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Contents

Evaluation of the Performance of the Bank of Botswana's Inflation Forecasting Model

Daniel Balondi, Innocent Molalapata, Lesego Molefhe and Lizzy Sediakgotla[1]

ABSTRACT

To support its forward-looking monetary policy framework, Bank of Botswana produces inflation forecasts using a quarterly projection model, known as the Core-Model. The inflation forecasts provide guidance on the appropriate monetary policy interventions necessary to achieve and maintain the Bank's primary objective of price stability. As such, it is critical to have a model that produces inflation forecasts that do not deviate significantly from the actual data, without justifiable accounting, as it can misinform policymaking. This paper thus, evaluates the performance of the Bank's inflation forecasting model over a 10-year period, from December 2008 to December 2018. The objectives of the study are to assess the Model's forecast bias by employing the Mean Forecast Error and determination of the size of the forecast error using the Mean Absolute Forecast Error (MAFE). According to the results, on average, the Bank's Model has a good forecasting accuracy in the short term, however the model has a low predictive power of medium-term inflation movements, reflecting higher uncertainty associated with economic events in the distant future. Regarding prediction bias, the Model tends to under-predict inflation, which is a result of changing economic conditions domestically and externally. Nonetheless, the results from a rolling four-year sample of forecast errors using MAFE indicate that the forecasting performance of the Model has improved with time, in tandem with the innovations in the model structure, constant engagements between the Modelling Team and Monetary Policy Technical Committee members and Sector Specialists, as well as capacity building programmes on modelling and forecasting which the Bank continues to invest heavily in. In general, high precision and reliable forecasts are important for predictability of monetary policy actions, which enhances policy credibility.

1. INTRODUCTION

The Bank of Botswana (Bank) uses a forward-looking monetary policy framework that is guided by a forecasting and policy analysis system (FPAS). The FPAS is the Bank's main policy analysis and forecasting framework. The Core-Model, which forms part of the FPAS, is used to produce medium-term forecasts for macroeconomic variables, such as inflation and the output gap. The Core-Model is based on Botswana's monetary policy transmission mechanism. It captures the essential macroeconomic relationships, primarily the impact of monetary policy on output and inflation. The model provides a comprehensive view on future economic developments and possible policy actions necessary to achieve the Bank's inflation objective. It also explores possible alternative scenarios to the baseline forecast. Given the Bank's forward-looking monetary policy framework, forecasts from the Core-Model are used as input into deliberations of monetary policy formulation and direction by the Monetary Policy Committee (MPC).

The Core-Model is calibrated in accordance with the behaviour of key relationships in the monetary policy transmission process. In this way, the model output is expected to be a close match to actual data, assuming an adequately functioning transmission mechanism, ceteris paribus. It is not easy, however, to have a model that is able to produce forecasts that accurately fit actual or realised data due to, among others, future unanticipated changes in the structure of the economy; model misspecification; historical data measurement errors; inaccurate parameter estimation or calibration; volatility in the analysed variables; inappropriate policy design and decision; as well as domestic and external shocks in the economy. Some of the shocks are generated by financial imbalances, as was evident during the 2008/9 global financial crisis, as well as lack of congruence of monetary, financial stability and fiscal policies towards achieving macroeconomic stability.

Meanwhile, a model that produces an inflation forecast path that deviates significantly from the actual data, without justifiable accounting, is not desirable as it can misinform policy making. In practice, it is essential for forecasts to be approximate to observed values as that provides reliable information that can be useful in guiding policy formulation and implementation. In this context, it is important to assess the forecasting ability of the Core-Model regularly in order to identify and attend to discrepancies, if any, and,

1 Economist, Deputy Director, and Senior Economists, respectively, in the Monetary Policy and Forecasting Division, Research and Financial Stability Department. The views expressed in this paper are those of the authors and do not necessarily reflect those of the Bank of Botswana.

where necessary, enhance its forecasting ability. This note, therefore, examines performance of the Bank's Core-Model with regard to the precision with which it predicts short and medium-term headline inflation.

The rest of the paper is structured as follows: Section 2 specifies the methodology, while Section 3 compares actual inflation to forecasts. In Section 4, the Bank's forecasting outcome is compared with those for more experienced central banks/ institutions for both short and medium-term inflation forecasting, and Section 5 discusses the potency of the Core-Model, while Section 6 concludes.

2. METHODOLOGY

The note evaluates quarterly headline inflation forecasts between December 2008[2] and December 2018. The first objective is to assess the forecast bias, that is, whether the model has been under or over-estimating inflation. Second, the paper determines the size or magnitude of the errors. The analysis uses two parsimonious statistical tools[3]: the forecast bias is measured by the mean forecast error and the size of the forecast errors is measured by the mean absolute forecast errors. The forecast error statistics are calculated as follows:

(a) The Mean Forecast Error (MFE)

MFE measures the presence and direction of bias in the forecasts. It is formally defined as:

$$\text{MFE} = \frac{1}{T}\sum_{t=1}^{T}(y_t - f_t) \qquad (1)$$

Where f_t is the forecast value of inflation, y_t is the observed inflation and T is the number of observations. Forecast errors are defined as 'actual inflation minus forecast inflation'. Hence, a positive MFE indicates a tendency to under-predict inflation, while a negative one indicates a tendency to over-predict inflation. The ideal value for MFE is zero, which is an indication that, on average, the forecasts are similar to the actual values and there is no under or over-prediction.

(b) The Mean Absolute Forecast Error (MAFE)

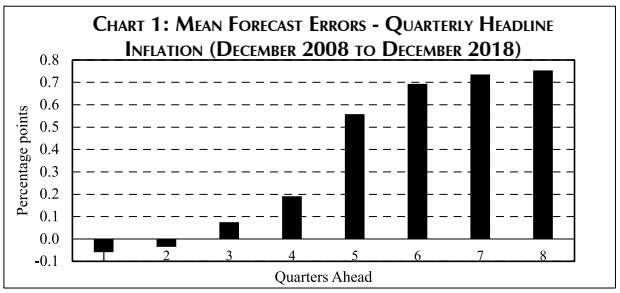
MAFE measures the size of forecast errors. It is calculated as follows:

$$\text{MAFE} = \frac{1}{T}\sum_{t=1}^{T}\left|y_t - f_t\right| \qquad (2)$$

The variables are as defined in (a) above, however, MAFE takes only the absolute values of the difference between actual inflation and forecast inflation. Taking an absolute value of a number avoids the positives and negatives cancelling each other out. Likewise, the ideal value for MAFE is zero, which suggests that, on average, the forecasts are equal to the actual values.

3. FORECAST ERRORS FOR HEADLINE INFLATION

Statistically, on average, with the exception of the first two periods, the Bank has consistently under predicted both short-term and medium-term headline inflation for the period December 2008 to December 2018 (Chart 1 and Table 1). The bias is more pronounced in the medium-term forecasts, precisely from the 5th quarter to the 8th quarter.[4] Under-prediction of short-term inflation (for four quarters) is, however, relatively small at around 0.05 percentage points on average, while medium-term inflation forecasts have on average been 0.69 percentage points lower than actual inflation.



Source: Bank of Botswana and authors' own calculations

TABLE 1: FORECAST ERROR SUMMARY STATISTICS - QUARTERLY HEADLINE INFLATION (DECEMBER 2008 TO DECEMBER 2018[5])

Forecast Period (Quarters)	MFE	MAFE	Observations
1	-0.06	0.34	60
2	-0.04	0.72	60
3	0.07	0.89	59
4	0.19	1.96	58
5	0.56**	1.07	57
6	0.69*	1.28	56
7	0.74*	1.54	54
8	0.75*	1.63	53

Source: Bank of Botswana and authors' own calculations

Notes: * and ** indicate 5 percent and 10 percent level of significance, respectively, for which the null hypothesis, Mean Forecast Error = 0, can be rejected.

2 The Bank adopted a forecast based monetary policy framework in 2008.

3 These statistical tools are used by central banks, such as the Sveriges Riksbank in evaluating their forecasts. See Riksbank Studies, May 2017.

4 The mean forecast errors for these periods are statistically different from zero at the 10 percent significance level or better.

5 At the time of producing the statistics, some of the data, especially distant quarters had not been observed.

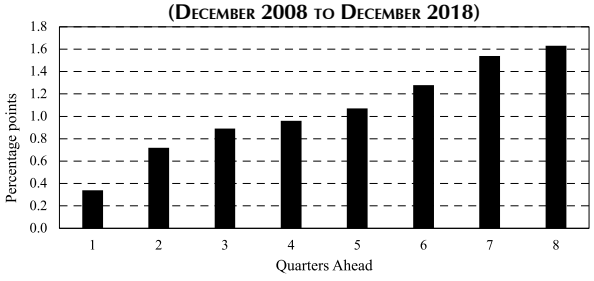
6 Administered prices constitutes 32.3 percent of total CPI.

The factors that could have contributed to under-prediction of headline inflation include: impediments in monetary policy transmission channels; unanticipated changes in administered prices[6]; volatility of commodity (oil and food) prices; volatility of non-mining GDP arising from the inclusion of the De Beers Global Sightholder Sales (DBGSS) component in GDP measurement; and ambiguous assumptions on the rate of crawl in the forecast horizon. In a fixed and crawling exchange rate regime, as it is the case in Botswana, the rate of crawl is reviewed semi-annually and typically set on an annual basis and announced in January each year.[7] In the past, inflation projections generated in the last quarter of the year were based on an unchanged rate of crawl (for the prevailing year); yet it was apparent that the rate of crawl would change in the following year. Thus, since the last quarter of 2017, instead of assuming an unchanged rate of crawl for the following year, an assumption is made for a revised rate of crawl. The assumption or judgment on the crawl rate is based on assumptions on prospective domestic and foreign price developments and the inflation differential thereof. The aim of having reasonable assumptions (domestic and external variables, for example, the rate of crawl) is mainly to ensure that the forecast is close to the actual/ realised values.

Size of the Forecast Errors

As expected, the size of the Bank's inflation forecast errors as measured by MAFEs is greater for more distant periods from the initial forecast period than the forecast periods closer to the observed period (Chart 2). This largely reflects uncertainty in economic developments as one moves further into the future.

CHART 2: MEAN ABSOLUTE FORECAST ERRORS: QUARTERLY HEADLINE INFLATION (DECEMBER 2008 TO DECEMBER 2018)

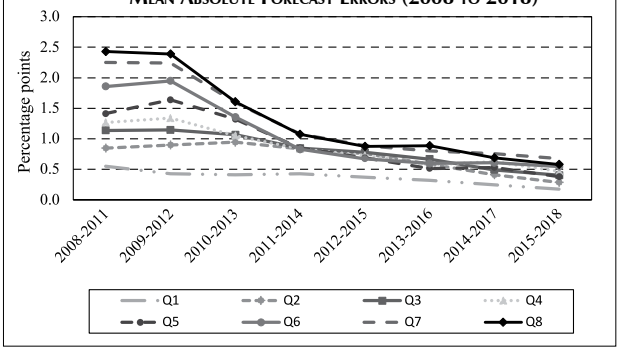


Source: Bank of Botswana and authors' own calculations

A rolling four-year sample of the Bank's inflation forecast errors is used to examine whether there has been any change in the forecasting performance for inflation over time. The size of the Bank's forecast errors for the short-term horizon, especially the first and second quarters, have remained largely constant. However, for the periods further into the forecast horizon (four to eight quarters), the size of the forecast errors has been declining over the sample period (Chart 3). For the period 2008 to 2011, the size of the forecast errors averaged around 2.43 percentage points in the eighth quarter of the forecast horizon and has significantly declined to 0.58 percentage points in the forecast periods between 2015 and 2018.

Several factors can be attributed to the improvement in the forecasting capacity of the Bank's forecasting framework. These include continuous updating of the model's equations and parameters to reflect the prevailing structure of the economy; improved expertise of the Bank staff through technical assistance missions of the International Monetary Fund (IMF) and other related capacity building programmes; infusion of expert judgement into the predictions; as well as the active participation and input in the forecasting process of the MPC and sector specialists across Units in the Research and Financial Stability Department.

CHART 3: ROLLING FOUR-YEAR SAMPLE OF FORECAST ERRORS USING MEAN ABSOLUTE FORECAST ERRORS (2008 TO 2018)



Source: Bank of Botswana and authors' own calculations

4. COMPARISON WITH OTHER COUNTRIES

In order to examine the relative performance of the Bank's inflation forecasting capacity, a comparison is made with experienced international institutions' operating forecast-based frameworks, namely: the South African Reserve Bank (SARB), Czech National Bank (CNB) and the IMF. Comparison is restricted to forecasts that are prepared within the same period or forecast round.[8] This validation procedure is adopted to ensure that comparison is made between projections produced from a similar set of external

7 The review period of the rate of crawl is critical for the projections mainly because the crawl forms part of the Bank's Core-Model equilibrium parameters, thus, informs the equilibrium position or values of fundamental variables in the model, for example, the implied inflation target. Equilibrium parameters are critical in the model because they influence the projected path of almost all the variables in the model. As such, frequent review and adjustments (if necessary) of the rate of crawl will bring about volatility to the inflation forecast, and mostly likely actual inflation.

