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Financial Development and Economic Growth in Botswana

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BOTSWANA INSTITUTE FOR DEVELOPMENT POLICY ANALYSIS

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ABSTRACT

The study examines the interrelationships between financial development, economic growth, capital accumulation and productivity growth in Botswana over the period 1980-2014. Using the Autoregressive Distributed Lag (ARDL) bound test technique, we find that financial development, measured by private credit, has a negative and significant impact on economic growth both in the long and short run. In contrast, we observe that financial development, measured by liquid liabilities, has a positive and significant impact on economic growth in the short run. Furthermore, the empirical results show that the interrelationship between FD (private credit) and economic growth support the supply leading hypothesis while the interrelationships between FD (liquid liabilities) and economic growth support the demand-following hypothesis. On a positive note, the empirical evidence also suggests that financial development (private credit) leads to higher output level in Botswana through promoting the accumulation of assets. Thus, for financial development to promote economic growth through both the accumulation of capital and productivity growth, it is useful to further develop Botswana's financial market. Efficient financial institutions may encourage innovation by mobilising resources to finance promising investment projects, evaluating prospective entrepreneurs and allowing investors to diversify the risks related to uncertain innovative activities. It is also crucial to improve the investment environment in Botswana which will encourage lending activities by the financial sector, especially towards the business sector. Furthermore, if diversification of the Botswana economy continues, we can expect the financial development to play a more prominent role in the country's overall economic performance in the future.

Key words: Financial development, capital accumulation, productivity growth, economic growth, Botswana

JEL Classification : E44, E511 & G21

1. INTRODUCTION

Theoretical and empirical evidence has revealed that a developed and efficient financial system promotes economic growth and development (Zhuang et al., 2013). It strengthens and facilitates the provision of financial services (such as mobilisation of savings, provision of adequate and quality credit to the private sector, reduction of information and transaction costs) to meet the requirements of economic agents (Ahmed, 2014). On the other hand, a weak financial system deters growth (Rioja and Valey, 2004; Al-Malkawi et al., 2012) and can also have adverse effects on the economy (Ang, 2008). As a result, countries have implemented reform measures to strengthen institutional framework as well as the performance of their financial systems.

In Botswana, the financial sector has witnessed a number of policy reforms aimed at developing an efficient banking system and deepening the domestic capital market so to support long term financing. While financial development is a priority to policy makers in Botswana, existing empirical literature on finance-growth nexus in the context of Botswana is limited. With the exception of Mmolainyane et al. (2015) and Adusei (2014) who further examined growth effects of financial development in Botswana, the existing literature only explore the direction of causality between financial development and economic growth. Thus, existing literature pays little attention to how financial development and economic growth are interrelated and on the mechanisms linking these two variables in Botswana.

Therefore, this study fills this gap by providing some insight on the interrelationships between financial development and economic growth and on the mechanisms linking these two variables. Specifically, the study has two interrelated objectives: (i) to examine the impact of financial development on Botswana's economy and vice versa; and (ii) to determine whether financial development affects growth through physical capital accumulation or/ and through the improvements of productivity[1]. The results of this paper are expected to inform the design of pro-growth policies and regulations in the financial sector and also add to the existing literature on finance-sources of growth nexus.

The remainder of the paper proceeds as follows. Section 2 provides an overview of Botswana's financial reforms and depth. Section 3 reviews the literature on finance-growth nexus and on channels linking financial development and economic growth. Section 4 discusses data and methodology. Empirical results are discussed in Section 5. Finally, Section 6 provides conclusion and policy recommendations.

1 According to growth literature, physical capital accumulation and TFP are the major sources of economic growth.

2. FINANCIAL REFORMS AND DEPTH IN BOTSWANA

Botswana has embarked on a number of reform measures to facilitate the development of the financial sector over the past two decades (Table 1). Major reforms that were implemented to encourage financial deepening and competition include the deregulation of interest rates, lessening of commercial bank licensing requirements and the removal of foreign exchange controls. Other important reform measures in the financial sector were the establishment of the Botswana stock exchange in 1989 and the introduction of government bonds to support the development of the domestic capital market.

Table 1: Financial Sector reforms, 1986-2003

Year	**Reform Measures**
1986	Removal of control on interest rates
1989	Establishment of Botswana stock exchange
1990	Liberalisation of commercial bank licensing requirements
1991	Introduction of Bank of Botswana Certificate (BoBs)
1995/96	Modernisation of legislation(revised Bank of Botswana Act; Bank Act)
1999	Removal of foreign exchange controls
2000	Launching of International Financial Service Centre (IFSC) operations
2003	Introduction of 2-,5-, and 12- year government bonds

Source: Bank of Botswana

These major financial reforms have led to the deepening of Botswana's financial system. As we can see from table 2, the liquid liabilities as a percentage of GDP, which measures the size of the financial sector rose from an average of 23.60 % during the period 1991-1995 to 41.45% during the period 2011-2015. The domestic credit allocated to the private sector by the financial sector as a percentage of GDP also increased, from an average of 13% in 1991-1995 to 31% in 2011-2015. The growth of credit to the private sector by the financial sector can be explained by the proliferation of household's credit, which accounts for 60% (using 2016% figures) of the commercial bank loan book[2].

2 The financial sector has gradually moved away from providing enterprise credit but more household finance since 1995 (Bank of Botswana,2002), signaling high levels of consumption in Botswana and lack of local industries.

Table 2: Evolution of the FD Indicators: 1970-2015

Year	Total Credit/GDP	Liquid Liabilities/GDP
1976-1980	15.30	27.89
1981-1985	12.25	25.70
1986-1990	7.85	27.93
1991-1995	13.33	23.60
1996-2000	12.10	21.80
2001-2005	19.51	26.35
2006-2010	25.01	44.31
2011-2015	30.94	41.45

Source: Authors computation from WDI data

3. RELATED LITERATURE

3.1. FINANCIAL DEVELOPMENT AND ECONOMIC GROWTH

Based on the analysis of both theoretical and empirical publications across the span of several decades on finance-growth nexus, there is no consensus on the nature of the relationship or the direction of the causality between financial sector development and economic growth (Prochniak et al.,2016; Samargandi et al., 2014).

