

**The Impact of Macroeconomic Variables on Capital Market Development in Botswana's Economy**

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**Abstract**

This study examines the impact of macroeconomic variables on stock and bond markets development in Botswana using Autoregressive Distributed Lag (ARDL)-Bounds Test. The results indicate that macroeconomic variables have an impact on capital market development in Botswana. In the short run, real output, money supply and inflation have a positive influence on the development of the stock market, while real exchange rate retards its development. Real output further supports the development of the stock market in the long run. For the bond market, inflation rate and lending rate have positive and negative impact on the bond market in the long run respectively, while the remaining variables do not influence the bond market in the short run. Policy implications include increased efforts by policy makers to increase gross domestic product for the development of stock market, while the bond market development requires a decrease in lending rates.

**Keywords:** ARDL; Botswana; bond market; stock market; macroeconomic variables

**JEL Classification Codes:** B22, C13, E44

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## **1. Introduction**

The role of capital market development in an economy cannot be overemphasised. According to El-Wassal (2013), capital markets play a crucial role and serve as mechanisms for transforming savings into financing for the real sector. Countries with efficient capital markets have a better degree of savings and investment in projects yielding high returns. Aggarwal (1999) postulates that capital markets exist to help allocate funds to firms and liquidity to investors. They also allow the transfer of risk between different parties because investments are inherently risky. Claessens, (1995) argues that the stock market plays an important role in providing firms with capital. Most companies and governments of developing countries have turned to the stock market as an avenue for raising capital to finance various projects instead of depending on financial institutions for funds. In contrast, underdeveloped capital markets have a negative impact on the economy through increasing investment risks, financial structure, and asymmetric information problems (Demirguc-Kut and Levine, 1996). Furthermore, Muhoza (2019), postulates that the financial sector development of which the capital market is part, is very important in the growth of any economy, therefore in order to achieve economic growth, the financial sector ought to be one that is fully developed.

According to Torre and Schmukler (2003), capital markets in many emerging economies are particularly poor, especially considering the many efforts already undertaken to improve macro-economic environment and reforms of institutions which are believed to foster financial development. Many African countries are not immune to this phenomenon, and this has left policy makers without clear guidance on how to revise the reform agenda and brighten the future for domestic capital markets, particularly for local stock markets in smaller emerging economies. Therefore, a better understanding of the impact of macroeconomic variables on capital market development in emerging economies can provide a useful guide to policy makers.

Even so, a lot of developing countries especially in Africa face government deficits. Economic theory suggests that, one way that a government can finance their deficit is through borrowing or by issuing government bonds. If the government borrows money this will lead to interest rate increase and crowd out of some private investment spending. Decreases in private spending reduce the expansionary impact of the deficit spending. This indeed shows that different macroeconomic variables affect the capital market.

The impact of macroeconomic variables on capital markets development have been examined by several researchers among them are, Maghyereh (2002), Chen *et al.* (1986) etc. Maghyereh (2002) argues that macroeconomic environment is dependent on gross domestic product (GDP), inflation, employment, spending, and monetary and fiscal policy and the interrelationship among diverse economic sectors. Conducive macroeconomic environment promotes the profitability of businesses which propels them to a stage where they can access securities for sustained growth. Chen *et al.* (1986) argues that the macroeconomic variables systematically affect the stock return through their effect on future dividends and discount rates. Mukherjee and Naka (1995) also found that a co-integrating long run relationship exists between exchange rate, inflation, money supply, real economic activity, long-term government bond rate, call money rate and stock prices. Furthermore, Lesotho, *et al.* (2016), argue that expansion in economic activity has a huge impact on the performance of stock markets.

Even though a vast amount of research work has been done by Talla (2013), Cheopkoiwo (2011), Gunsekaraage *et al.* (2004) etc., on the capital market development in developed countries, a very few studies have been conducted for developing countries. The few studies conducted, focussed on stock market development at the exclusion of the bond market development. Although the omission of the bond market is not defended in the literature, one could argue that it departs little from reality. In most emerging economies, bond markets are very small relative to the banking system or stock markets and in most cases, data is readily available for stock markets and the banking system than for bond markets.

Similarly, research work on capital market development in the context of Botswana's economy, including the work of Lekobane and Lekobane, (2014), only discusses the impact of macroeconomic variables on stock prices without taking into consideration the bond market. Little is known about what drives bond market development in other economies whose bond markets development historically took place well before stock markets came into being (Litan, Pomerlano and Sundararajan, 2003). However, the bond market plays a critical role in the efficient functioning of capital markets as it channels savings and makes funds available to long term borrowers (Thumrongvit *et al.* 2013). Additionally, bond markets worldwide are increasingly being recognised as an important component of financing development, and hence should be analysed as an integral part of a well-functioning financial market.