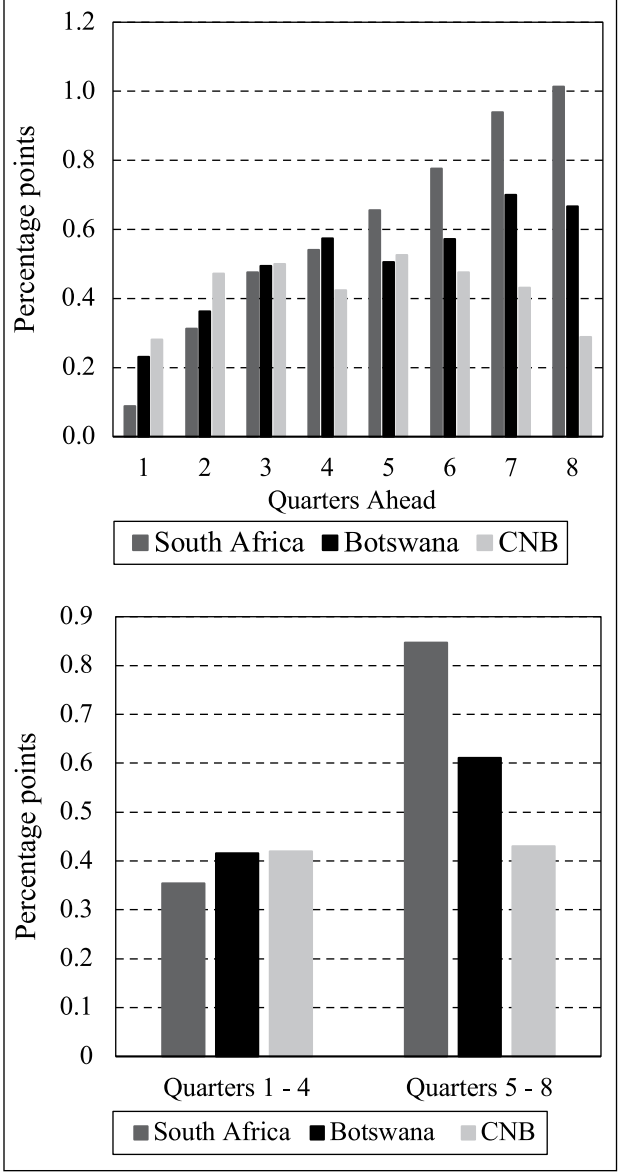
8 The availability of data from SARB, CNB and IMF restricted the period of analysis to 2015-2017.

assumptions, particularly in respect of fundamental drivers of global inflation, such as international food and oil prices.

Bank of Botswana, SARB and CNB

On average, the size of the Bank's inflation forecast errors is slightly larger than that of SARB, but the same as that of CNB for earlier periods of the forecast horizons (Chart 4). This suggests that the Bank's inflation forecasting performance is slightly better than that of the CNB in the short term, for the period 2015 to 2018. However, in the distant periods of the forecast horizon, the size of the forecast errors is larger than that of the CNB but smaller than that of the SARB. Therefore, by implication, the performance of the Bank's forecasting model is lower than that of the CNB, but higher than that of the SARB in the medium term.

CHART 4: MEAN ABSOLUTE FORECAST ERRORS – QUARTERLY HEADLINE INFLATION 2015 TO 2018

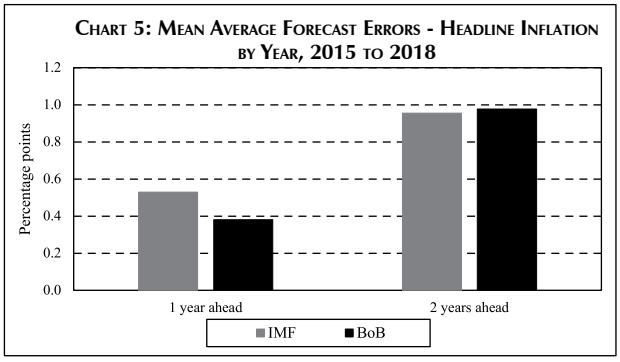


Source: SARB, CNB, Bank of Botswana and authors' own calculations

Bank of Botswana and IMF MAFEs

Chart 5 compares the Bank of Botswana and IMF forecast errors for Botswana's annual headline inflation for the period 2015 to 2018. The size of the Bank's forecast error one year ahead is smaller than that of the IMF, and similar to those for two years ahead.[9] This suggests that the Bank's inflation forecasting performance is slightly better than that of the IMF for the period 2015 to 2018.

CHART 5: MEAN AVERAGE FORECAST ERRORS - HEADLINE INFLATION BY YEAR, 2015 TO 2018



Source: Bank of Botswana, IMF and authors' own calculations

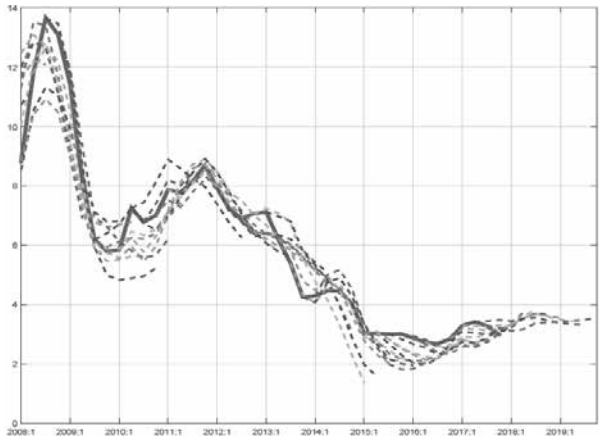
5. FORECASTING ABILITY OF THE CORE-MODEL

The predictive power of the Bank's current forecasting framework or Core-Model is also important as it determines the reliability of the model. A good predictive power indicates model reliability and the inverse is true. In-sample inflation forecast simulations starting from the period of inception of the Bank's forward-looking monetary policy framework in 2008 until 2018 are used to assess the power of fit of the model. The simulation shows, for each of the six forecast rounds the Bank conducts each year, the inflation paths that the Bank would have produced using the current structure of the forecasting framework (Chart 6). The general observation from the output of the simulation is that the current structure of the Bank's forecasting framework has a high predictive power of the movements in headline inflation. The deviation of past forecasts from actual inflation is not substantial, particularly in the short term. Although there were near-misses at the turning points and in the medium term (long horizon), the variance between the observed and simulated inflation forecast is not significantly large and, as such, all the past simulation projections are not so far from the actual inflation path. Thus, the model has a high predictive power and is reliable. The high predictive power of the forecasting framework can be

9 The IMF only produces annual inflation forecasts, not quarterly forecasts as is the case with the SARB and CNB.

ascribed to several factors, among them, continual improvements and innovation in the structure of the framework, as well as various capacity building and other skills development programmes that the Bank continues to extend to its staff.

CHART 6: IN-SAMPLE SIMULATION - INFLATION FORECAST (PERCENT)



Source: Bank of Botswana Core-Model

Note: The solid line represents actual inflation, while the dotted lines are inflation projection simulations.

6. CONCLUSION

The Bank's forecasting framework has a high level of precision, particularly in the short term. The framework's high predictive power of short-term inflation indicates, to some extent, the goodness of fit of the model and the incorporation of expert judgment in the forecasts. Precision of the inflation forecasts in the medium term, however, is limited by increased uncertainty associated with the longer horizon. On an on-going basis, this is partly addressed by updates of forecasts for successive MPC meetings and Monetary Policy Reports (MPRs).[10] Nevertheless, continual efforts are being made to improve the inflation forecast performance in both the short- and medium-term. As part of ongoing improvements to the forecasting ability, since the last half of 2017, an assumption on the rate of crawl for the ensuing year is made, compared to the earlier approach in which the rate of crawl was assumed to be constant.

Going forward, it is crucial for the Bank to continue to invest in capacity improvements to facilitate updating of the model (and its calibration) to reflect the evolving structure of the economy through infusion of relevant methods and skills inputs. Second, in recognition of the influence of administered prices on inflation, it is important for the Bank to broaden relations with all stakeholders in order to be informed of impending changes in administrative prices, to inform both forecasts and policy posture. Third, engagement of the MPC by the forecasting team in the formulation of initial conditions, external assumptions and alternative scenarios must be strengthened further and should include a discussion of the policy rate. Finally, where possible, the Bank should strive to address impediments to monetary policy transmission, particularly the credit channel,[11] to enhance the effectiveness of the transmission of monetary policy. High precision and reliable forecasts are important for the transparency and predictability of monetary policy, which enhances policy credibility.

REFERENCES

Bank of Botswana. (2019, December). Retrieved from: https://bankofbotswana.bw/content/consumer-price-index

Czech National Bank. (2019, December). Retrieved from: https://www.cnb.cz/en/monetary-policy/forecast/

International Monetary Fund. (2019, December). Retrieved from: https://www.imf.org/en/Publications/CR/Issues/2018/09/05/Botswana-2018-Article-IV-Consultation-Press-Release-Staff-Report-and-Statement-by-the-46209

Paolo, B., Ard, D. R., Jesper, J., Mårten, L., Ingvar, S., and Ulf, S. (2017). Evaluation of the Riksbank's forecasts. Sveriges Riksbank

South Africa Reserve Bank. (2019, December). Retrieved from: https://www.resbank.co.za/Publications/Detail-Item-View/Pages/Publications.

Yaffee, R. A., and McGee, M. (2000). An Introduction to Time Series Analysis and Forecasting. San Diego: Academic Press.

10 With effect from August 2018, the Bank publishes the Monetary Policy Report (MPR), in line with the MPC meetings. The MPR is the main medium through which the Bank of Botswana informs the public about the formulation and implementation of monetary policy. It provides a comprehensive, forward-looking framework for policy formulation by the MPC and serves as a basis for policy decisions.

11 According to the policy note on 'The Bank Rate and Prime Lending Rate in Botswana's Banking System,' credit pricing in the banking sector tends to be misaligned with both the policy rate and the prime lending rate, a phenomenon that is largely prevalent during periods of liquidity shortages and excesses. Prudent management of liquidity is therefore key in enhancing the transmission of monetary policy signals to credit pricing.

Financial Development and Economic Growth in The Southern African Development Community (SADC)

Omogolo Mighty Maripe[1]

ABSTRACT

This paper examines the impact of financial development on economic growth in the SADC region, using a panel dataset for the period 1990 to 2014. The paper uses the financial development indices, which are computed using the principal component analysis (PCA) technique. Specifically, the paper employs the generalised method of moments (GMM) and system generalised method of moments (SYM-GMM) to address some well-known panel estimation problems, such as the presence of unobserved country specific effects, common time effects and potential endogeneity. The results show that financial development has a positive and significant impact on economic growth in SADC. Furthermore, financial access and financial efficiency are found to be the measures of financial development that require more improvement. Thus, economic growth in SADC requires a sustained investment in financial sector development with appropriate policies focusing on improving innovative financial infrastructure, promoting sound legal and regulatory frameworks and promoting financial inclusion. In addition, a stable macroeconomic environment and financial reforms are needed to attain a sustainable and inclusive economic growth.

1. INTRODUCTION

Financial development refers to the improvement in the quality, quantity or efficiency of the financial systems. The system consists of financial markets, capital markets, banks and other financial intermediaries (Maskay, 2012). The impact of financial development on economic growth has been extensively analysed in the literature of economic development. Following Bagehot (1873), numerous empirical studies on the link between financial development and growth, as well as other development issues, have been conducted (Bara, Mugano and Le Roux, 2016; Mahawiya, 2015; Hassan, Sanchez and Yu, 2011; and Calderón and Liu, 2003). These studies produced mixed results on the relationship between financial development and economic growth. Some authors found that financial development leads to economic growth; economic growth leads to financial development; and bi-directional causality between financial development and economic growth.

Meanwhile, over the past decade, the Southern African Development Community (SADC)[2] has made significant progress in the development of the financial sector (KPMG, 2014). Financial development in SADC is enhanced mainly by innovation and institutional development, as well as financial reforms introduced in the 1980s and 1990s (Bara et al., 2016 and Kasekende, 2010). The financial sector has been driving economic growth in most of the Southern African nations, providing credit and capital to both the public and private sectors. Despite these advances, the financial sectors in the SADC region (excluding South Africa) remain underdeveloped and characterised by high levels of financial exclusion (Allen et al., 2011).