The first strand of the literature supports the supply-leading hypothesis. According to this view financial development acts as a productive input and hence fosters economic growth. Schumpeter (1934) posits that the provision of financial services by the financial intermediaries encourages technology and thereby promoting economic growth. Mc Kinnon (1973) and Shaw (1973) suggest that liberalisation of the financial system encourages financial deepening and increases competition in the financial sector, which in turn promotes economic growth. King and Levine (1993) also supports the supply-leading hypothesis.

The second strand of literature supports the hypothesis that financial development is demand-following. That is financial development responds to economic growth process. Robinson (1952) argues that as an economy develops, the demand for financial services increases further leading to the emergence of more financial institutions, instruments and services. Additional work supporting this view by Kuznets (1955) suggests that causality between financial development and economic growth depends on the level of economic development. He argues that as the real economy expands and approaches the intermediate stage of growth, the demand for financial services increases. This view was empirically confirmed by Schwartz (1963), Ireland (1994), Al-Yousif (2002), Ang and Mckibbin (2007).

The third strand of the literature supports the hypothesis put forward by Patrick (1966) that there is two-way direction of causality between financial development and economic growth. He argues that financial deepening is an outcome of economic growth, which in turn feeds back as a factor of growth. Similar views have been expressed by Greenwood and Jovanovic (1990), Greenwood and Bruce (1997) and Akinboade (1998).

The fourth strand of literature contends that financial development and economic growth are not causally related and that the role of financial development in economic development is overly stressed. Lucas (1988) and Stern (1989) are pioneers on this view. This view was empirically confirmed by Deidda and Fattouh (2002).

While it is well-known that financial development impacts economic growth positively, there exists another strand of literature that suggests financial development is negatively related to economic growth. This view was popularised by empirical research work on finance-growth nexus in the aftermath of the 2008-2009 financial crisis (Chopra, 2015). Empirical research work confirming a negative association between financial development and economic growth include Van Wijnbergen (1983), De Gregorio and Guidottii (1995), Al-Malkawi et al. (2012) and Samargandi et al. (2014). Various explanations have been offered for the negative relationship between financial development and growth. Recently, Beck et al. (2012) suggested that high levels of household credit may lead to an insignificant finance-growth relationship. The adverse effects of 'too much household credit' on economic growth may be a resultant of the relaxation of credit constraints on households which then reduces saving rates (Japelli and Pagano, 1994). Chopra argues that the financial deepening in high-income countries which comes through additional household lending might explain the insignificant or weakening finance-growth relationship across high-income countries. High levels of financial liberalisation may also decrease total credit to domestic firms and thereby lowering investment and economic growth (De Gregorio and Guidottii, 1995). The incidence of financial repression in resource-based economies may also explain the negative relationship between financial development and economic growth (Samargandi et al., 2014).

3.2. FINANCIAL DEVELOPMENT, CAPITAL ACCUMULATION AND PRODUCTIVITY GROWTH

From a theoretical and empirical perspective, financial development may affect growth through the accumulation of physical assets and/ or through improvement in productivity (Beck et al., 2000). These effects arise from the intermediation role provided by financial institutions, which enables the financial sector to mobilise savings for investment and optimise the allocation of capital between competing uses to ensure that capital goes to productive use (thus encouraging capital investment and promoting growth). In

explaining the finance-productivity nexus, McKinnon (1973) used an illustration of a farmer who wants to buy a particular machinery which will increase his productivity and enable him to earn a high income. Thus, by mobilising savings, and hence increasing the availability of credit, financial intermediation facilitates investment in new technologies across the economy, thereby increasing overall productivity. However, the quality of financial institutions in an economy importantly affects innovation in mobilising resources to finance promising investment projects, evaluating prospective entrepreneurs and allowing investors to diversify the risks related to uncertain innovative activities (King and Levine, 1993).

A review of empirical studies on the relationship between financial development, capital accumulation and productivity growth is provided in Table 3. These studies have used numerous measures of financial development, different sample of countries and different time periods. Their empirical results, however mostly reveal that in low income countries, financial development has impacted growth primarily through the capital accumulation channel, while its impacts in middle and upper income countries has been primarily through productivity growth. Various explanations have been offered on why FD impacts sources of growth differently at the various stages of national income level. First, financial institutions in developing countries or in low income countries tend to establish a long-term relationship with already established firms and allocate funds to these firms for capital accumulation purposes simple because there is less incentive to select innovative projects and managers due to related high costs. Conversely, middle and upper income countries, of which most are at the technological frontier have a strong incentive for innovation and hence financial markets within these economies are very selective of firms and managers to fund innovation activities leading to larger productivity gains (Rioja et al., 2004). Second, financial development not coupled with effective contract enforcement mechanisms and efficient legal system discourages the formation of new establishments which often enhance TFP growth (Beck and Levine, 2002).

While it is documented that FD has a positive impact on TFP and Capital growth, there exists some empirical evidence supporting the non-linearity in the finance-sources of growth relationship. A recent study by Naceur et al. (2017) suggests that in low and middle income countries, FD tends to reduce TFP growth and investment growth. Naceur links this reduction to uncompetitive markets in these economies.

