharan Africa.

In this study, the empirical model incorporated the selected macroeconomic variables. To examine the validity of the model, Rosell used annual observations from 1980 to 1987 from 42 of the main active stock markets in the world and found that stock market liquidity and economic growth are important determinants of stock market growth. Yartey (2008) modified the Calderon-Rosell (1991) model to include macroeconomic and institutional variables that might affect stock market development. Following Yartey (2008), the study will estimate the following equation:

$$Y_{it} = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \varepsilon_{it}$$

Where,

Y_{it} = is the stock market development indicator i.e stock market capitation, t denotes time and i denotes individual country.

β_0 = the intercept or the regression constant term

β_i ; $i=1,2,3,4$ is the coefficients for the various independent variables X_i for:

X_1 = Represents the coefficients for income level

X_2 = Represents the coefficient for banking sector development

X_3 = Represents the coefficient of stock market liquidity

X_4 = Represents the coefficient of institutional quality

$\varepsilon_{i,t}$ = the error term

Panel Unit Root Tests

Levin, Lin and Chu (LLC) test

Individual unit root tests have limited power. The power of a test is the probability of rejecting the null when it is false and the null hypothesis is unit root. Testing for unit roots in time series is now common practice among empirical studies. However, testing for unit roots in panels is quite recent, having the major developments in non-stationary panel models occurred since the middle of the 1990s. Before estimation is done it is important to analyze the characteristics of variables. Within a number of tests proposed for panel data include; Levin, Liu and Chu (LLC) (2002) test, Breitung test, Im, pesaran and Shin (IPS) (1995, 2003), test. These tests are popular and allows for the persistence parameter to vary across sections. Levin, Lin, and Chu (2002) propose a panel

unit root test for the null hypothesis of unit root against a homogeneous stationary hypothesis. The general panel root tests take the following process:

$$y_{it} = \rho_i y_{i,t-1} + \sum_{l=1}^{p_i} \phi_l \Delta y_{i,t-1} + \varepsilon_{it} \dots\dots\dots (1)$$

Where i=1, 2, 3.....N cross section units or series that are observed over time periods

Where t=1, 2, 3.....T, Pi is the autoregressive co-efficient and the errors ε_{it} are assumed to be mutually independent idiosyncratic disturbance.

If $|p_i| < 1$ y_i is said to weakly (trend) stationary on the other hand if $|p_i| = 1$ then y_i contains a unit root.

The Im, Pesaran and Shin (IPS) test

The Im-Pesaran-Shin (IPS) test is not as restrictive as the Levin-Lin-Chu test, since it allows for heterogeneous coefficients. Im, Pesarian and Shin denoted IPS proposes a test for the presence of unit roots in panels that combines information from the time series dimension with that from the cross section dimension. Since the IPS test is a superior test to analyze panel data. Under the null hypothesis, there is a unit root, while under the alternative hypothesis there is partial unit root.

$$\Delta y_{it} = \alpha_i + y_{i,t-1} + \sum_{j=1}^{p_i} \beta_{ij} \Delta y_{i,t-j} + \varepsilon_{it} \dots\dots\dots (2)$$

For null hypothesis: $H_0: = \alpha_i = 0$ For all i

The alternative hypothesis allows some (but not all) of the individuals to have unit roots:

$H_1: = \alpha_i = 0$ For all $i=1, 2, \dots, N$ $\alpha_i < 0$ for $i = N + 1, N + 2, \dots, N$

Table 1: Summary of Variables and their measurement

Variable	Measurement	Expected Sign
Dependent Variable		
Stock market development	Total value of listed shares/GDP	+
Independent Variable		
Income Level	GDP per capita in US dollars	-
Banking Sector Development	Credit to private sector/GDP	+
Stock market liquidity	Total value traded to GDP	-
Institutional quality		
Political Risk	Composite index	-
Corruption Index	Range from 0-6	-

Results and Discussions

The study covered a period of 16 years (2000 to 2015). The study used panel data that involved 10 countries that include Ghana, Kenya, Malawi, Lebanon, Mauritius, Namibia, Nigeria, South Africa, Swaziland and Uganda. The results were presented in line graphs and tables.

Descriptive Statistics

The descriptive statistics comprise of mean and standard deviation of the dependent variable (market capitalization of listed companies, as % of GDP) and the independent variables (total value of stocks traded, stocks traded turnover ratio, GDP per Capita in US Dollars and domestic credit provided by banking sector).

