A Causality Analysis between Financial Development and Economic Growth for Botswana

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A CAUSALITY ANALYSIS BETWEEN FINANCIAL DEVELOPMENT AND ECONOMIC GROWTH FOR BOTSWANA

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ABSTRACT

This paper analyses the causal relationship between financial development and economic growth in Botswana for the period 1977 to 2006, using Granger causality through cointegrated Vector Autoregression methods. The results show that there is a stable long-run relationship between financial development and economic growth. Financial development causes economic growth in Botswana. The causality runs from financial development to economic growth. The results suggest that the financial sector is important in the economic growth and development of Botswana. Financial intermediation and institutional financial reforms should be enhanced in order to promote Botswana's economic growth.

INTRODUCTION

There is a general consensus that the financial sector contributes to economic development. It improves productivity and economic growth through the functions that are part of the financial system which include capital allocation, mobilisation savings, evaluation and monitoring of borrowers. The financial sector is important in transferring deposits to financial assets and channelling funds from surplus units to deficits. It therefore facilitates the creation of wealth, trade and the formation of capital (Ahmed, 2006).

The theoretical relationship between financial development and economic growth dates back to Schumpeter (1911) who emphasised that the services provided by the financial intermediaries are important for innovation and development. Fry (1978, 1980) and Galbis (1977) extended and developed this theoretical relationship further. They analysed the effect of government intervention on the development of the financial system. They proposed that government intervention to impose restrictions such as credit ceilings and high reserve requirements on the banking system can impact negatively on the development of the financial sector. This will have a negative effect on economic growth.

Greenwood and Smith (1997) and Levine (1997) are other theoretical developments that offer support for the positive relationship between financial development and economic growth. They argue that in a developing financial sector, the creation of credit causes an increase in economic growth. The creation of credit should not be constrained by the

supply of deposits because there exists an idle balance in the banking system and the possibility of borrowing from the money market or central bank. Ghali (1999) contributed to this view arguing that the availability of money in the financial system translates into the creation of credit to finance economic activity and this will cause high economic growth.

There is an extensive literature on the relationship between financial development and economic growth and it is now generally agreed that financial development is important for economic growth (Apergis, Filippidis and Economidou, 2007; Jung, 1986; Calderon and Liu, 2003). However, the direction of causality between financial development and economic development is not without ambiguity. Knowing the direction of causality is important because it has a different implication for policy development.

For Botswana, Akinboade (1998) tested the causal relationship between financial development and economic growth for the period 1976 to 1995 and found that there is bi-directional causality between financial development and economic growth. The purpose of this paper is to provide further evidence by analysing the causality between financial development and economic growth of Botswana for the period 1976 -2005. This paper differs from Akinboade (1998) in several ways. Firstly, it uses a different proxy for financial development and economic growth. Secondly, it employs different and advanced econometric techniques (Granger causality through cointegrated vector autoregression method) to test the causal relationship between financial development and economic growth.

Section 2 discusses the financial structure in Botswana. Section 3 discusses the views expressed on the financial development and economic growth, and selected literature. Section 4 provides an overview of the financial development and structure in Botswana. Section 5 describes the econometric methodology, while Section 6 discusses data and the results. The conclusion is provided by Section 7.

1. FINANCIAL STRUCTURE IN BOTSWANA: AN OVERVIEW

Botswana used South African currencies before and after its independence as the country was a member of the Rand Monetary Area (RMA). Such membership did not give the government any monetary independence because monetary policy was conducted by the South African Reserve Bank. Botswana terminated its membership of the RMA in 1976 and established its own central bank and currency, the Pula (Ahmed, 2006). There were only two commercial banks which were foreign-owned namely Standard Chartered and Barclays. These banks were incorporated locally after establishment of the central bank, but they were free to make their own decisions. As Akinboade (1998) stated, the economy of Botswana recorded a high growth rate of more than 10 percent per year for most of the 1980s because of the increase in diamond revenue. This rapid increase in economic growth led to a rapid expansion of the financial system and the two commercial banks expanded to more than thirty branches or agencies.

The Botswana Stock Market was established in 1989, and overseas portfolio investment institutions were allowed to buy shares on generous terms. However, local institutions were subjected to exchange control regulations to invest up to 50 percent of their assets abroad. According to Ahmed (2006) the exchange control measures have penalised local savers because foreign financial assets generally offer higher real rate of return than those denominated in Pula. Local investors were denied the opportunity to increase their wealth and diversify their risks.