Table 3: Empirical studies on how financial development affect growth through investment and productivity growth

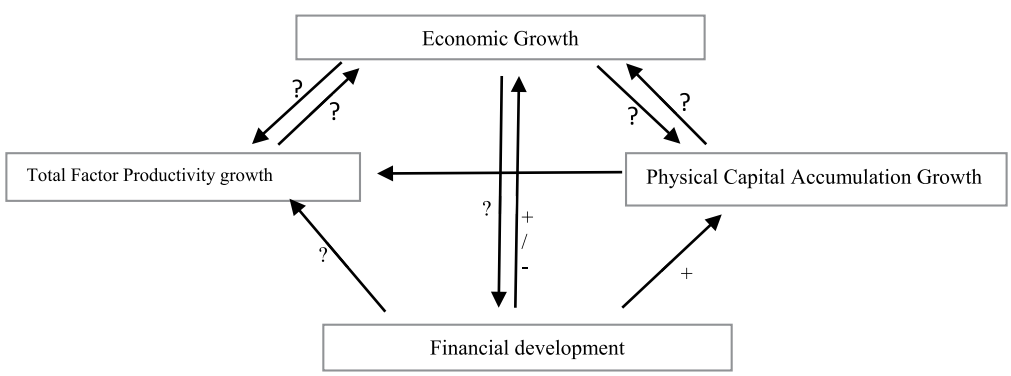
Authors	Methodology and Data Set	Measures of Fin. Dev	Main Results
Naceur. et al.(2017)	Panel dataset of 145 countries (CCA and MENA countries) for the period 1960-2011 and applied GMM estimator.	Financial depth-access, efficiency, stability and financial openness	Failed to establish positive relationships between most financial development indicators, investment, and TFP growth. Various dimensions of FD impact sources of growth depending on a country statistics. FD reduces productivity growth in low income and MICs.
Grechna & Ductor (2015)	Panel dataset of 101 developed and developing countries over the period 1970 to 2010 .	Private Credit, Private Credit by banks, Liquid liabilities	The effects of FD on GDP depends on the growth of private credit relative to the real output growth
Ghirmay (2006)	Time series dataset of Malaysia over the period 1960-2003 and applied the ARDL model	Private credit by banks	FD affect GDP through both capital accumulation and productivity of investment.
Ghirmay (2006)	Time series dataset of the US over the period 1970-2001 and applied Granger-Causality procedure	Financial sector(% GDP)	FD affect GDP through both capital accumulation and productivity channels
Rioja. & Valev. (2004)	Panel dataset of 74 countries (comprising of low, middle and high-come) over the period 1961-1995 and applied GMM dynamic panel techniques	Private Credit, Liquid liabilities, commercial versus central bank	FD and EG vary according to level of development; in middle income countries and especially in high-income countries FD primarily affect EG through productivity growth while in low-income countries FD primarily affect GDP through capital accumulation.
Beck et al.(2000)	Panel dataset of 63 countries over the period 1960-1995 and applied both pure cross-country instrumental variable estimator.	Private Credit, Liquid liabilities, Commercial Versus Central Bank	Positive correlation between real per capita GDP growth and Total Factor Productivity growth. FD exert a large, positive impact on TFP, which feeds to overall GDP growth .Long run links between FD and capital physical growth and private savings are weak.
Benhabib & Spiegel (2000)	Panel dataset of 4 countries (Argentina, Chine, Indonesia and Korea) over the period 1965 to 1985 and applied GMM estimator.	Private Credit, M2/ GDP, Commercial versus bank	FD positively affects investment rates and Total Factor Productivity growth. However, indicators those are correlated to TFP differ from those that encourage Investment.
Levine and Zervos (1998)	Cross-sectional data of 47 countries over the period 1976-1993 and applied OLS Method		Stock market liquidity and back sector affect GDP , capital accumulation and productivity growth; Positive role of FD capital accumulation and private saving rate; but statistically weak
De Gregorio & Guidotti (1995)	Panel dataset on a large cross–country sample and applied growth regressions	Private Credit	FD affect EG through efficiency of Investment(productivity of capital channel)
Acemoglu et al.(2002)	Panel dataset of 42 countries over the 1960-1995 period and applied OLS and IV technique		Countries which are behind the technology frontier pursue capital accumulation growth strategy whereas countries which are at the technology frontier pursue an innovation-led growth

3.3. FINANCE-GROWTH NEXUS ON THE BOTSWANA'S ECONOMY

A few studies on the finance-growth nexus have been conducted in Botswana using different econometric models, financial development variables and period of study. Akinboade (1998) examined causal relationship between financial development and economic growth in Botswana using data for the period 1976 - 1995 and Granger causality test. His major findings support the bidirectional hypothesis, implying that financial deepening in Botswana is an outcome of economic growth, which in turn feeds back as a factor of growth. Using data for the period 1977- 2006 and VAR Granger causality. Eita (2007) found that his results supported the supply-leading hypothesis, suggesting that financial development acts a productive input which then fosters economic growth. Contrary to Eita and Akinboade, Adusei (2013), Ntsosa (2014) found that the nature or the direction of causality between financial development and economic growth was sensitive to measures of financial development. Using domestic credit as a measure of financial development Adusei (2014) and Ntsosa (2014) argued that financial development responded to economic growth processes.

Adusei (2013) and Mmolainyane et al. (2015) further examined the impacts of the relationship between financial development and economic growth and found a negative relationship between domestic credit and economic growth. These two studies also report a positive influence on economic growth by other measures of financial development (bank deposits and liquid liabilities). However, there is still some literature gap (as demonstrated in Fig. 1) especially on mechanisms through by which financial development might be influencing economic growth positively. For instance, there is a need to establish whether domestic credit (which is reported to be influencing Botswana's economic growth negatively) has a positive influence on economic growth through major sources of growth - capital accumulation and TFP.

Figure 1: Identified finance-growth literature gap on the Botswana's economy



Notes:

1. *? = Finance-growth nexus literature not available*
2. *+, +/– =Finance-growth nexus available*

Thus, this study will examine the interrelationships between financial development, economic growth, capital accumulation and TFP to fill the existing gap. The study will inform the design of pro-growth policies and regulations in the financial sector and also add to the existing literature on the finance-sources of growth nexus.

4. METHODOLOGY

4.1. ANALYTICAL FRAMEWORK

Literature has shown that financial development and economic growth may be strongly inter-related. We therefore use a system approach in modeling the relationship between financial development and economic growth. As Ang (2008) posits, a system approach minimises issues of endogeinity. Adopting this approach will also allow us to examine mechanisms through which financial development impact economic growth in Botswana. We estimate four –equation model of financial development and economic growth based on a theoretical model and the general empirical literature on finance-growth nexus[3]. These four equations include; financial development (FD), capital accumulation (CS), Total factor productivity growth (TFP) and economic growth(Y).