Botswana's economy has for many years been driven by mineral-led growth and remains dominated by the mining sector, particularly diamond mining (Botswana Financial Sector Overview, 2016). However, the end of the diamond-led growth is within sight. The Government of Botswana is undertaking ongoing efforts towards diversifying the economy and stimulating alternative engines of growth, including promotion of a services-led economy. In this respect, the role of the financial sector, including the role of Botswana Stock Exchange (BSE) in capital market development, in implementing the diversification strategy, is indeed very critical.

Even so, a clear distinction between stock market and bond market is necessary. In Botswana particularly, the stock market has been, over the years performing better than the bond market with stock market capitalisation estimated at about 35% of GDP at the end of 2008 and bond market capitalisation equivalent to some 7% of GDP (Botswana Financial Sector Overview, 2016). Nevertheless, both the stock and the bond market face several challenges, liquidity being one of them. Hence, there is a need to study each market individually, to find out the impact of macroeconomic variables on each.

It is against this background, that the current study is undertaken to fill this gap. The objective of this study is to determine the impact of macroeconomic variables on capital market development in Botswana's economy. Previous studies have only focused on stock market without investigating the role of the bond market on capital markets development. The current study investigates over and above the stock market, the role the bond market plays in the overall capital market development. Specific objectives are to determine the effect of macroeconomic variables on stock market development measured with market capitalisation and on the bond market development measured by Botswana Bond Index.

The rest of this paper is organised as follows; section two gives an overview of capital market development in Botswana, whereas section three presents a review of the literature. Section four and five present the methodology and analysis of results, respectively. Section six gives a summary and conclusion as well as policy recommendations.

## **2. Overview of Capital Market Development in Botswana**

The Botswana Stock Exchange (BSE) was established in 1989 as the Botswana Share Market (BSM). With only five listed entities and a single broking firm in the market, the pressure to grow and develop came with the need to separate the running of the exchange from the broking firm and this set-in motion preparation for the establishment of an independent exchange.

BSE is Botswana's national stock exchange with the mandate to operate and regulate the equities and fixed interest securities market. The role of BSE goes beyond being a host to the most preeminent companies doing business in Botswana, the BSE is also an avenue through which government, quasi- government and the private sector can raise debt and equity capital. To date, BSE is one of Africa's best performing stock exchanges, averaging 24% aggregate return in the past decade. This has allowed the BSE to be the third largest stock exchange in terms of market capitalization in Southern Africa. The stock market has developed in terms of the number of firms listed and total trading volume while total market capitalization has been fluctuating between the years 2010 and 2017 (see Table 1).

**Table 1: Market Capitalisation, Total Trading Volume and Number of shares listed in BSE (2010-2017)**

<b>Year</b>	<b>Market Capitalisation</b>	<b>Number of firms listed</b>	<b>Total trading volume</b>
2010	434 626	31	308 662 263
2011	411 603	33	458 721 565
2012	412 349	37	409 909 708
2013	413 742	35	710 451 879
2014	418 157	36	591 637 972
2015	421 099	32	803 074 011
2016	421 313	34	778 232 574
2017	418 144	35	775 009 145

Source: BSE Market Status Report, 2017

Table 1 shows market capitalisation, total trading volume and number of firms listed over the years 2010 to 2017. The table shows that market capitalisation has been fluctuating over the years registering BWP 434 626 billion as at December 2010, declined to BWP 412 349.0 billion in 2012 and finally BWP 418 143.8 billion as at December 2017. Total trading volume has however been on a rise from 2010 with 308 662 263 billion shares traded to 775 009 145 billion shares traded as at December 2017 whereas only 35 companies were listed in BSE as at December 2017 compared to 31 as at December 2010 (BSE Market Status Report, 2017).

Efforts to develop the bond market in Botswana include the formation of the Bond Market Association Steering Committee in 2010. The committee comprises of the Botswana Stock Exchange (BSE) and other market participants. The main aim of the committee is to resolve structural issues impeding bond market development in Botswana, strategise on ways to develop the bond market in Botswana as well as establish an association for the bond market participants. Some of the reforms that have been put forward as a way of developing the bond market in Botswana include the need to build a robust yield curve, improve liquidity in the bond market, market data dissemination, transparency and information systems etc. (Botswana Bond Market Development Strategy Paper, 2011).

Table 2 shows the bond market performance from 2015 to 2017. In 2017, there were a total of 43 bonds listed on the BSE, 5 of which are government bonds. The limited number of Government bonds is a great concern with respect to maintaining a robust risk-free curve and

the viability of the existing 3 BSE bond indices. Activity in the bond market has improved over the years. With overall liquidity totalling BWP 535.7 million as at December 2017. Total market capitalisation also grew from BWP 10.1 billion in 2015 to BWP 14.3 billion in 2017.

**Table 2: Bond Market Performance**

<b>Year</b>	<b>Liquidity (P'Mn)</b>	<b>Market Capitalisation (P'Bn)</b>	<b>Number of Bonds Listed</b>
2015	858.0	10.1	38
2016	483.9	12.2	41
2017	535.7	14.3	43

Source: BSE Market Status Report, 2017

### **3. Literature Review**

In the past decades, researchers, financial analysts, and practitioners have attempted to predict the relationship between capital market development and macroeconomic variables. Many have conducted empirical studies to examine the effect of stock price on macroeconomic variables or vice-versa. The results of each of the studies have provided different conclusions depending on the combination of variables, methodologies and tests used. Below are some previous works and their findings.