A substantial number of studies have estimated the impact of the financial sector development on growth using several financial development indicators, such as private sector credit to GDP, and liquid liabilities to GDP (broad money stock (M2) to GDP) as proxies (Ntsosa, 2016; Phakedi, 2014; Hassan et al., 2011; Mupimpila and Funjika, 2010; and Calderón and Liu, 2003). These studies have established that there is a positive impact of financial sector development on economic growth and productivity. However, it has been found that the use of a single indicator approach to analyse the impact of financial sector development on economic growth might lead to invalid inferences (Mahawiya, 2015). This is because financial development is a multi-dimensional variable. Thus, using a single indicator omits other variables, leading to an endogeneity problem that causes biased estimates. This paper, therefore, examines the multi-dimensional impact of financial sector development on economic growth in the SADC region using a financial development index as a proxy for financial development. This helps to deal with the endogeneity problem and, therefore, estimation bias.

1 Economist, National Economics Unit, Research and Financial Stability Department. The views expressed in the paper are those of the author and do not necessarily reflect those of the Bank of Botswana.

2 SADC consists of sixteen countries, namely: Angola, Botswana, the Comoros, the Democratic Republic of Congo, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Eswatini, Tanzania, Zambia and Zimbabwe. However, the analysis of the present study excludes Comoros and Zimbabwe due to unavailability of data.

The role of finance in economic development is progressively gaining importance in the SADC region, and remains a key input to industrialisation across the globe. And indeed SADC countries have implemented or are implementing financial sector development initiatives and other innovations to further develop or grow their financial sectors, which could in turn support economic growth. Therefore, financial sector development is considered an essential ingredient for economic growth. This paper therefore, seeks to identify factors that policymakers could adapt in order to promote financial sector development and economic growth.

The primary objective of this paper is to examine the relationship between financial development and economic growth in SADC. Specifically, the paper aims to: determine the impact of financial sector development on economic growth in SADC. The paper also identifies financial development measures or indicators which need to improve for finance to generate an enhanced impact on growth. Financial sector development indicators used in this paper are financial access, financial efficiency and financial size (usually called "financial depth"). The paper also makes policy recommendations on regional economic development. The rest of the paper is structured as follows: Section 2 discusses the literature review, followed by the methodology in Section 3. Section 4 provides data description, while Section 5 discusses the empirical results. The conclusion and policy recommendations are discussed in Section 6.

2. LITERATURE REVIEW

2.1 Theoretical Literature

Theoretical literature on the role of financial development in fostering economic growth can be traced to Bagehot (1873), who argued that large and well-organised financial markets can enhance resource allocation towards more productive investment. Other pioneers on the subject matter include Schumpeter (1911), Hicks (1969) and Goldsmith (1969). According to Schumpeter (1911), a country's banking system is critical for mobilising savings and encouraging productive investment. Hicks (1969) emphasised the importance of financial markets in the industrialisation process, as financial development facilitates investment in and adoption of new technologies and innovations. Goldsmith (1969) finds a positive linkage between financial development and economic growth from a panel data of 35 countries over the period 1860–1963. McKinnon (1973) and Shaw (1973) proposed the financial repression and financial development framework for financial market and policy analysis.

The role of financial development in influencing growth in a country depends on the quality, quantity and efficiency of the financial system (Maskay, 2012). Most of the studies on the linkage between finance and growth entail examination of three hypotheses: the finance-led or supply leading growth hypothesis, the demand-following or growth-driven finance hypothesis, and the two-way causality link between finance and growth hypothesis.

Proponents of the finance-led growth hypothesis assert that financial sector development stimulates economic growth (Rajan and Zingales, 2001; and Levine, 1997). This hypothesis supports Bagehot's (1873) seminal paper, which postulates that it was England's efficient capital markets that made the industrial revolution possible. The hypothesis stipulates that financial development can promote economic growth through the efficient allocation of capital, mobilisation of savings through attractive instruments and lower costs of collecting information (Akinlo and Egbetunde, 2010). This view was reinforced by Schumpeter (1911), Goldsmith (1969) and McKinnon (1973). In contrast, the demand-following hypothesis (Robinson, 1952; and Stern, 1989) posits that an increase in economic growth leads to financial development (Stern, 1989; and Robinson, 1952). According to this hypothesis, the demand for financial services resulting from economic activity fosters financial development.

The theory of the bi-directional causality between financial sector development and economic growth was pioneered by Patrick (1966), who argued that the bi-directional causality relationship between finance and economic growth occurs over the stages of development. This bi-dimensional causality hypothesis posits that financial development induces real capital formation which, in turn, promotes economic growth or vice versa. The bi-directional causality hypothesis was supported by several studies applying endogenous growth models (Nyasha and Odhiambo, 2014; Chowa and Fung, 2013; and Calderón and Liu, 2003).

2.2 Empirical Literature

The study by Eng and Habibullah (2011) used the system generalised method of moments (SYM-GMM) model to examine the impact of financial development on economic growth, using the ratio of domestic credit to GDP as a proxy. The

study used a panel dataset of selected developing countries from Africa, Asia, Europe and the Western Hemisphere for the period 1990 to 1998. The conclusion was that financial development positively and significantly contributes to economic growth in these regions, hence, supporting the finance-led growth theory. Furthermore, the authors argued that, despite the evidence supporting other theories such as demand-following and two-way causality, the results were not as substantial as the supply-leading view.

Phakedi (2014) examined the relationship between financial development and economic growth in SADC for the period 1990 to 2012, using fixed-effects (F-E), GMM and seemingly unrelated regression estimators (SURE). The results showed that the proxies for financial sector development (ratio of money supply to GDP and ratio of credit extension to GDP) negatively affected economic growth in the SADC region, using both SURE and GMM models. However, the ratio of money supply to GDP, as a proxy for financial development, was found to have a positive impact on economic growth under the F-E model. The author concluded that financial development is crucial for growth despite contrary results for SADC. Akinlo and Egbetunde (2010), among others, also used a ratio of broad money stock (M2) to GDP as a proxy for financial development. The authors used a vector error correction model (VECM) and found a positive long-run relationship between financial development and economic growth in Sub-Saharan Africa for the period 1980 to 2005.

Using the 1985-2014 panel data for 15 SADC countries, Bara et al. (2016) investigated the role of different measures of financial development in economic growth, using the GMM approach and the panel F-E Model. The variables used were domestic credit to GDP, liquid liabilities to GDP and the bank credit to private sector to GDP ratios, as proxies for financial development. The results showed that the proxies for financial sector development negatively affected economic growth in the SADC region, while financial reforms were found to have a positive, but weak impact on economic growth in the region. Therefore, the authors concluded that it is vital for the SADC region to continually introduce reforms in order to improve the performance of the regional financial sector, which in turn, would increase growth in the region. Furthermore, the study established a bi-directional causality between financial development and economic growth, although economic growth was found to have a strong causal impact on financial development than in the opposite direction.

Relatively few studies have used financial development indices to estimate the impact of financial development on economic growth in developing countries. Atiq and Haque (2015) used the principal component analysis (PCA) to construct a composite financial development index using private credit to GDP, liquid liabilities to GDP, the bank assets to total assets held by deposit money banks and central bank; total assets held by deposit banks to GDP; the central bank assets to GDP; and bank credit to bank deposits rations, the central bank assets to GDP, and bank credit to bank deposits ratios. The study used a panel dataset of 88 countries for the period 1973 to 2005 to analyse the effects of financial development on economic growth, with financial liberalisation as a conditional variable. The study employed one-step and two-step system GMM estimators to capture the country-specific effects and address the endogeneity issue. The results revealed that financial development has a positive and significant impact on economic growth, whereas financial liberalisation had an insignificant effect.

Similarly, Samanhyia et al. (2014) investigated the long-run effects of financial sector development on growth in Ghana. The study employed the fully modified ordinary least squares (FMOLS) model, for the data period 1988 to 2012. In this study, financial development index was calculated using the PCA. Overall, the results showed that the ratio of private credit to GDP, ratio of broad money (M2) to GDP, ratio of currency to broad money (M2), ratio of currency to GDP and ratio of total domestic credit to GDP have negative and statistically significant effects on growth. However, the composite financial development index confirmed the sensitivity of the effect of the selected proxy. It was concluded that the effect of financial development on growth depends on the choice of proxy variable for financial development.

Ntsosa (2016) examined the causal relationship between financial development and economic growth in Botswana. The study used a dynamic error correction model (ECM), for the period 1995Q1 to 2013Q4. The proxy variables for financial development were the ratio of broad money stock to non-mining GDP, the ratio of private sector credit to non-mining GDP and the ratio of banks' deposits to non-mining GDP. The author found that financial sector development leads to economic growth in the short-run; whilst in the long-run, economic growth produces a positive causal effect on financial development.

Using the 1980-2015 panel data for 183 countries, Svirydzenka (2016) constructed a conceptual

framework and generated composite indices to assess the development of financial markets and financial institutions in terms of access, depth and efficiency. These indices enhance the understanding of the multiple dimensions of financial sector development. Therefore, this paper uses the financial sector development indices developed by Svirydzenka (2016).

3. METHODOLOGY

This study uses the GMM approach to estimate the impact of financial development on economic growth in the SADC region. The approach has an advantage over other methods in that it addresses some well-known issues, such as the presence of unobserved country specific effects, common time effects and potential endogeneity that are inherent in other methods (Allerano and Bond, 1991; Allerano and Bover, 1995). The assumption of strict exogeneity is also relaxed, i.e., explanatory variables are allowed to correlate with current and previous lags of the time-variant error term. Therefore, following Bara et al. (2016), with slight modification to capture the multi-dimensions of financial development, the following equation is estimated:

$$Y_{it} = \gamma Y_{it-1} + \beta_i X_{it} + \delta_i W_{it} + \nu_{it} \quad (1)$$

Where Y is real gross domestic product per capita, Y_{it-1} is a lagged dependent variable, X is a vector of labour, capital and the financial development index, W is a vector of other sources of growth, besides labour, capital and financial development index, i denotes cross sections of SADC countries, t represents the time from 1990 to 2014, υ_{it} is an error term consisting of two components: the unobserved country-specific effect (α_i) and the time-variant component (ε_{it}) that is serially uncorrelated. γ, β and δ are the parameters of interest. The parameter γ measures the speed of adjustment. Therefore, the long-run effects of explanatory variables can be estimated by dividing both β and δ with (1-γ).

In order to eliminate the unobserved country-specific effects, we take the first difference of Equation (1), which yields:

$$\Delta Y_{it} = \gamma \Delta Y_{it-1} + \beta_i \Delta X_{it} + \delta_i \Delta W_{it} + \Delta\varepsilon_{it} \quad (2)$$

Where Δ denotes changes in respective variables and $\Delta\varepsilon_{it}$ is a change in time-variant error term. Equation 2 is rearranged as a function of changes in residuals in order to derive moment conditions. That is,

$$\Delta\varepsilon_{it} = \Delta Y_{it} - \gamma \Delta Y_{it-1} - \beta_i \Delta X_{it} - \delta_i \Delta W_{it} \quad (3)$$

The orthogonal assumption of moment conditions are $E\{Z'_{it}\Delta\varepsilon_{it}\}=0$, where Z is a set of instruments that are valid for a given period of time. The moment conditions, hence, are written as follows:

$$E\{Z'_{it}(\Delta Y_{it} - \gamma \Delta Y_{it-1} - \beta_i \Delta X_{it} - \delta_i \Delta W_{it})\} = 0 \quad (4)$$

More formally, Equation (4) shows that an instrumental variable, Z, is uncorrelated with changes in the error term. The other assumption is that, there is correlation between the instrumental variable, Z, and the regressors. The instrumental variables are used to correct for endogeneity[3] in the model, and are usually classified as internal and external instruments. Internal instruments are the current or lagged values of endogenous regressors, while the external instruments are the current or lagged values of exogenous variables.

The study uses both internal and external instruments. Since financial development indicators might contain a measurement error, lags of financial development measures would be invalid instruments. Hence, to address this problem, external instruments, such as institutional variables that affect financial development, are used. Precisely, the current values and two lagged values of the rule of law of each country are used as external instruments for financial development. The measures of legal origin are the instrumental variables for financial development because they produce laws to protect the rights of external investors and enforce those rights effectively in order to promote financial development (Levine, 2005). Other instrumental variables used include the current values and two lagged values of real gross domestic product per capita, inflation, gross fixed capital formation, trade openness and total labour force. In addition to the GMM model, a system GMM (SYM-GMM) estimation is used to increase the efficiency of the GMM estimators. The estimation combines the equation of interest both in levels and first differences. A one-step system GMM estimator instead of a two-step system GMM estimator is selected for estimation to avoid the downward bias of the standard errors in small samples associated with the latter estimator (Roodman, 2006).