The basic equations for each model are as follows;

$$Y = [TFPg, FD, EDU, INV] \quad [1]$$

$$FD = [Y, RIR, FL] \quad [2]$$

$$CS = [Y, FD, COC, UN] \quad [3]$$

$$TFP = [Yg,\ FD,\ EDU,\ FDI] \quad [4]$$

Where possible determinants of economic growth (Y) are total factor productivity growth ($TFPg$), financial development (FD), education (EDU) and investment (INV). FD is determined by Y, real interest rate (RIR) and financial liberalisation (FL) while physical capital accumulation (CS) is influenced by (Y), FD, macroeconomic uncertainty (UN), and cost of financing capital input (COC). Total factor productivity *(TFP)* is determined by Y, FD, EDU and foreign direct investment (FDI).

4.2. DATA

We used annual data for the period 1976-2015 in the estimation. The data was collected from various sources. Data on total factor productivity was collected from the University of Groningen and University of California (2015)- (World Penn Table) while data on Secondary education enrolment was sourced from UNESCO Institute for Statistics. The

3 For further reading on theoretical explanation for each equation see Ang (2008).

Chinn-Ito Index, which is used as an indicator for financial liberalisation, was sourced from Chinn and Ito (2006). Data on other variables was sourced from the World Bank (2017)-World Development Indicators (WDI). Except for economic growth rate, TFP growth rate, real interest rate, financial liberalisation, cost of financing capital input and foreign direct investment, all variables are expressed in natural logarithms in the estimation. Variables which not expressed in natural logarithms are either indexes or some of their observations are in negative values.

Following the empirical literature, we use more than one measure of financial development since the financial process involves the interaction of many activities and institutions. The first proxy for financial development is the total credit to the private sector by banks and non-financial institutions as a percentage of GDP. This proxy has been widely suggested in the literature (King and Levine,1993; Levine,1997; Qayyum and Hanif, 2007). It measures the extent to which funds are channeled into the private sector by financial intermediaries and is more directly linked to investment and growth. The second proxy, liquidity liabilities, measures the financial depth or size of the financial intermediaries' sector. It has been argued that the larger the size of the financial system the stronger it contributes to economic activities; by mobilising savings and channeling them towards productive economic activities, and hence growth (Levine, 1997). Table 4 defines each variable used in the estimation.

Table 4: Data Description

Variables	Description
GDP per Capita (Y)	GDP per capita is GDP divided by midyear population. (constant 2010 U.S. dollars)
Total Factor Productivity (TFP)	Total factor productivity at constant prices (2010=1)
Capital Accumulation (CS)	Gross fixed capital formation at constant 2010 prices (millions of 2010 U.S dollars
GDP per capita growth rate (Yg)	Annual percentage growth rate of GDP per capita based on constant 2010 U.S. dollars.
TFP growth (TFPg)	Annual percentage growth rate of Total factor productivity at constant prices (2010=1)
Private Credit(CRED)	Private credit by deposit money banks and other financial institutions in percent of GDP
Liquid liabilities (LL)	Liquid liabilities (broad money) in percent of GDP
Investment (INV)	Gross fixed capital formation in percent of GDP
Human Capital (EDU)	Secondary education enrolment ratio
Real Interest Rate (RIR)	The lending interest rate adjusted for inflation
Macroeconomic Uncertainty (UN)	The three-year moving average deviation of change in output between two periods
Price of capital Input (COC)	The financing cost of capital good (proxied by commercial bank's average lending rates
Financial Liberalisation (FL)	An index measuring a country's degree of capital account openness.

4.3. ESTIMATION TECHNIQUES

The study uses the Autoregressive Distributed Lag (ARDL)-Bounds testing to cointegration technique of Pesaran et al. (2001). This approach has several desirable statistical features. First, in contrast to the two most popular cointegration tests (Engel-Granger two-step method and Johansen's system based reduced rank regression method), this test procedure is valid irrespective of whether the variables are I (0) or I (1) or mutually co-integrated, which means no unit root test is required. However, this test will not be applicable if a I (2) series exists in the model. Thus, the ARDL approach is suitable for economic models that combine level and growth variables. Second, this test is very efficient and consistent in small and finite sample sizes (Samargandi et al., 2014) of 30 (or more) observations (Zermeno et al., 2014). And third, in this framework, accurate long run parameters and valid t-values can be estimated regardless that independent values are endogenous. The endogeneity bias tends to be irrelevant and very small. However, such is achieved if optimal number and sufficient lag structure is applied (Zermerno et al., (2014), Inder (1993) and Ang (2008)). Other desirable statistical features of the ARDL technique are discussed by Inder (1993), Ang (2008), Lalil and Ma (2008).

Following Ang (2008)'s approach and others, we first test the existence of cointegration based on the bounds-testing approach proposed by Pesaran and Smith (1998) and Persaran et al., (2001). The model can be formulated as;

$$\Delta Y_t = \alpha_0 + \delta_0 Y_{t-1} + \sum_{j=1}^{k} \delta_j Z_{j,t-1} + \sum_{i=1}^{p} \lambda_{0i} \Delta Y_{t-i} + \sum_{j=1}^{k} \sum_{i=0}^{q} \lambda_{ji} \Delta Z_{j,t-i} + \varepsilon_t \qquad [5]$$

Where Y_t is the dependent variable, a_0 is a constant term; δ and λ are coefficients; Z is a vector of k determinants of Y_t; p,q are optimal lag orders; Δ denotes difference operator, and ε_t is the white noise error term.

We employ the F-test to the bounds test in Eq.5 in order to test whether there exists a long run relationship among the variables in Eq. 1-4 respectively. The procedure tests the null hypothesis (i.e. non-existence of a long run relationship) in Eq. (1) as $H_0 : \delta_1 = \delta_2 = \ldots\ldots \delta_k = 0$ against an alternative hypothesis of $H_1 : \delta_1 \neq \delta_2 \neq \ldots\ldots \delta_k \neq 0$. The test-statistic is then compared to the critical values for the cointegration test (Pesaran et al. , 2001). The lower critical bound assumes that all the variables are I (0), meaning that there is no cointegration among the variables, while the upper bound assumes that all the variables are I (1). If the computed test-statistic is greater than the upper critical bound, then the null hypothesis will be rejected suggesting that there exists a cointegrating relationship among the variables. If the F-statistic falls below the lower critical bounds value, it implies that there is no cointegration relationship. However, if F-statistic lies between the lower and upper bound then the test is inconclusive.