Studies such as Lekobane and Lekobane, (2014); Cheopkoiwo, (2011); Jefferis and Okeahalam, (2000); and Fama, (1981) investigated the relationship between stock market returns and gross domestic product. Lekobane and Lekobane (2014) found a positive and significant relationship between domestic stock market prices and gross domestic product in Botswana. These results are consistent with those of Jefferis and Okeahalam (2000) who found a positive long-run relationship between the stock market development and real GDP in South Africa, Zimbabwe, and Botswana. Chepkoio, (2011) also found a positive relationship between capital market development and economic growth. Fama (1981), also investigated the relationship between economic activities and stock returns in the US and concluded that there is a positive relationship between stock returns and gross national product (GNP).

Studies on the relationship between money supply and stock market prices have produced mixed results. Lekobane and Lekobane (2014) found a negative relationship between stock market prices and money supply in Botswana. Talla (2013) using multivariate regression model observed that money supply is positively associated with stock prices although not significant. While Abugri (2006) found that in Latin American countries, money supply significantly affects the stock market. The research results indicated that exchange rates, interest rates, industrial production and money supply are consistently significant in explaining returns in all the markets. The country macroeconomic variables are found to impact the markets at varying significance and magnitudes. Gunsekaraage *et al.* (2004), examined the impact of money supply and inflation on the stock market in Sri Lanka and found that money supply has a positive and significant influence on the stock market.

The relationship between inflation and capital market growth has been mostly found to be negative as the following studies indicate. Okulenu et al. (2016) found a negative relationship between inflation and capital market growth in Nigeria. The results are supported Kimani and Mutuku (2013), who found a negative and significant relationship between overall stock market performance and inflation rate in Kenya. Furthermore, Talla (2013) also found a negative relationship between inflation rate and stock prices in Sweden. However, Ochieng and

Adhiambo (2012) found out that inflation had a weak positive relationship with the Nairobi Stock Exchange Share Index (NASI). Lekobane and Lekobane (2014) and Okulenu *et al.* (2016), and Gunsekaraage *et al.* (2004) found a negative relationship between lending rates and stock market development. The results are consistent with those of Jefferis and Okeahalam (2000).

Based on the findings that macroeconomic variables affect stock market development, Ochieng and Adhiambo (2012) recommends monitoring of the macroeconomic environment, which also influences the foreign investor's decisions in the local investments. Mukherjee and Naka (1995) applied Johansen's (1998) VECM to analyse the relationship between the Japanese Stock Market and exchange rate. They concluded that a cointegrating relation indeed existed and that stock prices contributed to this relation. The same results were found by Maysami and Koh (2000) in their study on the relationship between macroeconomic variables and the stock market in Singapore as well as Kimani and Mutuku (2013) negative and significant relationship with net effective exchange rate in their study on inflation dynamics on the overall stock market performance in Kenya.

With respect to the bond market, Nkwede (2017) explored the macroeconomic determinants of bond market development in Nigeria and found that exchange rate, interest rate, inflation rate and banking sector development have negative and significant influence on the Nigerian bond market capitalization and as such, they demonstrated strong evidence as robust macroeconomic determinants of bond market development in Nigeria. Githinji (2013) on their study on the impact of macroeconomic variables on the bond market development in Kenya found out that three macroeconomic variables (exchange rate, interest rate and gross domestic product per capita) had a positive effect on bond market development.

Even so, Mu *et al* (2013) who did immense work on bond markets in Africa firmly argue that even though African bond market have a steady growth rate, the market is still underdeveloped. The results of their study indicated that government bond market capitalisation is directly related to better institutions and interest rate volatility, but inversely related to the fiscal balance, higher interest rate spread, exchange rate volatility and capital account openness. Adelegan and Radzewicz-Bak (2009) carried out a study on what determines bond market development in sub-Saharan Africa and found that various macroeconomic factors influence bond market development. The study concluded that GDP has a positive impact on bond market development while interest rates have a negative and significant relationship with bond market development.

From the literature, a conclusion can be drawn that the studies agree that macroeconomic variables have an impact on capital market development and do so with varying magnitude and mixed direction of change depending on the country of study. Nonetheless, from the empirical literature, it can also be drawn that the studies focused more on the stock markets without including the bond market on their analysis, and therefore, little is known on how macroeconomic factors affect the bond market. The current study will be based on both the stock and bond markets. This study is not aware of any studies that investigate the impact of macroeconomic variables on capital market development in Botswana. It is with this view that this study wishes to bridge the gap in literature.