4. DATA DESCRIPTION

In this paper, real gross domestic product per capita (RGDPPC) growth is used to represent economic growth, while gross fixed capital

3 Endogeneity occurs when the explanatory variables are correlated with the error term.

formation (GFCF) as a percentage of GDP is used as a proxy for physical capital, and TLF is total labour force. Other sources of growth include: total secondary school enrolment, measured as a ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to secondary school level, a proxy for human capital; trade openness (OPEN), calculated as a ratio of total exports and imports of goods and services to GDP; DEBT, denoting the total debt service on external debt; terms of trade (TOT), measured as the ratio of the price of a country's exports to the price of its imports; and annual inflation (INF), measured by annual percentage change in consumer price index to capture the effectiveness of the monetary policy. All the enumerated variables are expected to enhance economic growth significantly except for INF and DEBT, which negatively affect growth. Meanwhile, all variables are expressed in logs, except for the financial development index, secondary school enrolment, and inflation.

A good measure of financial development should capture information on various aspects of the financial system, such as access, depth, efficiency and stability. Ang and McKibbin (2007) emphasise that a financial development measure should provide information on how the financial system channels funds from savers to investors. However, in this paper, a composite index of financial development indicators is computed using the PCA technique.[4] The overall financial development index (FINDEX) is computed from financial access, depth and efficiency indicators of both financial institutions and financial markets.[5]

The study uses annual data obtained from the World Bank and International Monetary Fund (IMF) for the period 1990 to 2014. The choice of the sample is mainly due to lack of data for some variables. The study uses panel data for 14 SADC countries (excluding Zimbabwe and Comoros due to lack of data).

4 The use of PCA for the aggregate index of financial development is gaining popularity in the finance-growth literature (Huang, 2011; Ang and McKibbin, 2007). Basically, the principal component analysis takes N specific indicators and produces new indices (the principal components) X_1, $X_2 \ldots X_N$, which are uncorrelated with one another. Each principal component is a linear combination of the N indicators and captures the multi-dimensions of the data. Generally, the first k principal components are retained for easy interpretation of the data and to avoid information loss.

5 Refer to Tables 6 and 7 for variables used to construct an aggregated financial development index. This index assumes that financial services are provided by various financial institutions and that well-developed financial markets allow individuals and firms to diversify savings or investment channels and other sources of funds. However, financial stability did not form part of the analysis mainly due to unavailability of data.

5. EMPIRICAL RESULTS

5.1 Panel Unit Root Tests

Unit root test is used to determine the stationarity of a series. Several panel unit root tests are applied to avoid spurious regression that might lead to invalid inferences (Baltagi, 2005).[6] The study employs panel unit root tests; namely, the augmented Dickey Fuller-Fisher (ADF-Fisher) test and the Levin, Lin and Chu (LLC) test to determine the presence of a unit root and the order of integration. The ADF-Fisher test assumes an individual unit root process across cross-sections, while the LLC test assumes a common unit root process across cross-sections. Therefore, the tests are appropriate for this study as they take into account the unbalanced data used. Both the ADF-Fisher and LLC panel unit root results are presented in Table 3.

Both tests show that all the variables are non-stationary at levels, except trade openness (OPEN), inflation (INF) and human capital (SESEC). All non-stationary variables are integrated of order one, i.e., I(1), or stationary after first difference, except total labour force (TLF), which is stationary after the second difference. Following the unit root tests, the data was subjected to both the Kao (1999) and the Pedroni (2000) panel cointegration tests on I(1) series to establish the existence of the long-run relationship between the variables. Cointegration or long-run relationship between the variables could not be established, implying that the estimated equation captures only the short-run effects of the regressors.

6 Spurious regression arises from regressing a non-stationary variable on one or more non-stationary variables, which results in estimating a misleading linear relationship.

TABLE 3: PANEL UNIT ROOT TEST RESULTS

Variables	ADF-Fisher's Test		Levin, Lin and Chu's Test		Order of Integration
	Levels	First Difference	Levels	First Difference	
RGDPPC	35.0479	98.8714*	1.48353	-5.60356*	I(1)
	(0.1685)	(0.0000)	(0.9310)	(0.0000)	
GFCF	8.11788	89.0764*	1.50241	-5.06789*	I(1)
	(0.9997)	(0.0000)	(0.9335)	(0.0000)	
TLF	5.39687	43.4701	1.99437	-4.69633	I(2)
	(1.0000)	(0.5769)	(0.9769)	(0.3602)	
TOT	39.7690***	127.987*	-2.30104	-8.40913*	I(1)
	(0.0693)	(0.0000)	(0.1071)	(0.0000)	
OPEN	38.7552***	---	-1.44381***	---	I(0)
	(0.0849)		(0.0744)		
DEBT	22.8038	114.636*	-0.27708	-6.30929*	I(1)
	(0.5314)	(0.0000)	(0.3909)	(0.0000)	
INF	69.8374*	---	-5.39059*	---	I(0)
	(0.0000)		(0.0000)		
FINDEX	22.2638	138.361*	-1.06988	-8.85410*	I(1)
	(0.7689)	(0.0000)	(0.1423)	(0.0000)	
SESEC	21.0829***	---	-3.11493*	---	I(0)
	(0.0634)		(0.0009)		

Notes: *, ** and *** denotes 1 percent, 5 percent and 10 percent level of significance at which variables are stationary, respectively. Values in the parenthesis are probability values (p-values).

5.2 Principal Component Analysis Results

The PCA technique was used to compute the component loadings for easier interpretation of individual components.[7] In Table 4, all financial development variables have a positive correlation with the aggregated financial development measure. The strongest correlation is between the first principal component and the financial depth variable, implying that financial depth increases with the first principal component. Therefore, this component can be interpreted as a measure of improved financial depth, weak financial access and financial inefficiency. In fact, based on correlation coefficient of 0.476, it is evident that the depth of the financial system, measured as a percent of GDP for: private credit; pension fund assets; mutual fund assets; life and non-life insurance premiums; stock market capitalisation; stock market turnover; international government securities outstanding and total debt securities outstanding of private non-financial corporations, have improved in the past two decades. The results are consistent with findings by KPMG (2014).

TABLE 4: COMPONENT LOADINGS OF THE ORIGINAL VARIABLES

Financial Development Variables	Component Loadings
Financial Access	0.348
Financial Depth	0.476
Financial Efficiency	0.384

Source: Author's computation from IMF (2017)

These results are also consistent with the findings by Cihak et al., (2012), who argued that Sub-Saharan Africa countries have the least efficient financial institutions due to the high cost of financial intermediation, as well as lack of financial instruments, within the region. In this regard, the SADC Real Time Gross Settlement System (SADC-RTGS)[8] was implemented in July 2013 to facilitate and lower the costs of regional cross border transactions. While the system's uptake has been very good, with usage in 14 of the 16 SADC member countries, the envisaged lower costs have not yet been fully realised, as there are still perceptions of high transaction costs in the region. However, once the issues relating to these high costs are resolved, it is expected that financial efficiency will improve significantly.

Meanwhile, financial depth does not necessarily translate to high financial access because deep and accessible financial systems have different characteristics in relation to socio-economic development. In addition, each of these characteristics consecutively associates with financial sector policies and other parts of the enabling environment for finance. The results of this study are consistent with Bara et al. (2016), who asserted that most SADC countries have high levels of financial exclusion, despite the focus on implementing financial inclusion initiatives.

7 The loadings show the correlation between the selected indicators of financial development and the components. The first principal component is the linear combination of the selected indicators.

8 Formerly known as the Southern African Development Community Integrated Regional Electronic Settlement System (SIRESS).

5.3 Panel Regression Results

The GMM results in Table 5 indicate that the conventional neoclassical growth variables, capital and labour, have the expected signs. Physical capital has a positive and significant impact on growth in SADC, consistent with Bara et al. (2016) and Mupimpila (2014). Likewise, total labour force has a positive sign but an insignificant impact on growth. Economic growth in the previous year has a negative and significant effect on economic growth in the current year in SADC countries. This variable captures conditional convergence. Therefore, the coefficient indicates the speed of adjustment at which deviations from the equilibrium are corrected after a year.

The results suggest that the accumulation of human capital positively affects economic growth, as already indicated by other studies elsewhere (Romer, 1990; Barro, 1991; Mankiw, et al., 1992; and Mupimpila, 2014). These studies pointed out that economic growth is sustainable in the long-run provided the increasing marginal product of knowledge sufficiently outweighs the diminishing marginal product of physical capital. Therefore, accumulation of human capital leads to an increase in technological progress, which in turn, increases growth in the region.

Inflation has a negative and statistically significant coefficient as expected, implying that growth is adversely affected by higher inflation. The results are in line with Bara et al. (2016) and Mupimpila (2014), who found that inflation reduces economic activity in the SADC region. In the GMM model, variables that have statistically insignificant coefficients, but with expected signs, are the terms of trade, financial development and external debt, implying that these variables do not significantly affect growth in the region. Contrary to expectations, trade openness has a negative and insignificant effect on growth in the SADC region.

The SYM-GMM estimation results provide some robust insight into the sources of economic growth in the SADC region. Physical capital, human capital and lagged economic growth were found to be the critical determinants of growth, the same as in the GMM model. The SYM-GMM results identify three additional significant sources of growth in SADC; financial development, trade openness and the terms of trade. Total labour force was not included in the SYM-GMM because it is integrated of order two.[9] The results show that financial development has a positive impact on economic growth in the SADC region. The results are also in line with SADC's strategic objective of improving the financial sector in order to boost economic growth in the region (SADC Revised Regional Indicative Strategic Development Plan (RISDP) 2015-2020). These results are consistent with findings of other studies (Phakedi, 2014; Hassan, et al., 2011; Eng and Habibullah, 2011; Mupimpila and Funjika, 2010). The development of the financial sector can boost economic growth through numerous channels. For example, well-developed financial institutions and markets influence saving and investment, leading to an increase in economic growth.

TABLE 5: GMM AND SYM-GMM MODEL RESULTS

Dependent Variable (RGDPPC)	GMM	SYM-GMM
RGDPPC (-1)	-0.827456* (-10.13020)	-0.737179* (-5.488854)
GFCF	0.820534* (2.819936)	1.628738** (2.145874)
TOT	0.025049 (0.251360)	1.930472** (2.039885)
OPEN	-0.161668 (-0.218521)	2.174392** (2.246785)
DEBT	-0.043367 (-0.291446)	-0.147358 (-0.831663)
INF	-0.006238* (-6.099662)	-0.137533 (-1.599863)
FINDEX	0.277732 (0.638500)	0.201874*** (2.002251)
SESEC	1.881313** (2.616248)	3.274705** (2.056076)
TLF	0.040277 (1.499228)	
R-squared	0.411032	
Durbin-Watson statistic	1.858406	
J-Statistic	4.841134	4.338439
Prob (J-Statistic)	0.188871	0.114267
Instrumental rank	11	10
JBNormal	103.79	42.98

Notes: Both models use White period robust standard errors. JBnormal is the Jarque-Bera Statistic of Normality Test. *, **, *** denotes that a variable is significant at 1 percent, 5 percent and 10 percent level, respectively. Values in the parenthesis represent t-statistics.

Trade openness has a positive and statistically significant coefficient as expected, suggesting that economic growth in the SADC region increases as member states open up their economies for trade. The results are consistent with findings of Mbulawa (2015). Therefore, SADC countries require more effective trade openness, in order to boost their economic growth through international trade. Similarly, change in the terms of trade has a significantly positive effect on economic growth

9 The SYM-GMM estimation combines the equation of interest both in levels and first differences. Therefore, including I(2) variables in the model will lead to the downward bias of the standard errors in small samples that might lead to invalid inferences.

in the region. The results are in line with Jawaid and Waheed (2011), who found that an increase in terms of trade leads to an increase in investment and, hence, economic growth. In the SYM-GMM model, variables that have insignificant coefficients, but with the expected signs are external debt and inflation.

The Durbin-Watson statistic test (Table 5) indicates that there is no serial correlation, and the normality test suggests that the residuals are normally distributed. In addition, the J-statistic indicate that the instruments are valid. Therefore, the results for both models are robust and not weakened by many instruments, suggesting that the models are well specified. The study also used the White robust standard errors to address the heteroscedasticity problem in both models.

6. CONCLUSION

This paper examined the impact of financial development on economic growth in the SADC region using the GMM approach for dynamic panel models, spanning the period from 1990 to 2014. The study used a financial development index as a proxy for financial sector development. The empirical findings of this study show that financial sector development has a positive and significant impact on economic growth in the SADC region. Therefore, for SADC to support growth, it needs to promote financial development through various reforms, including adopting appropriate policies focusing on improving innovative financial infrastructure and promoting sound legal and regulatory frameworks. In addition, a stable macroeconomic environment is needed to attain a sustainable and inclusive economic growth. The results also show that there is prevalence of high levels of financial exclusion in the SADC region, despite the focus on implementing financial inclusion initiatives, as reflected by KPMG (2014). Undeveloped financial systems and high levels of financial exclusion slow down financial development, which calls for concerted efforts aimed at developing the financial systems, as well as promoting financial inclusion. Additionally, the financial sector in SADC is found to be inefficient, mainly due to the high cost of financial intermediation within the region, in line with findings by Mlachila (2016). This necessitates the need for more effective measures, such as avoiding double charges, excessive charges and unexplained fees of transactions, to facilitate and lower the financial services costs on regional transactions.