Assuming that the bounds test leads to the conclusion of cointegration, we can meaningfully estimate long-run equilibrium relationship between the variables as well as the short run dynamics using Eq. (6) and Eq. (7), respectively.

$$Y_t = b_0 + \sum_{i=1}^{p} \delta_i Y_{t\ i} + \sum_{j=1}^{k} \sum_{i=0}^{q} \beta_{ji} Z_{j,t\ i} + \mu_t \quad [6]$$

$$\Delta Y_t = \alpha_0 + \sum_{i=0}^{p} \lambda_{0i} \Delta Y_{t-i} + \sum_{j=1}^{k} \sum_{i=0}^{q} \psi_{ji} \Delta Z_{j,t-i} + \lambda ECM_{t-1} + \varepsilon_t \quad [7]$$

A negative and significant ECM_{t-1} coefficient would imply that any short-term disequilibrium between the dependent and explanatory variables would converge back to the long-run equilibrium relationship. The optimal lag length is chosen by the Schwarz Bayesian Information Criterion (SBC). In order to test for robustness of the results, all estimators are subject to various diagnostic tests to check whether there is serial correlation and multicolinearity among the variables. We also conduct the CUSUM test using Eq.5 to check the stability of the long-run coefficients together with the short run dynamics.

5. RESULTS AND DISCUSSIONS

In this section, we report and discuss the regression results on financial development, economic growth, capital accumulation and total factor productivity. In each equation, our analysis mainly focus on the effects of financial development variables since the central question of our empirical analysis is on the interrelationships between financial development, economic growth and its major sources. Private credit and liquid liabilities are included in each regression analysis as separate explanatory variables.

5.1 STATIONARITY TEST

Prior to selecting the appropriate model to examine the interrelationship between FD, EG, Cs and TFP, we conducted a test of the order of integration for each variable. We conducted more than one test to improve the robustness of the stationarity test. The paper uses the Augmented Dickey-Fuller and Phillips-Perron (PP) tests which are the two most widely used unit root tests for stationarity of data. Variables including foreign direct investment, real interest rate, TFP growth and Cost of capital goods are I (0) while other variables are stationary after first differencing at 1% significant level (Table 5). Thus, an Autoregressive Distributed Lag (ARDL)-bound testing is the most appropriate model to analyse the data since variables are variables I (0) or I (1).

Table 5: Unit Root Tests

	ADF TEST		PP TEST	
VARIABLE	**IN LEVEL I(0)**	**1ST DIFF**	**IN LEVEL I(0)**	**1ST DIFF.**
LNY	*0.198(0.968)*	*-6.105(0.000)****	*0.473(0.983)*	*-6.301(0.000)****
LNCS	*3.259(1.000)*	*-3.054 (0.040)****	*2.686(1.000)*	*-3.054(0.004)****
TFP	*-0.400(0.890)*	*-6.130(0.000)****	*-0.527(0.874)*	*-5.389(0.000)****
Yg	*-4.740(0.001)****	*-6.298(0.000)****	*-4.737(0.001)****	*-19.516(0.000)****
TFPg	*-6.130(0.000)****	*-4.757(0.001)****	*-6.131(0.000)****	*-25.610(0.000)****
LNCRED	*0.290(0.970)*	*-3.830(0.007)****	*0.290(0.974)*	*-4.930(0.0003)****
LNEDU	*-1.340(0.600)*	*-6.070(0.000)****	*-1.278)(0.62)*	*-6.072(0.000)****
LNINV	*3.259(1.000)*	*-3.054(0.040)***	*2.686(1.000)*	*-3.054(0.040)***
LNLL	*0.078(0.959)*	*-6.010(0.000)****	*0.166(0.966)*	*-6.001(0.000)***
COC	*-2.780(0.071)**	*-7.380(0.000)****	*-3.421(0.071)**	*-8.010(0.000)****
FDI	*-4.069(0.003)****	*-6.976(0.000)****	*-4.063(0.003)****	*-8.220(0.000)*
RIR	*-3.536(0.013)****	*-5.224(0.000)****	*-3.492(0.014)*	*-9.090(0.000)****
FL	*-1.091(0.708)*	*-6.712(0.000)*	*-0.956(0.756)*	*-6.810(0.000)****
LNUN	*-1.352(0.593)*	*-6.285(0.000)****	*-1.507(0.512)*	*-7.142(0.000)****

Notes: *, **, *** indicate significance at *10%, **5%, ***1% respectively. P-values in parenthesis.

5.2 BOUND TEST FOR COINTEGRATION ANALYSIS

The calculated F-statistic for the cointegration tests are displayed in Table 6. The computed F-Statistic (Table 6) for all the regression results are greater than the upper bound critical values of Perasan (2001), implying that the null hypothesis of no integration cannot be accepted. Therefore, there is a cointegrating relationship between dependent variables (being financial development, economic growth, capital stock and Total factor productivity) and the explanatory variables. The estimated models could therefore be used to examine the long run relationships and the short-run dynamics using an error correction representation.

5.3 LONG RUN IMPACTS

Our main empirical findings of the estimated long-run coefficients for Y, FD, CS and TFP are reported in Tables 7,8,9 and 10 respectively. The estimations made are based on the choice of the lag length reported in Table 6. In each model a different financial development variable is added (private credit or liquidity liabilities).

Estimation results show that financial development (measured by private credit has a negative and significant impact on economic growth in the long run (table 7). These results are consistent with some of the findings of the existing empirical literature.