Although Botswana experienced rapid economic growth, financial institutions did not expand as expected. Jefferis (1995) and Ahmed (2006) noted that since independence, the financial sector has been dominated by two major commercial banks. For a long time, these two commercial banks concentrated on short-term segments of the market and did not offer much development to enhance long-term investment. There were limited range of financial instruments and capital market for equities and long-term and short-term debt instruments did not exist before the establishment of the Botswana Stock Market. The government recognised that although excess liquidity existed, there was a demand for long-term financing which was not satisfied. This constituted structural weakness in the financial system.

Until the late 1990s the government of Botswana became the main lender for project financing, mainly to the public sector and also to some extent the private sector. Several Annual Reports of the Bank of Botswana reported that until 1990, there were only three commercial banks. According to Jefferis (1995) these banks earned high profits on the

basis of relatively low risks such as foreign exchange transactions, and this was due to the oligopolistic structure of the banking system in the country. They were not under pressure from competition or development of new sources of business and range of financial instruments. There have been some significant changes to diversify and integrate the financial sector into the whole economy since 1990. According to several Annual Reports of the Bank of Botswana, the number of commercial banks increased to 6 in 1992. In the year 2000, the number of commercial banks was 5 while that of other financial institutions were 6. The banking sector continued to grow and resume its role within the financial system. The entry of new commercial banks in the financial sector made an impact on the quality of products offered by the banking sector. New banking services such as automatic teller machines and replacements of saving account books by electronic cards were introduced. The number of bank branches increased and services have become widely available. The increase in banking services indicates the widening and deepening of the financial system in Botswana. As shown in Figure 1, the degree of financial intermediation increased between 1977 and 2006 and this indicates that the growth of the financial sector is in line with output growth.
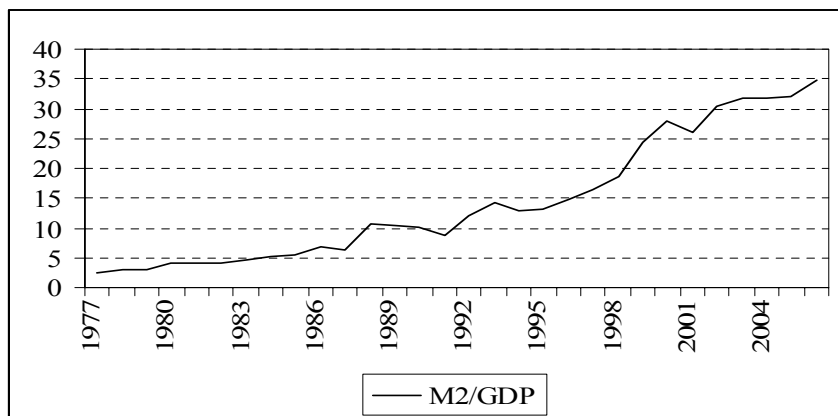
Figure 1. Financial intermediation in Botswana

2. VIEWS ON FINANCIAL DEVELOPMENT AND ECONOMIC GROWTH, AND SELECTED LITERATURE

The emergence of the endogenous growth theory resulted in considerable emphasis on the contribution of financial development to economic growth. This resulted in the expansion of the literature on the finance-growth nexus. Apergis, Filippidis and Economidou (2007) summarised the views on the relationship between financial development and economic growth. There are two main views on the financial development growth relationship. The first one states that financial development has a positive effect on economic growth. According to this view, the effect runs from financial development to economic growth. This effect is caused either by an improvement in the efficiency of capital accumulation or an increase in the rate of savings as well as the rate of investment. This view is called supply-leading view, and it is initiated by Schumpeter (1911) and supported by among others, King and Levine (1993) and Calderon and Liu (2003), Gurley and Shaw (1967) and Jung (1986).

The second view states that financial development responds to changes in the real sector and is called demand-following view. The postulation of this view is that the causality runs from economic growth to financial development. An increase in real economic growth causes a rise in the demand for financial services and this result in the expansion of the financial sector. This means that financial development respond to economic growth. The demand-following view is supported by among others, Jung (1986) and Ireland (1994). Apergis *et al*. (2007) states that there are two other views between the supply-leading and demand-leading hypotheses (views). The first one postulates that there is mutual impact between financial development and economic growth. The second one is that there is no relationship between financial development and economic growth.