REFERENCES

Akinlo, A. E., and Egbetunde, T. (2010). Financial Development and Economic Growth: The Experience of 10 Sub-Saharan African Countries revisited. *The Review of Finance and Banking, 2*(1), 017-028.

Allen, F., Otchere, I., and Senbet, L. W. (2011). African Financial Systems: *A review. Review of Development Finance, 1*(2), 79-113.

Ang, J. B., and McKibbin, W. J. (2007). Financial Liberalization, Financial Sector Development and Growth: Evidence from Malaysia. *Journal of Development Economics,* 84(1), 215-233.

Arellano, M., and Bond, S. (1991). Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations. *The Review of Economic Studies, 58*(2), 277-297.

Arellano, M., and Bover, O. (1995). Another Look at the Instrumental Variable Estimation of Error-Components Models. *Journal of Econometrics, 68*(1), 29-51.

Atiq, Z., and Haque, M. E. (2014). Financial Development and Economic Growth: The Role of Financial Liberalization. *Centre for Growth and Business Cycles Research, Discussion paper, 201.*

Bagehot, W. (1873). *A Description of the Money Market.* Lombard Street: Scribner, Armstrong & Company.

Baltagi, B. H. (1995). *Econometric Analysis of Panel Data* (Vol. 2). Chichester, West Sussex: John Wiley & Sons.

Bara, A., Mugano, G., and Le Roux, P. (2016). Financial Reforms and the Finance–Growth Relationship in the Southern African Development Community (SADC). *ERSA Working Paper, 615.*

Barro, R. J. (1991). Economic Growth in a Cross-Section of Countries. *The Quarterly Journal of Economics, 106*(2), 407-443.

Calderón, C., and Liu, L. (2003). The Direction of Causality between Financial Development and Economic Growth. *Journal of Development Economics,* 72(1), 321-334.

Chowa, W. W., and Fung, M. K. (2013). Financial Development and Growth: A Clustering and Causality Analysis. *The Journal of International Trade and Economic Development,* 22(3): 430-453.

Cihak, M., Muñoz, S., Sharifuddin, S. T., Jahjah, S., and Tintchev, K. I. (2012). Financial Stability Reports; What are they Good for? *IMF Working Paper, WP/16/5.*

Eng, Y., and Habibullah, M. S. (2011). Financial Development and Economic Growth Nexus: Another Look at the Panel Evidence from Different Geographical Regions. *Banks and Bank Systems, 6*(1), 62-71.

Goldsmith, R. W. (1969). Financial Structure and Development. *Studies in Comparative Economics.* New Haven: Yale University Press.

Hassan, M. K., Sanchez, B., and Yu, J. S. (2011). Financial Development and Economic Growth: New Evidence from Panel Data. *The Quarterly Review of Economics and Finance, 51*(1), 88-104.

Hicks, J. R. (1969). *A Theory of Economic History.* New York: Oxford University Press.

Huang, Y. (2011). *Determinants of Financial Development.* London: Palgrave Macmillan.

Jawaid, S. T., and Waheed, A. (2011). Effects of Terms of Trade and its Volatility on Economic Growth: A Cross-Country Empirical Investigation. *Transition Studies Review, 18*(2), 217-229.

Kasekende, L. (2010). Developing a Sound Banking System in Sub-Saharan African Countries. *African Finance in the 21st Century.*

Levine, R. (1997). Financial Development and Economic Growth: Views and Agenda. *Journal of Economic Literature, 35*(2), 688-726.

Levine, R. (2005). Finance and Growth: Theory and Evidence. *Handbook of Economic Growth, 1*(Part A), 865-934.

Lucas Jr, R. E. (1988). On the Mechanics of Economic Development. *Journal of Monetary Economics, 22*(1), 3-42.

Mahawiya, S. (2015). Financial Sector Development, Inflation and Openness: A Comparative Panel Study of ECOWAS and SADC. *ERSA Working Paper,* 528.

Mankiw, N. G., Romer, D., and Weil, D. N. (1992). A Contribution to the Empirics of Economic Growth. *The Quarterly Journal of Economics, 107*(2), 407-437.

Maskay, B. K. (2012). *Three Essays on Financial development.* Unpublished PhD dissertation. University of Kentucky: College of Business and Economics.

McKinnon, R. I. (1973). *Money and Capital in Economic Development.* Washington, DC: Brookings Institution.

Mlachila, M. (2016). *Financial Development in Sub-Saharan Africa: Promoting Inclusive and Sustainable Growth*: International Monetary Fund.

Mupimpila, C. (2014). Sources of Economic Growth in the Southern African Development Community (SADC). *Asian-African Journal of Economics and Econometrics*, 14(2): 185-193.

Mupimpila, C., and Funjika, P. (2010). Growth and Regional Integration: The Case of the Southern African Development Community. *Zambia Social Science Journal, 1*(2), 158-174.

Ntsosa, M. (2016). Financial Development and Economic Growth in Botswana: Is there a causal link? *The Research Bulletin.*

Nyasha, S., and Odhiambo, N. M. (2014). Bank-based Financial Development and Economic Growth: A review of international literature. *Journal of Financial Economic Policy, 6*(2), 112-132.

Patrick, H. T. (1966). Financial Development and Economic Growth in Underdeveloped Countries. *Economic Development and Cultural Change, 14(2)*, 174-189.

Phakedi, M. (2014). Financial Sector Development and Economic Growth in SADC. *A research paper to be submitted to the Committee of Central Bank Governors in SADC, South African Reserve Bank. [online] https://www. sadcbankers. org.*

Rajan, R. G., and Zingales, L. (2001). Financial Systems, Industrial Structure, and Growth. *Oxford Review of Economic Policy, 17*(4), 467-482.

Robinson, J. (1952). *The Generalization of the General Theory, the Rate of Interest and Other Essays*. London: Palgrave Macmillan.

Romer, P. M. (1990). Endogenous Technological Change. *Journal of Political Economy, 98*(5), S71-S102.

Roodman, D. (2006). How to do xtabond2: An Introduction to Difference and System GMM in Stata. *Stata Journal,* 9(1), 86-136.

Samanhyia, S., Donbesuur, F., and Owusu-Ansah, I. (2014). Financial Development and Economic Growth in a Post-Financial Liberalisation Era in Ghana: Does the Measure of Financial Development Matter? *Journal of Economics and Sustainable Development, 5*(25), 51-59.

Schumpeter, J. A. (1911). *The Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest, and the Business Cycl*e. Oxford, England: Oxford University Press.

Shaw, E. S. (1973). *Financial Deepening in Economic Development*. New York: Oxford University Press.

Stern, N. (1989). The Economics of Development: A survey. *The Economic Journal, 99*(397), 597-685

Svirydzenka, K. (2016). Introducing a New Broad-based Index of Financial Development. *IMF Working Paper, WP/16/5.*

http://www.blog.kpmgafrica.com/encouraging-growth-southern-african-banking-sector/

APPENDIX

TABLE 6: FINANCIAL INSTITUTIONS' VARIABLES FOR FINANCIAL DEVELOPMENT

Financial Institutions (FI)		
Depth (FID)	**Access (FIA)**	**Efficiency (FIE)**
Private credit to GDP (%)	Commercial bank branches per 100 000 adults	Net interest margin
Pension fund assets to GDP (%)	ATMs per 100 000 adults	Lending-deposit rate spread
Mutual fund assets to GDP (%)		Non-interest income to total income
Life and non-life insurance premiums to GDP (%)		Overhead costs to total assets
		Return on assets (ROA)
		Return on equity (ROE)

Source: Svirydzenka (2016)

TABLE 7: FINANCIAL MARKETS' VARIABLES FOR FINANCIAL DEVELOPMENT

Financial Markets (FM)		
Depth (FMD)	**Access (FMA)**	**Efficiency (FME)**
Stock market capitalisation to GDP (%)	Stock market capitalisation outside of the top 10 largest companies (%)	Stock market turnover ratio (stocks traded to capitalisation)
Stocks traded to GDP (%)	Total number of debt security issuers	
International debt securities outstanding of government to GDP (%)		
Total debt securities outstanding of financial corporations to GDP (%)		
Total debt securities outstanding of non-financial corporations to GDP (%)		

Source: Svirydzenka (2016)

Botswana's General Data Dissemination System (GDDS) Roadmap: A Conduit to the Special Data Dissemination Standard (SDDS) Subscription – An Assessment

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ABSTRACT

This paper assesses Botswana's participation in the data initiatives of the International Monetary Fund (IMF). The IMF has taken steps to enhance member country transparency and openness, including setting voluntary standards for dissemination of economic and financial data, which are geared at overall improvements in statistical systems. Botswana has made strides in data collection, compilation and dissemination since joining the data initiatives in 2001. Recommendations from various IMF technical assistance missions were implemented together with those of the Report on Observance of Standards and Codes (ROSC), which greatly improved data compilation and statistics for Botswana. However, challenges have also emerged that required the authorities to undertake major reviews of processes for the development of statistics, including coordination for statistics producers. This led to participation by Botswana in the enhanced GDDS initiative, which should facilitate the transition to the stringent reporting standards of the SDDS.

1. INTRODUCTION

This paper assesses participation by Botswana in the data standards of the International Monetary Fund (IMF), namely the SDDS and the GDDS. Both Data Standards Initiatives (DSIs) are aimed at facilitating the production of timely, accurate and reliable statistics, with emphasis on metadata[2] development, especially targeting the three main official data producing agencies within countries, that is, statistics offices, central banks and ministries of finance. The launch of these data standards, beginning with the SDDS in 1996, followed by the GDDS in 1997, marked a period of intense metadata development by the aforementioned agencies (IMF, 2000). The SDDS and the GDDS were both formulated following the Mexican financial crisis of the early 1990s, in part to address data deficiencies to help prevent recurrence of similar crises (Kibuka and Enoch, 2009).

The GDDS is a structured planning framework, mainly for developing comprehensive statistical systems, and emphasises cooperation among data producing and disseminating agencies. This builds on the four United Nations Fundamental Principles of Official Statistics, namely (a) data relevance, coverage, timeliness and periodicity; (b) quality; (c) integrity of the data production processes; and (d) access to the data by the public. As the basis for detailed assessment and development planning, GDDS focuses on the development of metadata, including plans for improvement, with the monitoring role being the updating of the metadata as major changes occur. The development plans for a statistical system entail the diagnosis of the current situation; elaboration of a detailed plan; identification of resources; and tracking of progress under these plans. After the inception of the GDDS framework, the IMF embarked on a series of complementary international and regional developmental and statistical initiatives that were intended to highlight the rationale for setting up the standard.

According to the IMF, SDDS serves to guide countries that have or that might seek access to international capital markets in the dissemination of economic and financial data to the public. Countries that subscribe to the SDDS undertake to follow good statistical practices in four respects:

(a) *data:* coverage, periodicity and timeliness of the data disseminated;

(b) *access by the public:* dissemination of advance release calendars, and simultaneous release of the data;

(c) *integrity*: disclosing information on laws governing the compilation and release of the data, access to the data by other government officials prior to release, ministerial commentary accompanying the release of the data, revision policy, and advance notice of major changes in methodology; and

(d) *quality:* the dissemination of documentation on methodology and sources, and of detailed and other data that support statistical cross-checks (IMF, March 1996).

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2 Metadata is defined as the data providing information about one or more aspects of the data; it is used to summarise basic information about data, which can make tracking and working with specific data easier.

Furthermore, under the SDDS, data dissemination practices are prescribed for 20 data categories covering the real, fiscal, financial and external sectors, as well as population, and are posted on the IMF's Dissemination Standards Bulletin Board (DSBB). For this standard, the IMF encourages and requires the publication of the national summary data page (NSDP) that is hyperlinked to the DSBB, as well as the advance release calendar (ARC). Subscription to the SDDS entails obligations to disseminate the required data according to the prescribed timeliness and periodicity. The SDDS has led to wider availability and enhanced timeliness of published data and the greater use of ARCs. In the light of the 2008/09 financial crisis, the IMF has taken steps to strengthen the SDDS, particularly in the areas of financial soundness indicators (expanding country coverage and moving to quarterly reporting), international investment position (IIP) (moving from annual to quarterly reporting of IIP data), international reserves and external debt reporting.

It should be noted however, that participation in all of the IMF's data standards initiatives is voluntary; although subscribing to the SDDS entails obligations to disseminate the required data according to prescribed timeliness and periodicity, making it a stringent data standard.