Table 2: Descriptive Statistics of the variables

Variable	Obs	Mean	Std. Dev.	Min	Max
GDP, current U.S. dollars	160	64.70437	118.6032	1.22	568.5
Bank credit to the private sector	160	37.603	29.04467	2.75	108.02
Stock market capitalization, percent of GDP	160	37.991	62.77817	.01	276.6
Stock market capitalization, in dollars	160	67.98071	204.1612	0	942.81
Stock market turnover ratio	160	26.94319	160.6835	0	1721.54
Corruption index	160	33.8375	11.0635	9	57

From the findings, the average GDP (current U.S. dollars) for all the 10 countries during the study period (2000-2015) was 64.70437, the average bank credit to the private sector (% of the GDP) was 37.603%, average Stock market capitalization (% of the GDP) was 37.991%, average stock market capitalization, in dollars was 67.98071, stock market turnover ratio was 26.94319 and corruption index was 33.8375.

The minimum GDP (current U.S. dollars) for all the 10 countries, over the study period was 1.22 while the maximum was 568.5. The minimum Bank credit to the private sector was 2.75% while the maximum was 108.02%. In addition, the minimum stock market capitalization was 0.01% while the maximum was 276.6%. Further, the minimum stock market capitalization in dollars was 0 while the maximum was 942.81. Also, the minimum stock market turnover ratio was 0 while the maximum was 1721.54. Additionally, the minimum corruption index was 9 while the maximum was 57.

Diagnostic Tests

Diagnostic tests in this study included Heteroscedasticity Test and Breusch and Pagan Lagrangian multiplier test for random effects.

Heteroscedasticity Test

The study used Breusch-Pagan/Cook-Weisberg test for heteroscedasticity. Homoscedasticity describes a situation in which the error term (that is, the “noise” or random disturbance in the relationship between the independent variables and the dependent variable) is the same across all values of the independent variables. Heteroscedasticity (the violation of homoscedasticity) is present when the size of the error term differs across values of an independent variable. The impact of violating the assumption of homoscedasticity is a matter of degree, increasing as heteroscedasticity increases.

Table 3: Breusch-Pagan/Cook-Weisberg test for heteroscedasticity

Ho: Constant variance
 Variables: fitted values of SMCGDP

chi2(1) = 45.09
 Prob > chi2 = 0.0000

From the findings, as shown in table 3, it was revealed that the p-value of 0.000 was less than than 0.05 significant levels implying that the study rejects the null hypothesis of homoscedasticity. SMCGDP represents stock market capitalization (% of the GDP).

Breusch and Pagan Lagrangian multiplier test for random effects

The Lagrangian multiplier test helps decide between a random effects regression and a simple OLS regression. The null hypothesis in the LM test is that variances across entities are zero. This is, no significant difference across units (i.e. no panel effect).

Table 4: Breusch and Pagan Lagrangian multiplier test

Breusch and Pagan Lagrangian multiplier test for random effects

$$SMCGDP[Country, t] = Xb + u[Country] + e[Country, t]$$

Estimated results:

	Var	sd = sqrt(Var)
SMCGDP	3941.098	62.77817
e	148.6723	12.19313
u	136.5923	11.68727

Test: Var(u) = 0

chibar2(01) = 117.63
 Prob > chibar2 = 0.0000

Since the p-value (0.000) is less than the significance level (0.05), we can conclude that variances across entities are not zero, which means that there is significant difference across units (i.e. no panel effect).

Unit Root Test

Im, Pesarian and Shin denoted IPS proposes a test for the presence of unit roots in panels that combines information from the time series dimension with that from the cross section dimension. Since the IPS test is a superior test to analyze panel data, it was adopted in this study. Under the null hypothesis, there is a unit root, while under the alternative hypothesis there is partial unit root.

Table 5: GDP, current U.S. dollars

Ho: All panels contain unit roots
 Ha: Some panels are stationary

AR parameter: Panel-specific
 Panel means: Included
 Time trend: Not included

Number of panels = 10
 Number of periods = 16

Asymptotics: T,N -> Infinity
 sequentially

ADF regressions: No lags included

	Statistic	p-value	Fixed-N exact critical values		
			1%	5%	10%
t-bar	-2.4347		-2.210	-1.990	-1.890
t-tilde-bar	-1.8612				
Z-t-tilde-bar	-2.1059	0.0176			

The null hypothesis indicates that Stock market capitalization (% of GDP) in all panels contains unit root. The p-value (0.0176) was less the significance level (0.05) and hence we reject the null hypothesis. This implies that Stock market capitalization (% of GDP) in some panels is stationary.

Table 8: Stock market capitalization, in dollars

Ho: All panels contain unit roots
 Ha: Some panels are stationary

AR parameter: Panel-specific
 Panel means: Included
 Time trend: Not included

Number of panels = 10
 Number of periods = 16

Asymptotics: T,N -> Infinity
 sequentially

ADF regressions: No lags included

	Statistic	p-value	Fixed-N exact critical values		
			1%	5%	10%
t-bar	-1.2321		-2.210	-1.990	-1.890
t-tilde-bar	-1.0929				
Z-t-tilde-bar	1.1109	0.8667			

The null hypothesis indicates that stock market capitalization in dollars in all panels contains unit root. Since the p-value (0.8667) was more than the significance level (0.05), we can accept the null hypothesis. This means that stock market capitalization in dollars in all panels contains unit root.