It has been assumed that the supply-leading view dominates the demand-leading view, which implies that financial development causes economic growth. However, a stage of development view was suggested by Patrick (1966). According to Patrick, the causal relationship between financial development and economic growth depends on the stage of economic development. In the early stages of economic development, supply leading view can stimulates real capital formation. The development of new financial services creates new opportunities for savers and investors and causes an increase in economic growth. The supply-leading view become less important as financial and economic development proceed and gradually, the demand-leading view start to dominate. Patrick states that one industry can be encouraged financially on the basis of supply-leading

view, and when it develops, its financing shift to demand leading. Other industries that are still at a low level of development will remain in the supply-leading phase.

There is a lot of empirical work on the relationship between financial development and economic growth. Some empirical studies support the supply-leading view, while others provide evidence of demand-leading view. There are also some empirical studies which show that there is a bi-directional causality between financial development and economic growth. Jung (1986) tested the causality between financial development and economic growth for 56 countries (19 developed and 37 developing). The results showed that developing countries have a supply-leading causality pattern more frequently than demand leading pattern. Developed countries have a demand leading causality. The results provided support for Patrick hypothesis of stage development.

Choe and Moosa (1999) examine the relationship between financial development and economic growth for Korea. The study focused on relative development of financial intermediaries and capital markets. Causality test shows that financial development in general leads to economic growth.

King and Levine (1999) presents evidence that support Schumpeter's view that financial development leads to economic growth. The study covers the period 1960 to 1980 for 80 countries. It was a cross-section regression of real GDP per capita on measures of financial development and other variables such as initial GDP and the ratio of investment to GDP. The results confirmed that financial development causes economic growth.

Luintel and Khan (1999) examined the long-run relationship between financial development and economic growth using multivariate vector autoregression for 10 countries. The examination revealed that there is a bi-directional causality between financial development and economic growth for all sampled countries.

Ghali (1999) investigated empirically whether financial development leads to economic growth in Tunisia. The investigation was also done using the vector autoregression technique. The empirical results suggest that there is a stable long-run relationship between financial development and economic growth. The causality runs from financial development to economic growth.

Calderon and Liu (2003) employs a Geweke decomposition test on pooled data of 109 countries (developed and developing) for the period 1960 to 1964 to examine the causal relationship between financial development and economic growth. The study confirms that generally, financial development causes economic growth. There is a bi-directional causality between financial development and economic growth. Financial development contributes more to economic growth in developing countries than in developed countries.

Odhiambo (2004) investigated the direction of causality between financial development and economic growth for South Africa using a vector error correction model. The investigation revealed that the supply-leading hypothesis is rejected for South Africa.

There is a strong evidence of demand-leading hypothesis for South Africa. This implies that the causality runs from economic growth to financial development and shows that economic growth drives financial development in South Africa. Odhiambo (2005) applied the same methodology to Tanzania and the results show that there is bi-directional causality between financial development and economic growth, although the supply-leading hypothesis dominates.

The latest study on financial development and economic growth was conducted by Apergis *et al*. (2007). It employed panel data integration and cointegration for a dynamic heterogeneous panel of 15 OECD countries over the period 1975 to 2000. The findings reveal that there is a long-run relationship between financial deepening and economic growth. The causality between financial development and economic growth is bi-directional.

Although studies on the causal relationship between financial development and economic growth in Botswana are limited or scarce, there is one notable study by Akinboade (1998). Akinboade examined the causal relationship between financial development and economic growth in Botswana for the period 1972 to 1995. The measure of economic growth or development in this study was non-mineral real GDP per capita. Two measures of financial development were used. These are the ratio of bank claims on the private sector to nominal non-mineral GDP, and ratio of bank deposit liabilities to nominal non-mineral GDP. The study tested for cointegration using the Engle-Granger cointegration test and finds no evidence of cointegration between measures of financial development

and economic growth. After rejection of cointegration, the study tested causality using the error correction model. A simple F-test was used to test for Granger causality. The results reveal that there is bi-directional causality between measures of financial development and non-mineral real GDP per capita.