2. BOTSWANA'S GDDS ROADMAP

Botswana's participation in the GDDS from 2001 was preceded by the Report on the Observance of Standards and Codes (ROSCs), which summarises the extent to which countries observe certain internationally recognised standards and codes. The ROSCs are prepared and published at the request of the member country. The extent to which countries observe the international standards is analysed through twelve (12) areas recognised by the IMF and the World Bank. These comprise accounting; auditing; anti-money laundering and countering the financing of terrorism (AML-CFT) - added in November 2002; banking supervision; corporate governance; data dissemination; fiscal transparency; insolvency and creditor rights; insurance supervision; monetary and financial policy transparency; payments systems; and securities regulation. The ROSCs are usually followed by short updates produced regularly and new reports produced every few years. In Botswana, the ROSC was done to provide an assessment of statistics covered by the GDDS, namely data on the real sector, prices, government finance, the monetary system and the balance of payments (BoP).

2.1 Botswana's 2001 ROSC[3]

The 2001 ROSC provided a review of Botswana's data dissemination practices against the IMF's GDDS, complemented by detailed evaluation of the quality of key data variables and recommendations towards enhancements.

The review focused on national accounts, prices (consumer and producer), government finance, monetary statistics and balance of payments.[4] In general, Botswana's statistics were rated as good and, in some instances, some variables judged to meet SDDS quality, especially the consumer price index (CPI). At the same time, there were areas of concern, notably the absence of producer prices. Dissemination was also an area that needed attention, especially regarding timeliness and readily available data to users.

Key findings on data quality

(a) *GDDS/SDDS participation*: Botswana was found to meet the periodicity standard relating to dissemination of data series. It was recommended that, for Botswana to meet the SDDS subscription criteria, it should have an action plan in place to drive this desire. Key in this action plan was for the country to prepare metadata on current statistical compilation and dissemination practices and plans for improvement. It was also vital to have this metadata posted on the DSBB of the IMF.

(b) *Reconciliation of macroeconomic statistics*: Lack of a unified accounting period between statistics producing agencies, i.e., national accounts (July – June), government finance data (April – March) and the BoP (calendar year), was viewed by the mission as an impediment to carry out plausible economic analysis.

(c) *Pre-requisites of quality*: the legal and institutional framework that existed in Botswana were considered adequate to guarantee support for quality statistics. However, training in statistical methodologies was considered necessary.

(d) *Integrity*: Ethical guidelines were found to exist, providing guidance to staff, with the

3 The ROSC mission was conducted during October 11–24, 2001, and a detailed report with recommendations was prepared for the authorities.

4 At the time, the review did not cover socio-demographic and labour market statistics, which were covered in the next phase of the GDDS project through the provision of technical assistance (TA) by the IMF.

need to improve on transparency of statistical practices and policies. Emphasis was placed on disseminating information on major revisions of data.

(e) *Methodological soundness*: The methodologies of compiling data on monetary, BoP and CPI statistics were found to adhere to internationally recommended frameworks. These have also been observed in the compiling of flows and stocks data. However, it was recommended that the compilation of real sector statistics be aligned to the 1993 System of National Accounts (SNA),[5] including also the adoption of international best practice for compiling the producer price index (PPI). The same recommendation was also made for the adoption of the 2001 Government Finance Statistics Manual (GFSM) – where accrual accounting was encouraged.

(f) *Accuracy and reliability*: It was determined that sound statistical procedures are adhered to. However, the survey response rate with regard to collection of national accounts (NA) data was a concern, as well as the availability of source data for consolidating general government statistics. There were also concerns relating to the estimation procedures for BoP.

(g) *Serviceability*: It was concluded that Botswana's data follows GDDS periodicity. However, to improve on timeliness, the dissemination of macroeconomic variables on government finance and monetary statistics needed to be addressed quickly.

(h) *Accessibility*: It was noted that metadata was lacking for all statistics produced. The need to develop the ARC, as well as identify contact persons, was identified as areas for improvement. Soft copy release of data, i.e., through the internet/website, was encouraged, to help address the problem of late release of publications such as the trade digest due to printing cycles.

IMF recommendations

The ROSC recommendations were premised on the data quality assessment framework (DQAF) and derived from an in-depth evaluation of the quality of the NA, CPI, PPI, government finance, monetary and the BoP statistics as indicated below. Most of the recommendations (Table 1) were to be undertaken in the short term (within 1 year). The only long-term recommendation related to a five-year cycle for rebasing the CPI.

TABLE 1: 2001 IMF RECOMMENDATIONS

Short Term	
General	- Prepare metadata on current statistical production, dissemination practice and plans for improvement. - Strengthen data sharing and coordination among major agencies. - Develop advance release calendars. - Enhance transparency of statistical policies and practices, i.e., providing in advance notice of major changes in source data and compilation methods. - Identification of contact persons.
National Accounts	-Advance work on implementing the 1993 SNA, with GDP estimates given preference.
CPI and PPI	- Re-designing of PPI to international standards in relation to sample size and validation procedures. - To compile and disseminate the PPI on a monthly basis.
GFS	- Dissemination of monthly budgetary central government statistics within one month after the reference period; also to disseminate central government debt data within one quarter of the reference period.
Monetary Statistics	- Arrange for inter-departmental electronic transmission of the Bank's balance sheet the moment it becomes available within BoB. -Instructing commercial banks to classify customers' accounts into resident and non-resident accounts, instead of using nationality of accounts holders; to conform with 'center of economic interest principle'. - Requesting for electronic submission of commercial banks' and the deposit taking institutions' balance sheets and accompanying schedules. - Reconciliation and validation of monetary statistics produced by various institutions and functional Units within BoB.
Balance of Payments	- Separate components of FDI in the financial account, or broadly revamp reporting in the account. - Supporting classification of banking source data according to centre of economic activity, i.e., resident and non-resident. - Eliminate resident transporters in the transportation account. - Update estimation methods on freight payments, imports and travel.

5 According to the IMF, "the SNA is the internationally agreed standard set of recommendations on how to compile measures of economic activity. The SNA describes a coherent, consistent and integrated set of macroeconomic accounts in the context of a set of internationally agreed concepts, definitions, classifications and accounting rules. In addition, the SNA provides an overview of economic processes, recording how production is distributed among consumers, businesses, government and foreign nations."

Medium Term	
General	- Promote training in statistics methodologies, i.e., participating in IMF courses. - Disseminate data on surveys relating to data biases, response rates, sampling techniques, etc. - Publication of articles relating to methodology used in compiling macroeconomic statistics.
National Accounts	- Work towards encouraging voluntary response to surveys. - To expand work programme towards SNA to include financial accounts and balance sheets.
CPI and PPI	- Integration of house rentals in the CPI. - Extension of PPI to include mining and quarrying.
GFS	- Automation of GFS and computerisation of the accounting and budget system. - Reducing the lag in dissemination of data on local government (currently 2-3 years). - Compiling consolidated central and local government GFS, and providing time series. - Designing and implementing work programme to improve documentation on concepts, definitions, as well as data sources used in compiling GFS.
Monetary Statistics	- Install software to automate consistency checks and also to build a comprehensive monetary base.
Balance of Payments	- Develop quarterly balance of payments (dependent on timeliness of merchandise trade statistics).

Source: IMF

IMF's Update on the 2001 ROSC Report Recommendations

In February 2004, the IMF prepared an update on the country's progress relating to the 2001 ROSC mission recommendations based on discussions with the relevant authorities in Botswana.

Regarding general recommendations, indications were that there was data sharing and coordination between agencies. The establishment of the Statistics Producers Committee (SPC) and its technical committee was acknowledged.[6] There was also a consensus that the July to June National Accounts period could be adopted, since it matched the tax accounting period.

Due to poor survey response rates, progress in improving the quarterly NA had been slow. It was noted that there were also resource constraints, which hindered necessary follow ups. Implementation had been completed for the adoption of the International Standard Industrial Classification (ISIC 3), and technical assistance had been sort and undertaken for full implementation of the 1993 System of National Accounts (SNA). At the same time, production of the PPI had been suspended pending rebasing of the CPI to 2002/03. The review of the PPI had been set for the first quarter of 2004, with the authorities hoping to make the best use of the IMF's technical assistance provided under the GDDS in order to make progress in this area. Work on the national household survey had been contracted out to a consultant. Under the GFS, the IMF acknowledged the production of annual debt data, but the authorities were requested to make the same data available on a quarterly basis. For monetary statistics, the authorities were encouraged to use the preliminary Bank of Botswana balance sheet information, even prior to completion of the audit process. The ROSC update also highlighted the need for timely trade data on imports to facilitate the production of quarterly BoP.

2.2 Botswana's 2007 ROSC

Botswana used the 2001 ROSC recommendations and subsequent reviews to progress the data development efforts. The country has, thus, relied on the ROSC assessment framework, as well as the GDDS-outlined plans to further develop macroeconomic statistics. Consequently, the 2007 ROSC mission reported that major gains had been made relating to some of the concerns raised during the first mission; among them, responsiveness to the needs of users, transparency of statistical policies and related practices, accessibility of data and metadata, as well as a better understanding of the GDDS methodological framework. However, there were concerns raised about the periodicity and timeliness of data, as well as dissemination of some of the data produced, such as the international reserves and foreign currency liquidity template (Reserves Template), and production of producer prices. It was noted that a willingness to publish preliminary data, together with coherent and transparent revision policies and related practices, could help Botswana advance further towards SDDS subscription.

As was the case in the 2001 ROSC report, the 2007 report had general and specific recommendations to the three data compiling agencies, i.e., Statistics Botswana, Ministry of Finance and Economic

6 The SPC comprises Deputy Governor from the Bank of Botswana (BoB), the Statistician General from Statistics Botswana (SB) and the Secretary of Budget Administration from the Ministry of Finance and Economic Development (MFED). There is a technical committee that supports the SPC.

Development and Bank of Botswana.[7] Cross-cutting recommendations and responses by the officials are summarised below:

(a) Strengthening cooperation between statistics producers, as well as ensuring timely compilation and sharing of data. This has largely been achieved through the establishment of the SPC, although technical elements of cooperation needed to be improved;

(b) Monitoring of the consistency of data sets and regular reconciliation where there was need to address the attribution of SACU revenues to BoP and National Accounts;

(c) Allow for dissemination of preliminary foreign exchange reserves data without the constraint of internal data validation process, subject to credible revision framework;

(d) Develop a list of institutional units based upon the 1993 SNA sectorisation, with the assistance of the TA mission;

(e) To keep the metadata up-to-date and provide easy access through the data producers directly linked websites;

(f) Formalising and publishing revision policies, which also detail revision cycles by the various agencies; and

(g) Keeping the business register up-to-date using, among others, the enterprise census undertaken by Statistics Botswana.

There were also specific recommendations aimed at different agencies, ranging from staffing issues to technical aspects. The ROSC also highlighted a need to conform to the guidelines provided by the various manuals in compiling statistics, for issues of harmonisation. Where there were data gaps, estimation techniques were also encouraged by the mission, with the help of technical assistance where necessary. The ROSC also recommended the review of some of the guiding and regulatory statutes for statistical agencies to reaffirm their responsibilities to call, compile and disseminate data. Finally, the mission underscored the importance of carrying out surveys in order to address data gaps and broaden coverage.

3. PROGRESS UNDER THE GDDS FRAMEWORK

Botswana, through the ROSC process, technical assistance and commitment by the authorities is closer to SDDS. The remaining areas impeding full subscription to SDDS include reporting by local authorities under the GFS, the timely release of the BoB balance sheet (unaudited release) for monetary statistics purposes, production of the PPI and the Industrial Production Index (IPI), labour market indicators and the reserve template. The detailed summary of the SDDS status, as at end of 2018, of the macroeconomic variables under each of the statistics producers is given in Appendix 1. The assessment of the SDDS status is based on the timeliness and periodicity of the variables as released by the country, versus that of the IMF standard. The IMF has made it possible for countries to attain the SDDS through what is known as the flexibility option.[8] However, the provision of this option for periodicity and timeliness varies with data categories (see Appendix 2). There is also what is known as 'as relevant' categories, when a category or component is considered by the IMF staff to not be relevant for a particular country, the subscribing country can be in observance of the SDDS, even if it does not produce and disseminate data pertaining to that category or component. It is important to note that this determination is the prerogative of the IMF.

4. WEIGHING FLEXIBILITY OPTIONS FOR BOTSWANA

As can be observed, judging by the criteria indicated in Appendices 1 and 2, Botswana has very limited options where flexibility allowed by the IMF can be utilised. In particular, considering that there are aspects as indicated in Appendix 1, where exercising this option is not permitted, for example, no flexibility options can be given for coverage. Thus all SDDS data categories need to be disseminated. For Botswana, flexibility options can be considered in relation to non-SDDS compliant variables in Appendix 1. These include Industrial Production Indices, Labour Market indicators, Price (wholesale and producer price indices), General Government, Analytical Accounts of the Banking Sector, Analytical Accounts of the Central Bank, external debt and finally the International Reserves and Foreign Currency Liquidity.

However, Botswana does not qualify for flexibility

7 The names for Statistics Botswana and the Ministry of Finance and Economic Development at the time were Central Statistics Office (CSO) and the Ministry of Finance and Development Planning.