## 4. Methodology

### 4.1 Theoretical Background for the Model

The response of market returns to changes in macroeconomic variables cannot be determined in advance since it varies across countries. In addition, it is generally claimed that the global variables are consistently more important than the domestic ones in explaining returns across markets. Nevertheless, since the markets are inherently linked to some of the domestic economic variables, weaknesses in the macroeconomic environment, poor policy making and implementation even in a single emerging market may be transmitted to other markets in today's global market place (Acikalin et al. 2008).

The Arbitrage Pricing Theory (APT) developed by Ross's (1976) has been the primary motive of earlier studies and may be considered as global asset pricing models. Among macroeconomic factors included in the models are either monetary ones such as inflation, interest rate, exchange rate, etc. or real economic ones such as production, oil prices, etc. This study is based on the theoretical reasoning of the Arbitrage Pricing Theory stating that asset return can be explained by multiple risk factors. It is also used in an aggregate stock market framework, where a change in a given macroeconomic variable could be seen as reflecting a change in an underlying systemic risk factor influencing future returns. A number of APT theories based empirical studies by the likes of Fama (1981,1990), Fama and French (1989), Black et al. (1972) collectively conceded that there exists a significant relationship between stock market prices and macroeconomic variables such as inflation, production index, yield curve, interest rates and risk premium. This paper, therefore, intends to explore the long-run relationship between key macroeconomic variables and capital market development considering the case of Botswana.

### 4.2 The Empirical Model

In time series analysis, the appropriate model to use depends on the order of cointegration. To test the impact of macroeconomic variables on capital market development, the study employed Autoregressive Distributed Lag (ARDL) model. This approach is chosen because the variables used in this study contain different orders of integration as indicated in Table 4 and Table 5. The ARDL model is suitable for a mixture of I (0) and I (1) (Nkoro and Uko, 2016). The ARDL technique has certain advantages in comparison to other single equation estimation techniques. ARDL minimises the endogeneity problems and all the variables are assumed to be endogenous. Moreover, the long run and short run estimates are estimated simultaneously, removing problems associated with omitted variables and autocorrelation (Kumar, 2012). Based on the empirical literature, the variables used on the model specification below are used in the study. The model is specified as follows:

$$\begin{aligned} \Delta \log(MC_t) = & \partial_0 + \sum_{i=0}^n \alpha_{1i} \Delta \log(MC_{t-i}) + \sum_{i=0}^n \alpha_{2i} \Delta \log(GDP_{t-i}) + \sum_{i=0}^n \alpha_{3i} \Delta \log(M2_{t-i}) \\ & + \sum_{i=0}^n \alpha_{4i} \Delta \log(CPI_{t-i}) + \sum_{i=0}^n \alpha_{5i} \Delta \log(LR_{t-i}) + \sum_{i=0}^n \alpha_{6i} \Delta RER_{t-i} \\ & + \beta_1 \log(MC_t) + \beta_2 \log(GDP_t) + \beta_3 \log(M2_t) + \beta_4 \log(CPI_t) + \beta_5 \log(LR_t) \\ & + \beta_6 \log(RER_t) + \beta_7 EC_t + \varepsilon_t \end{aligned} \quad (1)$$

$$\begin{aligned} \Delta \log(BBI_t) = & \partial_0 + \sum_{i=0}^n \alpha_{1i} \Delta \log(BBI_{t-i}) + \sum_{i=0}^n \alpha_{2i} \Delta \log(GDP_{t-i}) + \sum_{i=0}^n \alpha_{3i} \Delta \log(M2_{t-i}) \\ & + \sum_{i=0}^n \alpha_{4i} \Delta \log(CPI_{t-i}) + \sum_{i=0}^n \alpha_{5i} \Delta \log(LR_{t-i}) + \sum_{i=0}^n \alpha_{6i} \Delta RER_{t-i} \\ & + \beta_1 \log(BBI_t) + \beta_2 \log(GDP_t) + \beta_3 \log(M2_t) + \beta_4 \log(CPI_t) + \beta_5 (LR_t) \\ & + \beta_6 \log(RER_t) + \beta_7 EC_t + \varepsilon_t \end{aligned} \quad (2)$$

where:

Equation (1) has market capitalisation (MC) as the dependent variable and Equation (2) dependent variable is represented by Botswana Bond Index. BBI is the ratio of the amount outstanding of domestic debt securities to GDP, GDP is real gross domestic product, M2 is money supply, CPI is consumer price index, a measure of inflation, LR is the prime lending rate, RER is real exchange rate,  $EC$  is error correction term used to capture the deviation of variables from long-run equilibrium and is expected to be negative and significant,  $\varepsilon_t$  is an error term assumed to be distributed with zero mean and constant variance, and Greek letters are parameters to be estimated.

### 4.3 Data

With a view to accomplish the pre-determined set of objectives of this study, five macroeconomic variables namely: inflation, exchange rate, money supply, prime lending rates and GDP were taken as indicators of economic environment based on already reviewed empirical literature. The study used quarterly data for an 11-year period from 2006Q1 to 2017Q4 for analysis of indicators of stock market development, while for the bond market, the data are from 2010Q1 to 2017Q4 due to the unavailability of data on the bond market index prior to 2010Q1. Data was collected from Bank of Botswana’s Botswana Financial Statistics and capital market indicators were sourced from Botswana Stock Exchange Annual Reports.