Table 6: ARDL Bounds Test for Co-Integration Analysis

Equations	Lag Length	F-statistic
lnCRED|lnY,RIR,FL	2	5.397***
lnLL| lnY,RIR,FL	1	4.621**
lnY| TFPg, lnEDU,lnINV, lnCRED	1	4.489**
lnY| TFPg, lnEDU,lnINV, lnLL	1	3.793*
lnCS| lnY, lnCRED,COC,lnUN	3	4.400*
lnCS| lnY, lnLL,COC,LnUN	3	5.498***
TFP| Yg, lnCRED,lnINV, FDI	2	4.079***
TFP| Yg, lnLL,lnINV, FDI	3	3.539**

Notes: 1. *, **, *** indicate significance at 10%,5% and1% respectively.
2. The test statistics of the bounds are compared against the critical values reported in Pesaran et.al. (2001), Pg. 300.

Beck et al. (2011) suggest that natural resource curse in resource-based economies could be the root cause of the negative relationship between credit and growth. Jalil and Ma (2008) argue that a negative relationship between financial development and economic growth could be a result of the inefficient allocation of resources by banks coupled with unfavorable investment environment in the private sector. Levine (2003) posits that 'too much household credit' may deter growth, explaining the negative association between financial development and economic growth. The findings of Levine (2003) would be applicable to Botswana, where household credit is relatively high (accounting for 60% of the bank's loan book) and rising. According to Japelli and Pagano (1994), easing credit constraints on households reduce saving rates, with negative effects for economic growth.

Regression results presented in Table 8 reveal that economic growth has a positive but insignificant impact on financial development, suggesting that there is a unidirectional causality relationship from financial development to economic growth in Botswana. Thus, the interrelationship between FD and economic growth support the work of Schumpeter (1934), McKinnon (1973) and Shaw (1973) that services provided by the financial institutions encourage technical innovation and economic growth. In contrast, when financial development is measured by liquid liabilities, it has a positive but insignificant effect on overall economic growth in the long run. Furthermore, economic growth has a positive and significant impact on liquid liabilities, implying that as the economy expands more demand for financial services lead to more financial instruments and products to meet the demands of the economy. While the interrelationship between FD (private credit) and economic growth support the supply leading hypothesis, the interrelationships between FD (liquid liabilities) and economic growth support the demand-following hypothesis.

Considering the indirect transmission channels through by which financial development could impact economic growth, we estimated the impacts of financial development on capital accumulation and TFP (main sources of economic growth). Prior to estimating the impacts of FD on CS and TFP, we confirmed that both CS and TFP have a positive impact on the Botswana's economic growth (table 7). Table 9 and 10 reports results on the impacts of FD on both CS and TFP. These results indicate that FD (private credit) has a significant and positive impact on capital accumulation and a negative impact on TFP in Botswana. From this analysis, it is clear that although FD has a direct negative impact on Botswana's economic growth, its positive influence on economic growth is transmitted through the capital accumulation channel which then impacts economic growth positively.

Table 7: Long run impacts of FD on Economic growth

	CRED		LL	
Variable	Coef.	Prob.	Coef.	Prob.
C	-7.775	0.069**	-2.063	0.769
TFPG	8.048	0.002***	7.037	0.429
lnCRED	-0.552	0.007***		
lnLL			4.167	0.539
lnEDU	0.778	0.000***	0.219	0.802
lnINV	2.168	0.004***	1.113	0.459

Notes: 1. *, **, *** indicate significance at 10%,5% and1% respectively.
2. Real GDP per Capita is the dependent variable.

Table 8: Long run impacts of economic growth on FD

	CRED		LL	
Variable	Coef.	Prob.	Coef.	Prob.
C	0.221	0.925	-0.784	0.823
LnY	0.228	0.443	0.997	0.029**
RIR	0.033	0.008***	-0.007	0.633
FOPEN	0.985	0.004***	1.495	0.001***

Notes: 1. *, **, *** indicate significance at 10%,5% and1% respectively.
2. Financial development is the dependent variable.

Table 9: Long run impacts of FD on capital Accumulation

	CRED		LL	
Variable	Coef.	Prob.	Coef.	Prob.
C	23.473	0.093*	6.653	0.145
lnY	0.481	0.002**	0.048	0.011***
lnCRED	0.104	0.056*		
lnLL			0.149	0.385
COC	-0.026	0.000***	-0.038	0.005**
lnUN	-0.218	0.106	-0.543	0.424

Notes: 1. *, **, *** indicate significance at 10%,5% and1% respectively.
2. Real Capital Stock is the dependent variable.

Table 10: Long run impacts of FD on Total Factor Productivity

	CRED		LL	
Variable	Coef.	Prob.	Coef.	Prob.
C	1.888	0.000***	2.811	0.000***
YG	0.042	0.050**	0.067	0.054**
lnCRED	-0.250	0.018**		
lnLL			-0.245	0.114
lnEDU	-0.029	0.609	-0.251	0.048**
FDI	-0.018	0.038**	-0.024	0.290

Notes: 1. *, **, *** indicate significance at 10%,5% and1% respectively.
2. Real TFP is the dependent variable.

Similar results on finance-sources of economic growth have been reported in countries or regions where the existing financial system have established long term relationship with already existing firms and allocating funds for accumulation purposes as opposed to utilising their built-in specialised finance structures to fund innovation and start-up firms that tends to be innovative (Rioja et al., 2004). Moreover, financial development not coupled with effective contract enforcement mechanisms and efficient legal system may not foster the formation of new establishments and enhance productivity growth (Beck et al., 2002). Lastly, financial systems in developing countries are likely to impact economic growth through the capital accumulation channel rather than the productivity growth since they are behind the technology frontier[4] (Rioja et al., 2004). The interaction between Botswana's financial system and economic growth and its major sources somehow reflects some of the characteristics mentioned above. For instance, Botswana's financial sector allocates credit mainly to the already established firms and less to SMMEs and start-up firms which are generally known to be innovative. In 2013, only 4% of SMMEs received start-up capital loans from the commercial banks (Mmolainyane et al.,2015).