8 These are data compilation options that the IMF came up with in recognition of the differences in economic structures and institutional arrangements among countries, where data categories could be recognised as being "relevant" or "encouraged".

options as all these data categories need to be disseminated in accordance with the SDDS required periodicity and timeliness. It is only when all these are published that Botswana can take two timeliness and/or flexibility options, but only for specific data categories (see par. 2.24 of the SDDS Guide - https://www.imf.org/external/pubs/ft/sdds/guide/2013/sddsguide13.pdf).

Overall, Botswana has made commendable efforts towards fulfilling the SDDS requirement, but there are significant outstanding aspects to be addressed. The use of (a maximum of two) flexibility options (for periodicity and timeliness) will only go so far towards fulfilling the requirements.

5. IMF'S ENHANCED GENERAL DATA DISSEMINATION SYSTEM (E-GDDS) INITIATIVE

In May 2015, the IMF launched the e-GDDS as a way of enhancing the GDDS framework. The main focus of the e-GDDS is on data dissemination, intended to support data transparency, encourage statistical development, and help create strong synergies between data dissemination and surveillance. This initiative is expected to align the e-GDDS data categories with the Table of Common Indicators Required for Surveillance (TCIRS), which is used by the Fund for surveillance (Table 2). It is also anticipated that the e-GDDS will improve access to data by incorporation of a National Summary Data Page (NSDP), which is built on a global standard open format, and set as a path to achieving higher dissemination standards by the introduction of dissemination thresholds. These changes completely alter the GDDS, and the guidelines that governed the GDDS are superseded by those of the new e-GDDS. One of the IMF's concerns about the GDDS was that most countries were not making any progress relative to data development and dissemination. The IMF had also observed countries provide the TCIRS for Article IV missions, but then fail to disseminate the same data to a broader audience. This made the IMF's case even stronger for focusing on data development and dissemination of internationally comparable data. At the forefront of the e-GDDS initiative is the development of the open data platforms and subsequently establishing the NSDP, based on the TCIRS, Table 2.

TABLE 2: COMMON INDICATORS REQUIRED FOR SURVEILLANCE

Data category	Data category
National accounts	Broad money
Production Index	Interest rates
Labour Statistics	Share price index
Consumer Price Index	Balance of payments
General government operations	Official reserve assets
Central government operations	Merchandise trade
Central government debt	International investment position
Analytical accounts of the banking sector	External debt
Analytical accounts of the central bank	Exchange rate
Reserve/Base money	Addendum: Population

Source: IMF

The IMF also encourages the dissemination of other socio-economic data categories, which do not form part of the TCIRS. Participation in the e-GDDS is voluntary, as was the case with GDDS, and the IMF provides support to the participating countries for the entire period of the e-GDDS implementation. In this regard, Botswana acceded to e-GDDS in November 2015 making it the first country in the world to do so. In January 2016, Botswana became the first e-GDDS country to go live with the NSDP.

e-GDDS Data Monitoring Tool

To keep track of the participating countries' progress under the e-GDDS, the IMF has introduced a data monitoring tool. Through this tool, the IMF presents a monthly summary of the NSDP activities and shows where countries are lagging in terms of timeliness goals of the reported variables. In some of the past reports, specific to Botswana, the IMF identified non-compliance with some of the variables, for example, central government operations, labour market indicators, analytical accounts of the banking sector and central bank, production indices, producer prices and the reserve template. The IMF reports such lapses in compliance regardless of the cause of the delay in updating data sets. Reporting under the e-GDDS is more like reporting under the SDDS, where under the SDDS an extreme case of non-compliance is made public. There is a view that the market should reward countries that make an effort to improve data dissemination practices with a lower risk premium as suggested by Fischer (2003) who indicated that:

"Nothing would help improve standards more than if countries that met higher standards were rewarded with lower borrowing costs... If this awareness translates into lower spreads for those meeting higher standards, the standards initiative will begin to pay off both for individual countries and for the system as a whole."

6. CONCLUSION

From the time Botswana started participating in the GDDS, there have been progress in data development and dissemination. Key improvements (in some respects guided by the recommendations of the IMF technical assistance missions) have been made and greatly helped the country advance its agenda of credible statistics development and dissemination. Compiling authorities in the country adhere to the guidelines of the various manuals, i.e., NSA for national accounts, GFSM for fiscal statistics, BPM5/6 for balance of payments and MFSM for monetary and financial statistics. The entrenched production of metadata also helps in terms of understanding the processes undertaken in the production of statistics. This promotes transparency and credibility of statistics compilation and dissemination framework. Another key aspect is the dissemination of statistics through the internet, to help avoid delays due to printing cycles. Botswana has also set an example to other countries, especially in the region, in terms of collaboration between the data producing agencies. The formation of the SPC and its technical committee, the SPTC, has opened an important avenue for collaboration between the statistics producing agencies i.e. BoB, MFED, SB and of late the Non-Bank Financial Institutions Regulatory Authority (NBFIRA). NBFIRA is particularly important for data pertaining to other financial corporations (OFCs), which is crucial for analysis and monitoring of financial stability. The SPC and SPTC have facilitated regular reconciliation and sharing of data between stakeholders, as well as advancing the SDDS roadmap agenda for the country. With the introduction of the e-GDDS, Botswana regularly updates its NSDP and ARCs on the IMF's open data platform (ODP), a process that brings the country closer to SDDS reporting standards.

While the aforementioned efforts are progressive, a more concerted effort by the authorities is needed in fulfilling the SDDS requirements for Botswana. To that extent, authorities should continue to take advantage of efforts by the IMF, who upon request, provide technical assistance to improve on data compilation and dissemination practices.

Modifications made by the IMF over time regarding the GDDS framework placed more emphasis on data dissemination with the basic objective of graduating countries to the SDDS. Some of these innovations involved encouraging countries to develop NSDPs, as well as ARCs, to aid standardised reporting of data. These modifications are expected to intensify data development across countries. However, despite these efforts by the IMF, only a few countries have managed to graduate to the SDDS in the past two decades. Among the successful countries in Africa are South Africa (August 1996), Mauritius (February 2012) and Seychelles (May 2015). The IMF assesses progress towards SDDS by evaluating countries' efforts in compilation and dissemination with respect to: (a) new data categories (from the list of GDDS/SDDS macroeconomic data categories); (b) improvements in coverage; (c) improvements in periodicity; and (d) improvements in timeliness. Inputs to progress and success in the data initiatives include access to resources and commitment by the authorities. Moreover, the commitment should encompass focused strategy and plans for meeting the data standard requirements.

The evolution of data standards initiatives also entails a learning process, which benefits governments, the IMF and other international organisations in planning for future reforms pertaining to data production and dissemination.

REFERENCES

Alexander, W., Cady, J., and Gonzalez-Garcia, J. (2008). "The IMF's Data Dissemination Initiative After Ten Years." International Monetary Fund.

Cady, J. (2005). "Does SDDS Subscription Reduce Borrowing Costs for Emerging Market Economies?" IMF Staff Papers - Volume 52, Number 3.

Dziobek, C., and Tanase, F. (2007). "Institutional Cooperation between Central Banks and the Statistical Offices for Producing Macroeconomic Statistics." International Conference on Statistical Systems for Small Economies, Basseterre, St. Kitts and Nevis.

Internation Monetary Fund. 2000. "UN/ECE Work Session on Statistical Metadata." Statistical Commission. Working Paper No. 18, 28-30 November 2000.

International Monetary Fund. (2002). "Botswana: Report on Observance of Standards and Codes - Data Module; Response by the Authorities; and Detailed Assessments Using the Data Quality Assessment Framework." IMF Country Report No. 02/83.

International Monetary Fund. (2010). "The Financial Crisis and Information Gaps." Progress Report (Prepared by the IMF Staff and the FSB Secretariat).

International Monetary Fund. (2017). "IMF Standards for Data Dissemination." International Monetary Fund Fact Sheet.

Kester, A. (2006). "IMF Data Standards Initiatives - A Consultative Approach to Enhancing Global Data Transparency." IMF Working Paper No. 06/102.

Kibuka, R., and Enoch, C. (2009). "The General Data Dissemination System (GDDS) - A Reflection on its First 12 Years and Plans for Taking it Forward." IMF Working Papers No 09/278.

Legwaila, S., Mochipisi, P. and Wright, M. (2003). "Using the GDDS Framework to Improve Standards of Statistics Production and Dissemination: The Experience of the Bank of Botswana." Research Bulletin Volume 21 No. 2. Bank of Botswana.

APPENDIX 1: SPECIAL DATA DISSEMINATION STANDARD TEMPLATE - UPDATED FOR ALL AGENCIES - 2019

Data Category	International Monetary Fund		Botswana Current State		Comments
	Periodicity	Timeliness	Periodicity	Timeliness	
REAL SECTOR STATISTICS					
National accounts	Quarterly	One Quarter	Quarterly	One Quarter after reference period	***SDDS compliant***
Industrial Production Indices The IPI covers manufacturing, mining and water & electricity	Monthly (or as relevant)	Six Weeks (One month encouraged)	Quarterly	One quarter after reference period	***Not SDDS compliant.*** Manufacturing data are not available due to very low response rates, and only quarterly indices for Mining and Electricity are produced
Forward-looking indicators Encouraged indicators	Monthly or quarterly	One month or one quarter	Bi-annual	One quarter	These are encouraged, but not a requirement to subscribe to SDDS
Labor market	Quarterly	One quarter	**Employment and wages** (Quarterly) **Unemployment** (Annually) Variable and not more than annually	One quarter	***Not SDDS compliant***. Statistics Botswana is currently conducting the Continuous Multi-Topic Household Survey, which will yield quarterly unemployment figures
Price indices	Monthly	One month	**Consumer** (Monthly) **Wholesale / producer**	Every 15th day of the following month	***SDDS compliant*** ***Not SDDS compliant*** Mining and utilities PPI compiled, expected to be disseminated by the end of November 2019. To be produced on quarterly basis until December 2020 since it is still being observed for consistency

Data Category	International Monetary Fund		Botswana Current State		Comments
	Periodicity	Timeliness	Periodicity	Timeliness	
FISCAL SECTOR STATISTICS					
General government or public sector operations	Annual	Two quarters	No data on GGO are currently compiled	Not produced	***Not SDDS compliant***. Data for Local Authorities has been compiled for financial years 2009/10 up to 2016/17. The IMF technical assistance mission in August 2019 assisted in consolidating one financial year, 2016/17
Central government operations	Monthly	One month	Monthly	One month	***SDDS compliant***.
Central government debt	Quarterly	One quarter	Quarterly	One quarter	***SDDS compliant***
FINANCIAL SECTOR STATISTICS					
Analytical accounts of the banking sector	Monthly	One month	Monthly	Two months	***Not SDDS compliant***. It is currently the Central Bank's policy to publish data from its balance sheet once this is final. Processes are still done manually, there is need to automate to speed up production in order to meet timeliness
Analytical accounts of the central bank	Monthly (weekly encouraged)	Two weeks (one week encouraged)	Monthly	Two months	***Not SDDS compliant***. It is currently the Central Bank's policy only to publish data from its balance sheet once this is final
Interest rates	Daily	Timeliness is not specified to allow flexibility to incorporate these data into another (preferably high-frequency) product	Daily	Daily	***SDDS compliant***
Stock market	Daily	Timeliness is not specified to allow flexibility to incorporate these data into another (preferably high-frequency) product	Daily	Weekly	***SDDS compliant***

Data Category	International Monetary Fund		Botswana Current State		Comments
	Periodicity	Timeliness	Periodicity	Timeliness	
EXTERNAL SECTOR STATISTICS					
Balance of Payments	Quarterly	One Quarter	Quarterly	One Quarter	***SDDS compliant***
International reserves and foreign currency liquidity	Monthly (weekly encouraged) for both the official reserve assets and the reserves template	One week for total official reserve assets and one month (one week encouraged) for the reserves template	Monthly	Two months	***Not SDDS compliant***. It is currently the Central Bank's policy only to publish data from its balance sheet once this is final. The reserves template is also not produced by the Bank, due to its current policy that does not make the necessary breakdown public
Merchandise trade	Monthly	Eight weeks (4-6 weeks encouraged)	Monthly	Two months	***SDDS compliant***
International investment position	Annual (quarterly encouraged)	Three quarters (one quarter encouraged)	Annual	Three quarters	***SDDS compliant***
Exchange rates	Daily	Timeliness is not specified to allow flexibility to incorporate the data into another (preferably high-frequency) product	Daily	Daily	***SDDS compliant***
External debt	Quarterly	One quarter	These data are currently not compiled, at least not in the multi-sectoral format required by SDDS		***Not SDDS compliant***. The net foreign assets of the central bank and the banking sector are readily available, while information on government debt should be available within the next few months. The additional requirements for this category will be further investigated and consolidation will continue for the other years. The Extra-Budgetary Entities identified have been verified with Statistics Botswana to ensure same definition of general government