**Table 3: Description of variables**

<b>Variables</b>	<b>Proxy</b>	<b>Description</b>
Stock market Development	Market Capitalisation (MC)	Share price multiplied by the number of shares outstanding as a percentage of GDP
Bond Market Development	Botswana Bond Index (BBI)	Ratio of the amount outstanding of domestic debt securities to GDP
Real Output	Real Gross Domestic Product (GDP)	An inflation-adjusted GDP, 2016Q3 prices.
Consumer Price Index	Measure of Inflation	Consumer Price Index
Money supply	Monetary base	Money supply in real terms
Lending rate	Lending Rate	Prime lending rate
Exchange rate	Exchange Rate	Real exchange rate

#### **4.3.1 Expected Signs of Explanatory Variables**

First and foremost, it worth-noting that the dependent variable of interest is capital market development. Capital market development is measured using market capitalisation as a proxy for stock market development and Botswana Bond Index as a proxy for the bond market development. The expected signs of explanatory variables are explained below.

##### ***Real Output***

The demand driven hypothesis suggests that the expansion of an economy will create new demand for financial services (Yartey, 2008). Increased demand will in turn increase pressure to establish larger and more sophisticated financial institutions to satisfy the new demand for their services. This study therefore adopts the real GDP to measure output in the economy. The study expects a positive relationship between the real GDP and capital market development.

##### ***Inflation rate***

Macroeconomic stability is necessary for capital market development. The most common measure of macroeconomic stability used in this study is the inflation rate measured by CPI. Literature suggests that inflation can be either positive or negative in influencing capital market development. Proponents for a positive relationship between inflation and capital market development include the Fisher Hypothesis (1930) who argue that stocks provide a hedge against inflation and that nominal equity returns should be positively related to inflation, while McCarthy *et al* (1990), however, suggest a contradictory view that there is a negative relationship between stock returns and inflation. The study expects that the relationship between inflation and capital market development can be either positive or negative.

##### ***Exchange Rate***

Economic theory proposes that depreciation of the local currency makes exporting goods attractive, increases foreign demand and hence revenue for the local firm and its value appreciates thus stock prices increases. Conversely, appreciation of local currency reduces the profit for an exporting firm and thereby affect it value of stock price negatively (Jorion, 1991). The study expects a negative relationship between capital market development and real exchange rate.

##### ***Money Supply***

This study adopts broad money supply (M2) as a proxy money supply because it is the most acceptable definition of money supply. The coefficient of money supply is expected to be positively signed because the greater the money supply, the greater the level of economic activities and as such the greater the level of investment in the stock market.

##### ***Lending Rate***

The lending rate is proxied by the prime lending rate. The coefficient on prime lending rate is expected to be negatively signed because of the inverse relationship between interest rate and capital market activities through investment.

#### **4.4 Descriptive Statistics**

Table 4 and Table 5 present the descriptive statistics on the selected macroeconomic variables used in this study. Descriptive statistics help describe and understand the features of a specific data set by giving short summaries about the sample and measures of the data. The standard deviations indicate that money supply and gross domestic product are more volatile than inflation, lending rate and real exchange rate on both the stock and bond market. Furthermore,

the standard deviation indicates that the level of exchange rate is the least volatile compared to other capital market and macroeconomic variables.

The analysis of skewness showed that the distributions for real gross domestic product, lending rate and money supply were positively skewed, while the distribution for inflation and exchange rate were negatively skewed in the stock market, while for the bond market, distributions for money supply is positively skewed while all other variables are negatively skewed.

**Table 4: Descriptive Statistics for the Stock Market**

	MC	CPI	GDP	LRATE	M2	RER
Mean	36201.02	79.79574	18944.17	11.43042	48808.11	97.41749
Median	33084.00	81.74550	18511.35	11.00000	46782.60	97.74456
Maximum	50451.00	103.4333	23896.57	17.00000	73320.55	100.9876
Minimum	23777.00	50.49968	14372.31	6.500000	24567.70	91.74778
Std. Dev.	8822.722	16.87682	2848.693	3.446911	14494.84	2.931107
Skewness	0.186749	-0.252390	0.044152	0.383310	0.210377	-0.417132
Observations	48	48	48	48	48	48

Source: Author's Computation (2019)

**Table 5: Descriptive Statistics for the Bond Market**

	BBI	CPI	GDP	LRATE	M2	RER
Mean	83.72469	89.82988	20482.04	9.328750	56361.05	99.14334
Median	85.42410	91.67251	21080.46	9.165000	50763.70	99.90000
Maximum	104.5860	103.4333	23896.57	11.50000	73320.55	100.9876
Minimum	60.57015	70.09687	16504.13	6.500000	42860.10	94.76650
Std. Dev.	14.16676	9.954620	2133.329	1.712445	11120.80	1.685058
Skewness	-0.120244	-0.446782	-0.444798	-0.173217	0.279921	-0.892683
Observations	32	32	32	32	32	32