The approach followed in this paper differs from Akinboade (1998) in several ways. Firstly, it uses different proxies for financial development. The ratio of M2 to total GDP, the ratio of deposit liabilities to total nominal GDP, the ratio of credit extended to the private sector to total nominal GDP are used as proxies for financial development. These are compared to bank deposit liabilities to non-mineral nominal GDP and bank claims on the private sector to nominal non-mineral GDP used by Akinboade (1998). This study also uses total real GDP per capita to proxy economic growth compared to real non-mineral GDP per capita used by Akinboade (1998). Secondly, this paper employs a different econometric technique to test for cointegration and causality between financial development and economic growth. It applies a cointegrated vector autoregression methodology compared to the separate use of residual based cointegration and error correction model used by Akinboade (1998).

3. GRANGER CAUSALITY: FINANCIAL DEVELOPMENT AND ECONOMIC GROWTH

Granger causality test was developed by Granger (1969), and according to him, a variable (in this case financial development) is said to Granger cause another variable

(GDP) if past and present values of financial development help to predict GDP. To test whether financial development Granger cause GDP, this paper applies the causality test developed by Granger (1969). A simple Granger causality test involving two variables, financial development (FINA) and GDP is written as:

$$FINA_t = \sum_{j=1}^{p} \alpha_j FINA_{t-j} + \sum_{j=1}^{p} \beta_j GDP_{t-j} + u_t \tag{1}$$

$$GDP_t = \sum_{j=1}^{p} \eta_j FINA_{t-j} + \sum_{j=1}^{p} \gamma_j GDP_{t-j} + v_t \tag{2}$$

The null hypotheses to be tested are:

$H_1 : \eta_j = 0, \ j = 1......p,$ this hypothesis means that financial development does not Granger cause GDP.

$H_2 : \beta_j = 0, \ j = 1......p,$ this hypothesis means that GDP does not Granger cause financial development. If the first hypothesis is rejected, it shows that financial development Granger causes GDP. Rejection of the second hypothesis means that the causality runs from GDP to financial development. If none of the hypothesis is rejected, it means that financial development does not Granger causes GDP and GDP also does not Granger cause financial development. It indicates that the two variables are independent of each other. If all hypotheses are rejected, there is bi-directional causality between financial development and GDP.

The traditional Granger causality test uses the simple F-test statistic. Several studies such as Chow (1987), Marin (1992), Pomponio (1996), McCarville and Nnadozie (1995),

Darat (1996) have used the traditional (F-test) to test for causality. The use of a simple traditional Granger causality has been identified by several studies (such as Engle and Granger, 1987; Toda and Yamamoto, 1995; Zapata and Rambaldi, 1997; Tsen, 2006; Ahmad, 2006; Shan and Tian, 1998) as not sufficient if variables are I(1) and cointegrated. If time series included in the analysis are I(1) and cointegrated, the traditional Granger causality test should not be used, and proper statistical inference can be obtained by analysing the causality relationship on the basis of the error correction model (ECM). Many economic time-series are I(1), and when they are cointegrated, the simple F-test statistic does not have a standard distribution. If the variables are I(1) and cointegrated, Granger causality should be done in the ECM and expressed as:

$$\Delta FINA_{t-1} = \sum_{j=1}^{p} \alpha_j \Delta FINA_{t-j} + \sum_{j=1}^{p} \beta_j \Delta GDP_{t-j} + \phi_1 \varepsilon_{1t-1} + u_t \tag{3}$$

$$\Delta GDP_{t-1} = \sum_{j=1}^{p} \eta_j \Delta FINA_{t-j} + \sum_{j=1}^{p} \gamma_j \Delta GDP_{t-j} + \phi_2 \varepsilon_{2t-1} + v_t \tag{4}$$

where ε_{1t-1} and ε_{2t-2} are the lagged values of the error term from the following cointegration equations:

$$FINA_t = \delta + \varphi GDP_t + \varepsilon_{1t} \tag{5}$$

$$GDP_t = a + \psi FINA_t + \varepsilon_{2t} \tag{6}$$

4. ECONOMETRIC TECHNIQUE AND EMPIRICAL METHODOLOGY

The univariate characteristics which show whether the variables are stationary or non-stationary is the first step. If the variables are non-stationary, their order of integration is tested. This paper uses the Augmented Dickey-Fuller (ADF) statistic to test the stationarity or non-stationarity of the variables and their order of integration. If the variables are I(1), the next step is to test whether they are cointegrated. This is done by using the Johansen (1988; 1995) full information maximum likelihood. This econometric methodology corrects for autocorrelation and endogeneity parametrically using a vector error correction mechanism (VECM) specification. The Johansen procedure is described as follows. Defining a vector x_t of n potentially endogenous variables, it is possible to specify the data generating process and model x_t as an unrestricted vector autoregression (VAR) involving up to k-lags of x_t specified as:

$$x_t = \mu + A_1 x_{t-1} + \ldots\ldots + A_k x_{t-k} + \varepsilon_t \qquad\qquad u_t \sim IN(0, \sum) , \qquad\qquad (7)$$

where x_t is ($n \ x \ 1$) and each of the A_i is an ($n \ x \ n$) matrix of parameters. Sims (1980) advocates this type of VAR modelling as a way of estimating dynamic relationships among jointly endogenous variables without imposing strong *a priori* restrictions (see also Harris, 1995). This is a system in reduced form and each variable in x_t is regressed on the lagged values of itself and all the other variables in the system. Equation (7) can be re-specified into a vector error correction model (VECM) as:

$$\Delta x_t = \mu + \Gamma_1 \Delta x_{t-1} + \ldots + \Gamma_{k-1} \Delta x_{t-k+1} + \Pi x_{t-k} + \varepsilon_t \tag{8}$$

where $\Gamma_i = -(I - A_1 - \ldots - A_i)$, $(i = 1, \ldots, k-1)$ and $\Pi = -(I - A_i - \ldots - A_k)$, I is a unit matrix, and $A_i (i = 1, \ldots p)$ are coefficient vectors, p is the number of lags included in the system, ε is the vector of residuals which represents the unexplained changes in the variables or influence of exogenous shocks. The Δ represents variables in difference form which are I(0) and stationary and μ is a constant term. Harris (1995: 77) states that specifying the system this way has information on both the short and long-run adjustment to changes in x_t through estimates of Γ_i and Π respectively. In the analysis of VAR, Π is a vector which represents a matrix of long-run coefficients and it is of paramount interest. The long-run coefficients are defined as a multiple of two (*n x r*) vectors, α and β', and hence $\Pi = \alpha \beta'$, where α is a vector of the loading matrices and denotes the speed of adjustment from disequilibrium, while β' is a matrix of long-run coefficients so that the term $\beta' x_{t-1}$ in Equation (8) represents up to (*n-1*) cointegrating relationships in the cointegration model. It is responsible for making sure that the x_t converge to their long-run steady-state values. Evidence of the existence of cointegration is the same as evidence of the rank *(r)* for the Π matrix. If it has a full rank, the rank $r = n$ and it is said that there are *n* cointegrating relationships and that all variable are *I*(0). If it is assumed that x_t is a vector of nonstationary variables *I*(1), then all terms in Equation (8) which involves Δx_{t-i} are *I*(0), and Πx_{t-k} must also be stationary for $\varepsilon_t \sim I(0)$ to be white noise. The cointegrating rank is tested with two statistics, the trace and maximum eigenvalue.

If there is cointegration, it shows evidence of a long-run relationship between the variables and appropriateness of proceeding to test the direction of causality as illustrated in Equations (3) and (4). Cointegrated variables share common stochastic and deterministic trends and tend to move together through time in a stationary manner even though the two variables in this study may be non-stationary. It is important to note that there are three possible cases:

- The rank of Π can be zero. This takes place when all elements in the matrix Π are zero. This means that the sequences are unit root processes and there is no cointegration. The variables do not share common trends or move together over time. In this case, the appropriate model is a VAR in first differences involving no long-run elements.

- The rank of Π could be full (in this study, rank =2). In this case, the system is stationary and the two variables can be modelled by VAR in levels. It represents a convergent system of equations, with all variables being stationary.

- Finally, the rank of Π can be a reduced (in this study, rank =1). In this case, even if all variables are individually I(1), the level-based long-run component would be stationary. In this case, there are *n-1* cointegrating vectors. The appropriate modelling methodology here is a VECM.

5. DATA AND ESTIMATION RESULTS

5.1 Data

Annual data are used and the study covers the period 1977 to 2006. The study uses three proxies of financial developments. These are ratio of M2 to total GDP (LNM2/GDP), ratio of bank deposit liabilities to total GDP (LNDEPLIAB), and credit extended to the private sector to total GDP (LNPRIVGDP). The ratio of broad money, M2 to GDP is the most commonly used measure of financial development (see Levine, 1997; Calderon and Liu, 2003; King and Levine, 1993; Odhiambo, 2004; 2005). A higher ratio of M2 to GDP indicates a larger financial sector and bigger financial intermediation. This ratio shows the real size of the financial sector of the country. If this financial sector grows faster than the real sector of the economy, this ratio will increase over time.