Table 9: Stock market turnover ratio

Where,

Y_{it} = is the stock market development indicator i.e stock market capitation, t denotes time and i denotes individual country.

β_0 = the intercept or the regression constant term

β_i ; $i=1,2,3,4$ is the coefficients for the various independent variables X_i for:

X_1 = Represents the coefficients for income level

X_2 = Represents the coefficient for banking sector development

X_3 = Represents the coefficient of stock market liquidity

X_4 = Represents the coefficient of institutional quality

$\epsilon_{i,t}$ = the error term

Table 11: R-squared and F-statistics

Random-effects GLS regression	Number of obs	=	160
Group variable: Country	Number of groups	=	10
R-sq: within = 0.6271	Obs per group: min	=	16
between = 0.9133	avg	=	16.0
overall = 0.8721	max	=	16
	Wald chi2(5)	=	369.13
corr(u _i , X) = 0 (assumed)	Prob > chi2	=	0.0000

R-squared shows the variation in the dependent variable that can be explained by the independent variables. From the findings the overall r-squared was 0.8721. This implies that the independent variables (total value of stocks traded, stocks traded turnover ratio, GDP per Capita in US Dollars and domestic credit provided by banking sector) explain 87.21% of the dependent variable (market capitalization of listed companies, as % of GDP). Higher volume of intermediation through stock markets causes higher real income growth. F-test is conducted to establish whether all the coefficients in the model are different than zero. In this study, the p-value for the F-test was 0.000, which is less than the significance level (0.05). This means that the model is a good fit for the data. The results also show that differences across units are uncorrelated with the regressors.

Table 4. 1: Regression Coefficients

SMCGDP	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]
GDP	-.0441551	.0185517	-2.38	0.017	-.0805158 -.0077944
BCPS	.4373366	.1194167	3.66	0.000	.2032842 .671389
SMCD	.1979149	.0127756	15.49	0.000	.1728753 .2229546
SMTR	-.0021841	.0070762	-0.31	0.758	-.0160532 .0116851
CI	.5535345	.2309745	2.40	0.017	.1008328 1.006236
_cons	-7.722916	8.111826	-0.95	0.341	-23.6218 8.175971
sigma_u	11.687271				
sigma_e	12.193127				
rho	.47882662	(fraction of variance due to u _i)			

Interpretation of the coefficients includes both the within-entity and between-entity effects. In this study data represents the average effect of X over Y when X changes across time and between countries by one unit. In addition, Two-tail p-values test the hypothesis that each coefficient is different from 0. To reject this, the p-value has to be lower than 0.05, if this is the case then you can say that the variable has a significant influence on your dependent variable (y).

From the findings, the results show that GDP (GDP, current U.S. dollars) influences SMCGDP (market capitalization of listed companies) as shown by a regression coefficient of -0.0441. This

implies that a unit increase in GDP, current U.S. dollars across time and between countries would lead to a 0.0441 decrease in market capitalization of listed companies. The association was significant as the p-value (0.017) was less than the significance level (0.05).

The results also show that BCPS (bank credit to the private sector) influences SMCGDP (market capitalization of listed companies) as shown by a regression coefficient of 0.4373. This implies that a unit increase in bank credit to the private sector across time and between countries would lead to a 0.4373 increase in market capitalization of listed companies. The association was significant as the p-value (0.000) was less than the significance level (0.05).

The study findings show that SMCD (stock market capitalization, in dollars) influences SMCGDP (market capitalization of listed companies) as shown by a regression coefficient of 0.1979. This implies that a unit increase in stock market capitalization, in dollars across time and between countries would lead to a 0.1979 increase in market capitalization of listed companies. The association was significant as the p-value (0.000) was less than the significance level (0.05). The results further show that SMTR (Stock market turnover ratio) does not influence SMCGDP (market capitalization of listed companies). This is because the p-value (0.758) was more than the significance level (0.05).

The study findings show that CI (corruption perception index) influences SMCGDP (market capitalization of listed companies) as shown by a regression coefficient of 0.5535. This implies that a unit increase in corruption perception index, in dollars across time and between countries would lead to a 0.1979 increase in market capitalization of listed companies. The association was significant as the p-value (0.000) was less than the significance level (0.05).