Source: Author's Computation (2019)

#### 4.5 Non-Stationarity and Unit Root Tests

Most of empirical works on time series data assume that time series data are nonstationary. This is in accordance with the typical behaviour of macroeconomic variables. Hence, it is essential to carry out unit root tests before running the model to ensure appropriate model specifications. To test for unit root, Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests were performed. These tests are done to check whether the variables are stationary or nonstationary. A stochastic process is said to be stationary if its mean and variance are time invariant and the auto-covariance does not depend on time, but depends on the time lag between the variables, and the reverse is true for non-stationary time series. Most importantly, running a model using non-stationary data has high chances of leading to spurious relationships.

**Table 6: Augmented Dickey Fuller Unit Root Tests**

Variable	Without Trend		With Trend and intercept		Conclusion
	Level	First Difference	Level	First Difference	
Market Capitalisation	0.9085 [0.9003]	7.5944*** [0.0000]	1.8886 [0.6446]	7.7711*** [0.0000]	I(1)
Botswana Bond Index	8.49354 [1.0000]	2.07020*** [0.0387]	1.55371 [0.7880]	5.5053*** [0.0001]	I(1)
GDP	2.1620 [0.9918]	6.7139*** [0.000]	2.8203 [0.1975]	7.4125*** [0.0000]	I(1)
CPI	1.1329 [0.9309]	0.5829 [0.4590]	0.1189 [0.9965]	4.0621*** [0.0139]	I(1)
Money Supply	3.0234 [0.9991]	7.3892*** [0.0000]	2.9248 [0.1645]	8.7724*** [0.0000]	I(1)
Lending rate	2.7493*** [0.0071]	4.0313*** [0.0001]	3.2257* [0.0924]	4.5493*** [0.0036]	I(0)
Exchange rate	1.2316 [0.9422]	7.76871*** [0.0000]	2.8575 [0.1852]	5.42110*** [0.0004]	I(1)

**Table 7: Phillips Perron Unit Root Tests**

Variable	Without Trend		With Trend and intercept		Conclusion
	Level	First Difference	Level	First Difference	
Market Capitalisation	0.9085 [0.900]	7.5739*** [0.0000]	1.8600 [0.6591]	7.7716*** [00000]	I(1)
Botswana Bond Index	7.8824 [1.0000]	2.0702*** [0.0387]	1.6112 [0.7652]	5.9857*** [0.0002]	I(1)
GDP	4.2060 [1.0000]	6.7181*** [0.0000]	2.8517 [0.1871]	7.9636*** [0.000]	I(1)
CPI	6.2703 [1.0000]	2.8012*** [0.0061]	0.0382 [0.9957]	4.6755*** [0.0025]	I(1)
Money Supply	3.4063 [0.9997]	7.36173*** [0.0000]	2.8168 [0.1987]	9.1443*** [0.0000]	I(1)
Lending rate	2.6885*** [0.0085]	4.0313*** [0.0001]	2.2296 [0.4646]	4.5796*** [0.0033]	I(0)
Exchange rate	1.1020 [0.9275]	7.7687*** [0.0000]	2.8209 [0.1974]	7.7962*** [0.0000]	I(1)

Where:

\*\*\* represents significance level at 1% level of significance

\*\* represents significance level at 5% level of significance

\* represents significance level at 10% level of significance

Table 6 and Table 7 show that all variables are stationary in first difference except for the lending rate (LR) which is stationary in levels. The ARDL approach is, therefore, appropriate model to use in testing for the impact of macroeconomic variables on capital market development as some variables are stationary in levels, while one is first difference stationary (Nkoro and Uko, 2016).

## **5. Results and Discussion**

### **5.1 The Impact of Macroeconomic Variables on Market Capitalisation**

The results of the ARDL model used to estimate the impact of macroeconomic variables on market capitalisation are presented in Table 8. In the short run, money supply, gross domestic product and inflation are positively and significantly related to stock market development. These results suggest that an increase in these variables leads to an increase in stock market development in the short run. The real exchange rate negatively influences market capitalisation, while lending rate does not have any significant influence on stock market development.

Long run estimates indicate that gross domestic product is the only variable that has a positive relationship with market capitalisation. This shows that in the long run, an increase in national output has a positive influence on stock market development. The coefficient on the error term is also an indicator for goodness of fit of the model. The results indicate that the coefficient for error correction term is significant with negative expected sign (-0.241776), indicating that more than 0.23 percent of errors in the short run are corrected back to its equilibrium in the long run.

The coefficient on GDP is positive and significantly related to market capitalisation both in the long run and in the short run suggesting that a healthy and stable economic situation has a positive influence on capital market development. The results are consistent with Lekobane and Lekobane (2014) and Jefferis and Okeahalam (2000). In addition, a positive relationship between GDP and stock market was found by Moolman and du Toit (2005), whilst Aron and Muelbauer (2002), found a positive, but insignificant relationship. Hsing (2011) found a positive influence of GDP on stock market development in the Johannesburg Stock Exchange using a GARCH model.