5.4 SHORT RUN IMPACTS

The coefficients of the error correction term (ECM) for the relationship between financial development and GDP, CS and TFP are presented in Appendix 1. The error correction terms in each regression results are negative and statistically significant at the 1% level, indicating a cointegration relation between GDP, FD, CS and TFP and their explanatory variables respectively. With respect to the short run relationships, the results on the relationship between financial development (private credit) and economic growth are similar to what was observed in the long run estimations. On a positive note, liquid liabilities which is not significant in the long run, has a positive and significant influence on economic growth in the short run, indicating that financial intermediation leads to higher output levels in the short run.

4 It is well acknowledged that SMMEs are general have innovative ideas.

5.5 DIAGNOSTIC AND STABILITY TESTS.

We applied a number of diagnostic tests to the ARDL model. The results are displayed in Table 11. From Table 11, we find no evidence of serial correlation and heteroscedasticity. The CUSUM, shown in Appendix 2, for each regression analysis remains within the critical boundaries for the 5% level. These statistics confirm that the long run coefficients in the error correction model are stable and affect financial development. economic growth, capital accumulation and TFP growth.

Table 11: ARDL-VECM diagnostic tests

	Y		FD		CS		TFP	
	CRED	LL	CRED	LL	CRED	LL	CRED	LL
R^2	0.59	0.52	0.69	0.49	0.82	0.82	0.74	0.84
Adjusted R^2	0.53	0.45	0.61	0.44	0.70	0.71	0.64	0.72
Serial Correlation	1.7(0.20)	3.0(0.10)	0.6(0.57)	0.8(0.39)	1.70(0.22)	2.00(0.17)	1.6(0.24)	1.1(0.38)
Heteroscedasticity	0.5(0.86)	0.6(0.78)	1.5(0.21)	1.3(0.30)	0.81(0.66)	0.63(0.82)	1.4(0.27)	1.1(0.43)

6. CONCLUSION AND POLICY IMPLICATIONS

The study examines the interrelationships between financial development, capital accumulation, total factor productivity and economic growth in Botswana during the 1980-2014 period using the ARDL Bound test technique. The results show that financial development (private credit) has a negative impact on economic growth both in long and short run period. Similar results are reported by Beck et al. (2011), Jalil and Ma (2008), Adusei (2014) and Levine (2003). A positive but insignificant impact of economic growth on financial development (private credit) is also observed. Thus, economic growth in Botswana responds to financial development (private credit), supporting the supply-leading hypothesis. In contrast, the results also show that when financial development is measured by liquid liabilities the impact on economic growth is positive but only significant in the short run. On the other hand, financial development (LL) responds to economic growth, implying that financial intermediation services increase as Botswana's economy grows.

Furthermore, we estimated the impacts of financial development on capital accumulation and Total factor productivity, which are the major sources of economic growth, in order to establish if financial development impacts economic growth through these two channels. On a positive note, the empirical evidence suggests that financial development (private credit) leads to higher output through promoting the accumulation of assets. For financial development to accelerate growth in Botswana through both the accumulation of capital and productivity growth, it is therefore useful to further develop Botswana's

financial market. Efficient and functioning financial institutions can facilitate innovation by mobilising resources to finance promising investment projects, evaluating prospective entrepreneurs and allowing investors to diversify the risks related to uncertain innovative activities. It is also crucial to improve the investment environment in Botswana which will encourage lending activities by the financial sector, especially towards the business sector. Furthermore, if diversification of the Botswana economy continues, we can expect financial development will play a more prominent role in the country's overall economic performance in the future.

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APPENDICES

APPENDIX 1: SHORT RUN ESTIMATES

Economic growth (CRED)		
Variable	Coefficient	Prob.
TFPg	0.465	0.000***
ΔlnCRED	-0.095	0.018**
ΔlnEDU	-0.196	0.031**
ΔlnINV	0.156	0.020**
ECM(-1)	-0.071	0.000***
R^2	0.587	
Adjusted R^2	0.530	
Durbin-Watson stat	2.4	

Economic growth (LL)		
Variable	Coefficient	Prob.
TFPg	0.392	0.000***
ΔlnLL	0.213	0.005***
ΔlnEDU	-0.234	0.011***
ΔlnINV	-0.029	0.638
ECM(-1)	-0.059	0.000***
R^2	0.591	
Adjusted R^2	0.534	
Durbin-Watson stat	2.4	

Financial Development (CRED)		
Variable	Coefficient	Prob.
ΔlnCRED(-1)	0.042	0.726
Δln (Y)	-0.892	0.015**
Δln Y(-1)	0.229	0.525
ΔRIR	0.009	0.002***
ΔRIR(-1)	-0.002	0.352
ΔFL	0.177	0.162
ΔFL(-1)	-0.082	0.576
ECM(-1)	-0.402	0.000***
R-squared	0.694	
Adjusted R^2	0.609	
Durbin-Watson stat	1.745	

Financial Development (LL)		
Variable	Coefficient	Prob.
ΔlnY	0.727793	0.1422
ΔRIR	-0.005542	0.1667
ΔFL	0.115964	0.5849
ECM(-1)	-0.424584	0.000***
R-squared	0.492166	
Adjusted R^2	0.441383	
Durbin-Watson stat	2.109779	

Capital Accumulation (CRED)		
Variable	Coefficient	Prob.
ΔlnY	1.272	0.003***
ΔlnY(-1)	1.513	0.001***
ΔlnY(-2)	1.659	0.001***
ΔlnCRED	0.162	0.082*
ΔlnCRED(-1)	0.143	0.109
ΔlnCRED(-2)	-0.255	0.007***
ΔCOC	-0.021	0.007***
ΔCOC(-1)	0.014	0.011***
ΔCOC(-2)	0.008	0.050**
ΔlnUN	-0.183	0.001***
ΔlnUN(-1)	-0.062	0.062*
ΔlnUN(-2)	-0.055	0.105
ECM(-1)	-0.901	0.000***
R^2	0.82	
Adjusted R^2	0.71	
Durb-Watson stat	2.2	