The ratio of deposit liabilities to GDP excludes currency in circulation from the broad money stock. This is because an increase in the ratio of M2 to GDP could reflect more currency than a rise in bank deposits (Ghali, 1999). The ratio of deposit liabilities to GDP provides more direct information on the extent of financial intermediation.

The ratio of credit extended to the private sector to GDP represents the actual amount of funds that are channelled to the private sector. This is directly more related to investment and economic growth. Credit extended to the private sector also increases productivity more than credit extended to the public sector (Akinboade, 1998). An increase in the ratio of credit extended to the private sector to GDP is also interpreted as financial deepening.

For economic growth, real GDP per capita (LNGDP per capita) is used. The data are sourced from various issues of the IMF's International Financial Statistics.

5.2 Univariate Characteristics of the Variables

The data are tested for unit root and the results are presented in Table 1.

Table 1. Unit root test

Variable	Model Specification	Test statistic	
		Levels	Difference
LNGDP per capita	Intercept and trend	-2.730	-2.787*
	Intercept	-0.958	-2.713
	none	2.008	-1.808*
LNM2/GDP)	Intercept and trend	-3.072	-6.935***
	Intercept	-2.623	-6.845***
	none	-0.103	-7.067***
LNPRIVGDP	Intercept and trend	-2.153	-3.388*
	Intercept	-1.466	-4.631***
	none	-0.021	-4.709***
LNDEPLIAB	Intercept and trend	-2.516	-5.537***
	Intercept	-1.410	-4.887***
	none	0.125	-4.889***

Notes: */**/***/ significant at 10%/5%/1% level

The results of Table 1 show that all variables are non-stationary in levels, and stationary in first difference. Since the variables are I(1), the next step to test for cointegration using Johansen's full information maximum likelihood. The lag length was set, based on the Akaike information criterion, log likelihood ratio, final prediction error, Schwartz information criteria, and Hannan-Quinn information criterion. Cointegration test results are presented in Tables 2, 3 and 4.

Table 2. Cointegration test results between LNGDP per capita and LNM2/GDP

Null hypothesis	Alternative hypothesis	Test statistic	0.05 critical value	Probability value[b]
		Trace statistic		
r=0	r=1	27.385[a]	25.872	0.032
r=1	r=2	7.214	12.518	0.323
		Maximum Eigenvalue statistic		
r=0	r>0	20.172 [a]	19.387	0.034
r≤1	r>1	7.214	12.518	0.323

[a] Denotes rejection of the null hypothesis at 0.05 level

[b] MacKinnon-Haug-Michelis (1999) p-values

Table 3. Cointegration test results between LNGDP per capita and LNDEPLIAB

Null hypothesis	Alternative hypothesis	Test statistic	0.05 critical value	Probability value[b]
		Trace statistic		
r=0	r=1	24.888[a]	20.262	0.011
r=1	r=2	4.709	9.165	0.317
		Maximum Eigenvalue statistic		
r=0	r>0	20.178 [a]	15.895	0.009
r≤1	r>1	4.709	9.165	0.317

[a] Denotes rejection of the null hypothesis at 0.05 level

[b] MacKinnon-Haug-Michelis (1999) p-values

Table 4. Cointegration test results between LNGDP per capita and LNPRIVGDP

Null hypothesis	Alternative hypothesis	Test statistic	0.05 critical value	Probability value[b]
		Trace statistic		
r=0	r=1	28.148[a]	20.262	0.003
r=1	r=2	6.677	9.165	0.145
		Maximum Eigenvalue statistic		
r=0	r>0	21.471 [a]	15.892	0.006
r≤1	r>1	6.677	9.165	0.145

[a] Denotes rejection of the null hypothesis at 0.05 level

[b] MacKinnon-Haug-Michelis (1999) p-values

Tables 2, 3 and 4 show that there is one cointegrating vector between LNGDP per capita and measures of financial development. Since there is cointegration, the direction of

causality is tested by using the vector error correction model (VECM). The VECM results are presented in Table 5.