The results show that market capitalisation has a negative and significant relationship with the real exchange rate in the short run. The results indicate that in the short run, an increase in domestic market capitalisation leads to a decline in the real effective exchange rate and the reverse is true. Akinlo and Onatunji (2020) also confirm a negative and significant relationship between exchange rate and domestic investment. Furthermore, market capitalisation has positive relationship with inflation in the short run and this is consistent with what Fama and Schwert (1977), Chen et al (1986) and Fishers (1930). The explanation for this is the inflation hedge hypothesis, which states that stocks offer a hedge against inflation and the hedge is obtained when the investor is fully compensated for price rise through an increase in nominal stock returns.

Money supply (M2) has a positive and significant effect on market capitalisation in the short run. Arguments by Gupta and Modise (2011) posit that the increase in money supply creates an excess supply of money and this results in excess demand for equity through portfolio allocation and thereby increase in stock prices. In addition, Mukherjee and Naka (1995) confirm that the injections of money supply have an expansionary effect that boosts corporate

earnings, which then gets reflected in the share price and hence leading to a positive relationship between the two variables.

**Table 8. ARDL Test Results (Dependent variable: Market Capitalisation)**

<b>Coefficient</b>	<b>Estimates</b>	<b>p-value</b>
<b>Long-run estimates (Eq.1)</b>		
C	-4.112313	[0.847]
GDP	1.894498***	[0.010]
CPI	0.526535	[0.720]
M2	-0.333449	[0.659]
LR	-0.007242	[0.986]
RER	-0.629567	[0.895]
<b>Short-run estimates (Eq.1)</b>		
GDP	0.671941***	[0.0116]
CPI	2.466002***	[0.0015]
M2	0.374804 ***	[0.0102]
LR	0.121803	[0.5800]
RER	-4.648822 ***	[0.0002]
ECT	-0.241776***	[0.0023]

NB: market capitalisation is the dependent variable, M2; money supply, LR; lending rate, GDP: gross domestic product, CPI; inflation and RER; real effective exchange rate are independent variables, ECT is the error correction term, C is the constant term. P values are in brackets.

\*\*\*represents level of significance at 1%

## **5.2 The Impact of Macroeconomic Variables on Botswana Bond Index**

Like the previous model, the impact of macroeconomic variables was measured on Botswana Bond Index. Short run and long run estimates are presented in Table 9.

**Table 9. ARDL Test Results (Dependent variable: Botswana Bond Index)**

<b>Coefficient</b>	<b>Estimates</b>	<b>p-value</b>
<b>Long-run estimates (Eq.2)</b>		
C	-1.211047	-1.211047
GDP	-0.104204	[0.517]
CI	1.228869***	[0.000]
M2	-0.036055	[0.632]
LR	-0.203827***	[0.005]
RER	0.437909	[0.557]
<b>Short-run estimates (Eq.2)</b>		
GDP	0.004747	[0.9407]
CPI	-0.099202	[0.6357]
M2	-0.029861	[0.4233]
LR	-0.076409	[0.1665]
RER	0.378263	[0.1992]
ECT	-0.581363***	[0.0000]

NB: Botswana Bond index is the dependent variable, M2; money supply, LR; lending rate, GDP: gross domestic product, CPI; inflation and RER; real effective exchange rate are independent variables, ECT is the error correction term, C is the constant, P values are in brackets.

\*\*\*represents level of significance at 1%

The results from Table 9 indicate that the only variables that have a significant relationship with the bond market are inflation and the lending rate. In the long run, inflation has a positive and significant influence on the Botswana Bond Index, while the lending rate has a negative relationship with the Botswana Bond Index.

Theoretically, interest rates have a negative impact on bond market development. This is because high interest rates increase the cost of borrowing for investment purposes therefore reducing bond market development. Our results, therefore, corroborates this view as evidenced by the negative relationship between the bond market index and the lending rate. Like the first model, the coefficient on the error correction term is significant with negative expected sign (-0.581363), indicating that errors in the short run are corrected back to its equilibrium in the long run.

### 5.3 Diagnostic tests

Diagnostic tests are used to detect model misspecification and guide for model improvements. The study undertook several diagnostic tests to check robustness of the results. Following the diagnostic tests carried out, one may conclude that this model is correctly specified. The *Jarque-Bera* test for Normality showed that residuals are normally distributed and hence the regression model explains all trends in the dataset. The study tested for the presence of serial correlation using Breusch-Godfrey Serial Correlation LM Test and heteroscedasticity using *Breusch-Pagan-Godfrey* and both were not detected in the model. The results are presented in Table 10 and Table 11 below.