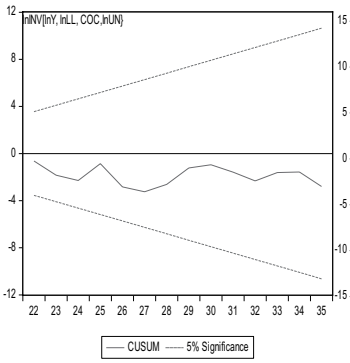
Capital Accumulation (LL)		
Variable	Coefficient	Prob.
ΔlnY	1.447	0.002***
ΔlnY(-1)	1.248	0.002***
ΔlnY(-2)	2.169	0.000***
ΔlnLL	0.408	0.000***
ΔlnLL(-1)	-0.004	0.995
ΔlnLL(-2)	0.011	0.912
ΔCOC	-0.012	0.036**
ΔCOC(-1)	0.014	0.004***
ΔCOC(-2)	0.012	0.002***
ΔlnUN	-0.254	0.001***
ΔlnUN(-1)	0.038	0.219
ΔlnUN(-2)	0.012	0.679
ECM(-1)	-0.697	0.000***
R^2	0.83	
Adjusted R^2	0.72	
Durbin-Watson stat	2.2	

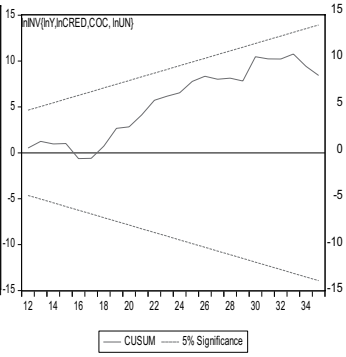
Total Factor Productivity (CRED)		
Variable	Coefficient	Prob.
ΔTFP	-0.444	0.006***
ΔYg	0.005	0.014***
ΔYg(-1)	-0.004	0.084*
ΔlnCRED	-0.145	0.025**
ΔlnCRED(-1)	-0.041	0.507
ΔlnEDU	0.106	0.338
ΔlnEDU(-1)	0.152	0.207
ΔFDI	0.001	0.693
ΔFDI(-1)	0.004	0.134
ECM(-1)	-0.427	0.000***
R^2	0.743145	
Adjusted R^2	0.642637	
Durbin-Watson stat	2.2	

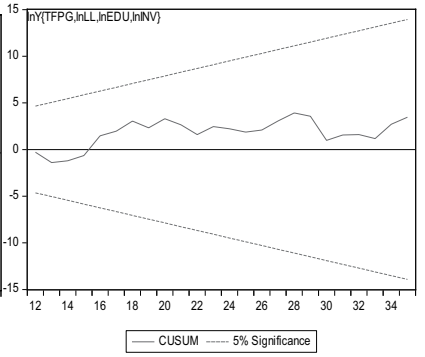
Total Factor Productivity (LL)		
Variable	Coefficient	Prob.
ΔTFP(-1)	-0.575	0.002
ΔTFP(-2)	-0.254	0.111
ΔYg	0.008	0.000
ΔYg(-1)	-0.006	0.154
ΔYg(-2)	0.000	0.941
ΔlnLL	-0.102	0.158
ΔlnLL(-1)	0.018	0.856
ΔlnLL(-2)	0.157	0.110
ΔlnEDU	0.219	0.090
ΔlnEDU(-1)	0.113	0.328
ΔlnEDU(-1)	-0.108	0.411
ΔFDI	0.001	0.810
ΔFDI(-1)	0.012	0.010
ΔlnFDI(-2)	0.008	0.010
ECM(-1)	-0.363	0.000
R^2	0.847008	
Adjusted R^2	0.721014	
Durbin-Watson stat	2.179385	

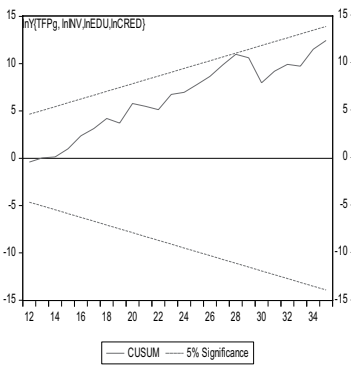
Notes: *, **, *** indicate significance at 10%,5% and1% respectively.

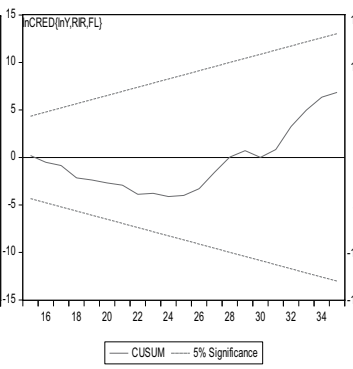
APPENDIX 2: PLOT OF CUSUM FOR COEFFICIENT STABILITY

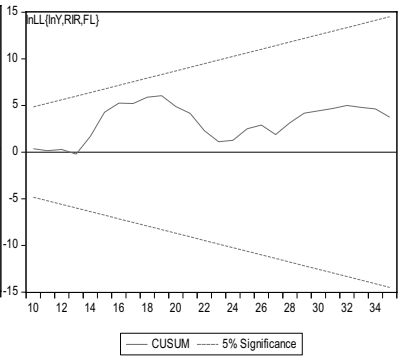


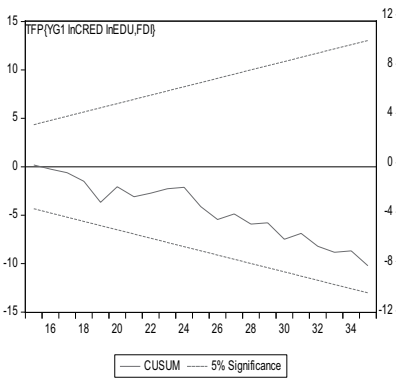


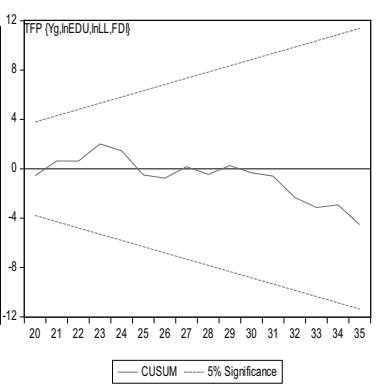












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