Table 5. VECM results

Variables	β'	ECM
(a) Variables included in the VAR: LNGDP per capita and LNM2/GDP		
LNGDP per capita	1.000	-0.720
		(-3.362)***
LNM2/GDP	-0.022	
	(-7.450)***	
Trend	-0.048	
	(-49.632)***	
Constant	-8.107	
(b) Variables included in the VAR: LNGDP per capita and LNDEPLIAB		
LNGDP per capita	1.000	-0.029
		(-4.553)***
LNDEPLIAB	-2.848	
	(-3.325)***	
Constant	-1.987	
	(-0.723)	
(c) Variables in the VAR: LNGDP per capita and LNPRIVGDP		
LNGDP per capita	1.000	-0.019
		(-4.007)***
LNPRIVGDP	-2.823	
	(-2.898)***	
Constant	-4.355	
	(-1.716)*	

Notes: */**/***Significant at 10/5/1 percent level

The cointegrating vector is normalised on LNGDP per capita.

The t-statistics are in parentheses.

The coefficients (β') of the measures of financial development are interpreted as positive because they still have to be taken to the right hand side of the equations.

The VECM results in Table 5 shows that all measures of financial development have a positive influence real GDP per capita. The VECM results distinguish between short-run and long-run Granger causality. The coefficients of the lagged error correction term (ECM) in Table 5 are negative and significant. The significance of the lagged ECM shows that there is a long-run causal relationship between economic growth and measures of financial development. It also indicates that each measure of financial development and economic growth are adjusting to their long-run equilibrium relationships. The negative coefficients (and the magnitudes) of the ECM indicate the speed of adjustment to the long-run equilibrium relationship. The χ^2 (or Wald test) of the explanatory variables indicates the short-run causal effects, and the direction of causality. Causality test results are presented in Table 6.

Table 6. Granger causality test results

H$_0$	Wald test/Chi-square	Conclusion
LNDEPLIAB does not Granger cause LNGDP per capita	21.543 (0.000)***	Reject the null hypothesis. There is causality from LNDEPLIAB to LNGDP per capita.
LNGDP per capita does not Granger cause LNDEPLIAB	2.118 (0.548)	Fail to reject the null hypothesis. There is no causality.
LNPRIVGDP does not Granger cause LNGDP per capita	19.402 (0.000)***	Reject the null hypothesis. There is causality from LNPRIVGDP to LNGDP per capita.
LNGDP per capita does not Granger cause LNPRIVGDP	5.785 (0.123)	Fail to reject the null hypothesis. There is no causality.
LNM2/GDP does not Granger cause LNGDP per capita	9.844 (0.079)*	Reject the null hypothesis. There is causality from M2/GDP to real GDP per capita.
LNGDP per capita does not Granger cause LNM2/GDP	7.019 (0.212)	Fail to reject the hypothesis. There is no causality.

*/**/*** Significant at 10/5/1 percent level

Note: probabilities are in parenthesis

The results in Table 6 show that the causality runs from financial development to economic growth regardless of the proxy for financial development. The results provide evidence that the relationship between financial development and economic growth follows a supply-leading view. It is financial development that causes economic growth. Botswana is still a developing economy, and these results are consistent with the stage of

development view of Patrick (1966) that in the early stage of development, supply-leading view stimulates capital formation and economic growth. These results are compared to those obtained by Odhiambo (2004) for South Africa which is relatively more developed and show that the relationship between financial development and economic growth follows a demand-leading view. Since South Africa is relatively more developed compared to Botswana, its economic growth causes financial development.

6. CONCLUSION

This paper examined the causal relationship between financial development and economic growth. Granger causality through cointegrated vector autoregression methods were applied to test the causality between three measures of financial development and economic growth in Botswana for the period 1977 to 2006.

Although Botswana has been dominated by an oligopolistic banking system for a long time, the number of banks increased after the 1990s. The banking sector expanded their branches and services, and financial intermediation increased from a low level in 1977 to a higher level in 2006. The results of this paper indicate that financial development causes economic growth in Botswana. The results confirm that the relationship between financial development and economic growth in Botswana follows a supply leading view. The results also confirm Schumpeter's (1911) postulation that financial development causes economic growth. Among others, the results are consistent with those obtained by

Odhiambo (2005) for Tanzania, Ghali (1999) for Tunisia, and Choe and Moosa (1999) for Korea.

These empirical results illustrate that the development of the financial sector in Botswana is important for its economic growth and development. This suggests that financial deepening and institutional reforms should be enhanced to promote Botswana's economic growth.

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