**Table 10: Breusch-Godfrey Serial Correlation LM Test**

F-statistic	0.050535	Prob. F(1,22)	0.8242
Obs*R-squared	0.071046	Prob. Chi-Square(1)	0.7898

**Table 11: Heteroscedasticity Test: Breusch-Pagan-Godfrey**

F-statistic	1.541090	Prob. F(7,23)	0.2033
Obs*R-squared	9.897601	Prob. Chi-Square(7)	0.1945
Scaled explained SS	19.16536	Prob. Chi-Square(7)	0.0077

In order to test for long run relationship in the model, ARDL Bounds Test was used. From Table 12 and 13, the results indicate that there is a long run relationship between the variables since the value of the F-statistic is greater than the upper bound at all levels of significance.

**Table 12: Null Hypothesis: No long-run relationships exist**

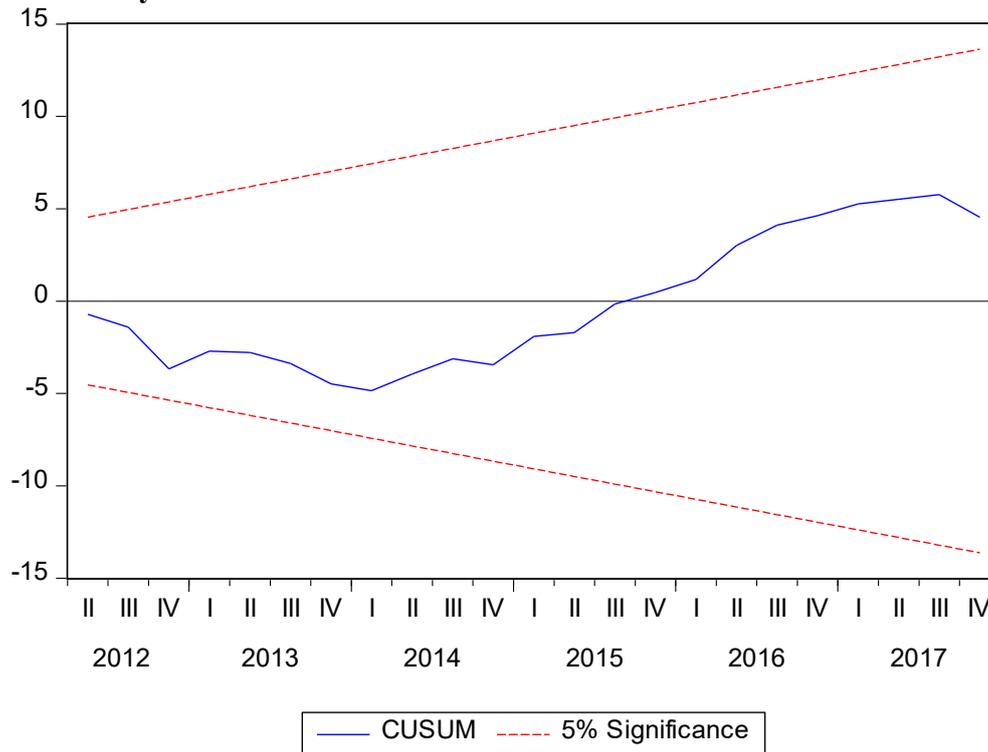
Test Statistic	Value	k
F-statistic	5.880986	5

**Table 13: Critical Value Bounds**

Significance	I0 Bound	I1 Bound
10%	2.08	3
5%	2.39	3.38
2.5%	2.7	3.73
1%	3.06	4.15

Stability test was done using the CUSUM test. The figure below is indicative that our model is stable since the residual lies in between the standard error bands.

**Figure 1: Stability Test**



**6. Conclusion and Policy Implications**

This paper explored the impact of macroeconomic variables on capital market development in Botswana using quarterly data for the period 2006Q1-2017Q4 for stock market development and from 2010Q1-2017Q4 for the bond market. The main objective was to determine the impact of macroeconomic variables on stock market development measured with market capitalisation and on the bond market development measured by Botswana Bond Index using Auto Regressive Distributed Lag (ARDL) bounds test framework. ADF test and PP test have been applied to check the stationarity of data.

The study revealed that money supply, gross domestic product and inflation have a positive and significant impact on stock market development while a negative relationship exists between real exchange rate and stock market development in the short run. In the long run; however, gross domestic product has a positive and significant relationship with stock market development. For the bond market, none of the variables are significant in the short run; however, in the long run, inflation rate and lending rate have a significant impact on bond market development.

Policy makers should develop strategies for attaining optimum levels of broad money growth for stock market development. The study found that money supply is one of the macroeconomic factors that promotes the growth of stock market. Expansionary monetary policy is prudent for stock market development; however, the growth in money supply should not be in such a way that it is inflationary hence the need to find an optimal level of money supply in the economy. GDP yielded a positive and significant impact on the stock market, both in the short run and in the long run. GDP is the most crucial economic indicator which tells us about the health of our economy. Therefore, the stock markets can be flourished with economic growth and policy makers should strive to improve growth to grow the stock market. To develop the bond market,

there is need to keep lending rates low because of the trade-off between lending rates and bond market development.

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