Summary of the Findings

The study found that income levels have a significant effect on stock market development in Sub-Saharan Africa. It was established that GDP per capita in US dollars negatively influences market capitalization of listed companies. These findings agree with Naccer (2007) argument that real income has been found to be highly correlated with the stock market size. Higher volume of intermediation through stock markets causes higher real income growth. High income growth in turn promotes development in the stock market. As income increases, its cyclical component should impact the size of the stock market and its price index. In addition, because higher income usually goes hand in hand with better defined property rights, better education, and a better general environment for business, we expect it to have a positive effect on the stock market size.

The study established that banking sector development has a significant effect on stock market development in Sub-Saharan Africa. The study bank credit to the private sector has a positive influence on market capitalization of listed companies. These findings agree with Garcia and Liu, (1999) and Nacueret (2007) findings that recognized that there is a positive relationship between banking sector development and stock market development. Developing the financial intermediary sector can promote stock market development in Sub-Saharan Africa. Many East Asian countries are successful examples. Support services from the banking system contribute significantly to the development of the stock markets in both developing and developed economies.

The study revealed that stock market liquidity significantly influence on stock market development in Sub-Saharan Africa. The study also found that stock market capitalization, in

dollars has a significant effect on market capitalization of listed companies. According to Arun Kumar (2015) Liquidity is said to be the lifeblood of stock markets. Market liquidity refers to the ease with which one is able buy and sell financial assets in the market, without adversely affecting the price, and best expressed as a ratio of value of shares traded to size of the economy. These findings agree with Miller (1991) findings that one of the most important aspects of stock market development is liquidity. A liquid market makes financial assets more attractive to investors, who can transact in them more easily.

The study established that the relationship between institutional quality and the development of stock market development in Sub-Saharan Africa is significant. These findings concur with Billmeier and Massa (2007) findings that institutional factor is important for stock market development. Yartey (2007) argued that good quality institutions such as law and order, democratic accountability, bureaucratic quality as important determinants of stock market development in Sub-Sahara Africa because they reduce political risk and enhance the viability of external finance. In addition, Demircuc-Kunt and Maksimovic (1998) showed that firms in countries with high ratings for the effectiveness of their legal systems are able to grow faster by relying more on external finance because international investors are attracted to such economies with institutional stability.

Conclusion

This study concludes that banking sector development influences the development of stock market development in Sub-Saharan Africa most, followed by stock market capitalization (in dollars), corruption perception index and GDP per capita in US dollars. Stock market liquidity was found to have a positive and statistically significant effect on stock market development. These results are consistent with the La Porta (1996) prediction of this study because we believe that liquid market affords investors an opportunity to transact business in the market by way of buying and selling securities. Similarly, it provides an opportunity to investors to access their savings in the stock market. The ability to access savings minimizes risks and hence increases investor confidence.

Income level was found to be positive and statistically significant in explaining the stock market development. As expected, the higher the income, the more likely it is for investors to save and invest because disposable income increase. Banking sector development was found to be positive and statistically significant. Again, these findings are consistent with Nacueret (2007) as well as our expectation, because we believe that a well-developed banking system provides funds to investors to invest in the capital market. The results of macroeconomic stability using both measures were unexpected because we hypothesized that a stable environment is conducive for stock market development.

Recommendations

The study found that corruption perception index as a measure of institutional capacity influences stock market development in Sub-Saharan Africa. This study recommends countries in Sub-Saharan Africa should improve their institutional capacity by reducing corruption. This should be done through development and strict implementation of policies.

The study also found that the banking sector is a crucial player in stock market development as it offers investors with liquidity by advancing credit, and facilitating savings and investment. This

study therefore recommends that countries in Sub-Saharan Africa should improve their banking sector by developing monetary and fiscal policies that support the growth of the banking sector.

Areas for Further Research

However, the study was limited to four macroeconomic factors, namely; income levels, banking sector development, stock market liquidity and institutional quality. Therefore, further studies to determine how other macroeconomic factors like inflation, foreign exchange rate, FDI and interest rates influence on stock market development. In addition, further studies should be conducted the challenges facing stock market development in listed companies in Sub-Saharan Africa. This should include countries such as Tanzania, Zimbabwe among others whose stock market had not developed.

Acknowledgement

First, my gratitude goes to our Lord, God Almighty for His mercies and grace and for providing me with strength, knowledge and vitality that has helped me to make this proposal a reality. I also wish to express my sincere gratitude to my supervisors Mr. Japheth Kogei and Mr L. Ochieng for their immeasurable guidance; support, encouragement and time input that they have given me without which this proposal would not have been the same. My sincere appreciation also goes to my colleagues and good friends Mr. Robert Mbau, Dikir Simel, Jackson Ndathi Gichobi, Dickson Lochulait, Paul Kapedo and Mr Ajak Manyok Ajak for their support and encouragement.

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