Data Category	International Monetary Fund		Botswana Current State		Comments
	Periodicity	Timeliness	Periodicity	Timeliness	
POPULATION STATISTICS					
Population	Annual	Timeliness is not specified, but the standard implies that data should be disseminated with an annual periodicity and on a regular basis	Annual estimates are produced based on projections from the 10-yearly population census	Timeliness not specified	***SDDS compliant***. Following each census, multi-year population projections are produced which can be used for this

Source: Bank of Botswana, Statistics Botswana and Ministry of Finance and Economic Development

APPENDIX 2: SDDS 'AS RELEVANT' PROVISIONS AND FLEXIBILITY OPTIONS

Data Category	'As Relevant' Provisions and Flexibility Options
Real Sector	
National Accounts – GDP: Nominal, real, and associated prices or price indices*	No flexibility options for coverage or periodicity. A special flexibility option may be taken for timeliness, subject to meeting the prescribed periodicity and timeliness for the tracking category – the production index.
Production index/indices	No flexibility for coverage. A regular flexibility option may be taken for periodicity and/or timeliness. Note: specifications for periodicity and timeliness must be met if a subscriber wishes to take a special timeliness flexibility option for the GDP data category. 'As relevant' provision for coverage, periodicity, and timeliness: the range of components included in the index (industrial, primary commodity, or other sectors) should reflect the structure of the economy. Note: Subscribers that invoke the 'as relevant' provision cannot avail themselves of the special timeliness for the national accounts.
Forward-looking indicator(s)	No flexibility option is required, since this is an encouraged data category.
Labour market	'As relevant' provision for the coverage, periodicity, and timeliness of employment, unemployment, and/or wages/earnings. For the whole labour market data category, or for any of its elements (employment, unemployment or wages/earnings), a regular flexibility option may be taken for the periodicity and/or timeliness.
Price indices	No flexibility options for coverage. For the whole price indices data category, or for any of its components (consumer price index or producer price index), a regular flexibility option may be taken for periodicity and/or timeliness. Thus, one regular flexibility option covers both consumer and producer price indices.
Fiscal Sector	
General government operations (or public sector operations, as relevant).	No flexibility for coverage. A regular flexibility option may be taken for periodicity and/or timeliness.
Central government operations**	No flexibility options for coverage. A regular flexibility option may be taken for periodicity and/or timeliness. Targeted timeliness flexibility option for countries implementing quarterly accrual-based data on general government operations (GGO): subscribers disseminating, with a one-quarter lag, quarterly GGO data in line with GFSM 2001 or an equivalent standard are allowed to disseminate data for the last month of the fiscal year with a lag of up to three months and data for the first month of the new fiscal year with a lag of up to two months.
Central government debt	'As relevant' provision for coverage and component disaggregation: domestic and foreign components, as relevant; breakdown by currency (including exchange rate indexed and non-indexed breakdowns with currency), as relevant; debt guaranteed by central government, as relevant. A regular flexibility option may be taken for periodicity and/or timeliness.

Data Category	'As Relevant' Provisions and Flexibility Options
Financial Sector	
Depository corporations survey (DCS)*	No flexibility options for coverage. A regular flexibility option may be taken for periodicity and/or timeliness. 'As relevant' timeliness provision for countries with extensive branch banking systems: subscribers, if necessary, can meet SDDS requirements by disseminating major indicators such as broad money and total credit within the prescribed timeliness of one month if all components are disseminated soon thereafter (normally with a lag not to exceed two months).
Central bank survey (CBS)**	No flexibility options for coverage. A regular flexibility option may be taken for periodicity and/or timeliness.
Interest rates	No flexibility options for coverage. A regular flexibility option may be taken with respect to periodicity.
Stock market	'As relevant' provision for coverage: if the stock market is in an early phase of development and no share price index is produced at this stage. A regular flexibility option may be taken with respect to periodicity.
External sector	
Balance of payments*	No flexibility options for coverage or periodicity. A special flexibility option may be taken for timeliness, subject to meeting the prescribed periodicity and timeliness for the merchandise trade.
Official reserve assets**	No flexibility options for coverage, periodicity, and/or timeliness.
*Template Guidelines (International Reserves and Foreign Currency Liquidity: Guidelines for a Data Template[2001])***	No flexibility options for coverage, periodicity, and/or timeliness.
Merchandise trade**	No flexibility options for coverage. A regular flexibility option may be taken for periodicity and/or timeliness. Note: the specifications for periodicity and timeliness must be met if a subscriber wishes to take a flexibility option for the balance of payments category.
International investment position	No flexibility options for coverage. A regular flexibility option may be taken for periodicity and/or timeliness.
External debt	No flexibility options for coverage, periodicity, and/or timeliness.
Exchange rates	'As relevant' provision for coverage: if there are no forward market rates or if forward market transactions are not significant. A regular flexibility option may be taken with respect to periodicity.
Addendum	
Population	A regular flexibility option may be taken with respect to periodicity.
Additional data categories	No flexibility option is required, as these are not prescribed categories.

Source: IMF Statistics Department

Coverage refers to the item and components coverage, not to the institutional or geographical coverage.

* Denotes comprehensive statistical frameworks.

** Denotes tracking categories.

Market Structure and Performance in Botswana's Banking Industry

Ronald Christopher, Omogolo Mighty Maripe and Obonye Galebotswe[1]

ABSTRACT

This paper empirically examines the effects of market structure on the performance of the banking industry in Botswana by analysing business performance indicators of a panel of six commercial banks for the period 2011 to 2016. The study employs the data envelopment analysis (DEA) technique and the system-generalised method of moments (S-GMM) to determine the effects of concentration, market share and efficiency on performance. The estimation results show moderate profit persistence, suggesting that departures from competitive performance might not be large. Therefore, the results suggest that bank profitability comes from superior managerial efficiency of the banks and not from scale effects and abuse of market power to influence prices or collusive behaviour of dominant banks. This paper concludes that the improvement in banking sector profitability does not raise any competition concerns as they are driven by adoption and use of organisational strategies and technologies that improve the efficiency rather than market power or its abuse.

1. INTRODUCTION

The analysis of the relationship between market structure and profits in the banking industry has been an important subject for debate among researchers and policymakers over the last three decades. This reflects the importance of the financial sector, particularly banks, to economic development. An understanding of the market structure-profit relationship in the banking sector is important for Botswana, for several reasons.

First, just like in many other developing countries, commercial banks dominate Botswana's banking industry[2], controlling about 92 percent of the industry's assets in 2018 (Bank of Botswana, Banking Supervision Annual Report, 2018). Banks, therefore, play a very significant role in the economic and price developments of the country through their intermediary role which in turn supports the transmission of monetary policy actions to the real sector. Second, the banking industry has a history of tight regulation, especially before 1990, where entry depended on the Bank of Botswana's (BoB) assessment of whether the market was over-banked or not (BoB, 2003). As a result, two banks dominated Botswana's banking industry for a long time. Third, despite entry by new banks following the reforms introduced since 1989, the industry is still highly concentrated with the largest four banks (Barclays Bank (now Absa), First National Bank, Standard Chartered Bank and Stanbic Bank) accounting for over 80 percent of the industry's assets, deposits and loans and advances (BoB, Banking Supervision Report, 2018). This situation creates an opportunity for collusion and other forms of anti-competitive conduct to the detriment of customers of banks. In fact, a study by Roberts (1994) reported some collusive activities in the past while Kapunda and Molosiwa (2012) expressed concern over the reported high concentration levels in Botswana's banking sector. Finally, banks in Botswana have enjoyed very high levels of profitability for an extended period of time, especially until around 2010.

Therefore, an understanding of the relationship between market structure and bank profitability has important implications for bank regulation, supervision and competition policy. For instance, Tregenna (2009) opined that, if evidence is found suggesting that concentrated structure and not efficiency or scale effects raises bank profitability, then it could point to greater focus on competition policy and other regulatory interventions to reduce bank concentration. Furthermore, the transmission of monetary policy is affected if banks in highly concentrated markets gain higher profits by desisting from competing among themselves as well as refraining from raising deposits and /or lowering lending rates (Morris, 1985).

Despite commercial banks' dominance of the country's banking industry and the observed coexistence of high concentration levels with high and persistence profitability, there has not been much empirical studies done in the market structure-performance relationship in Botswana's industry. Furthermore, the sector has undergone some changes since the last study by Kapunda and Molosiwa (2012), which examined the relationship between structure and performance in Botswana's banking industry. The number of commercial banks operating in the industry has increased and there has also been competition from non-bank firms offering similar services to those offered by commercial banks. These developments render the findings of the earlier studies less relevant for current policy

1 The views expressed in the paper are those of the authors and do not necessarily reflect those of the Bank of Botswana.

2 This includes commercial banks, statutory banks (National Development Bank and Botswana Savings Bank) and BBS Limited.

design and implementation. The present study fills this gap by providing up-to-date empirical evidence of the market structure and performance relationship in Botswana's banking industry. Moreover, unlike its closest antecedent (Kapunda and Molosiwa, 2012), who focused only on a test of the structure conduct performance (SCP) paradigm, this study tests for both market power (MP) and efficient structure hypotheses (ESH). In addition, while Kapunda and Molosiwa (2012) use ordinary least squares estimation techniques on aggregate data, this study employs system-generalised method of moments (S-GMM) estimator, which allows for a test of individual bank effects. This technique also corrects for endogeneity and unobserved heterogeneity. The other novelty of the study is that, similar to Berger (1995), it uses direct measures of efficiency in the estimation of the performance equation to distinguish between efficient-structure and the relative market power hypotheses.

The objective of the study is, therefore, to investigate the relationship between market structure and performance; to determine the nature of the association and establish whether the observed association, if any, is a result of abuse of market power or efficiency; and offers policy recommendations necessary to improve resource allocation in the banking sector and the economy as a whole.

The rest of the paper is organised as follows; Section 2 provides an overview of Botswana's banking sector. Section 3 reviews the literature on market structure and performance in the banking industry, while Section 4 discusses the methodology. Results are presented in Section 5. Section 6 draws some conclusions and policy recommendations.

2. Overview Of Botswana's Banking Sector

2.1 Policy Reforms and the Regulatory Environment

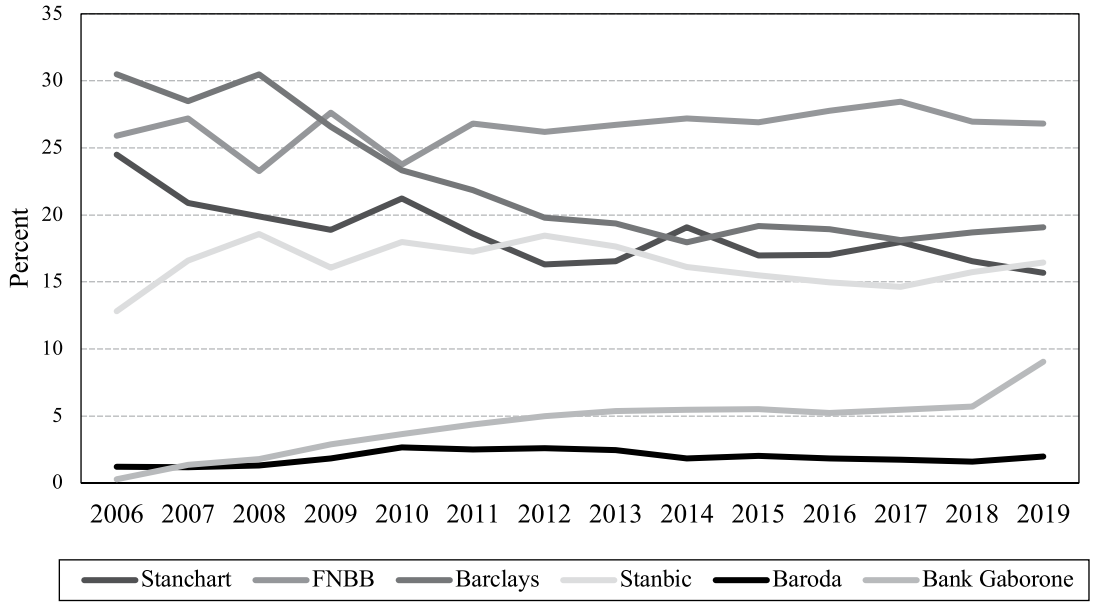
Botswana introduced major policy reforms in 1989 to liberalise the financial sector. In particular, the primary aim of these reforms was to increase efficiency of operations and the intermediation function of the country's banking institutions (Kayawe and Amusa, 2003). These changes focused on two key aspects; (i) allowing greater market determination of interest rates as a means of encouraging a greater degree of financial deepening and (ii) raising the level of competition within the banking sector through licensing of new banks. These reforms, together with high and persistent profits recorded by incumbent banks, attracted entry by new banks. As a result, the number of commercial banks operating in Botswana increased from four in 1991 to ten in 2017. The rise in the number of commercial banks was accompanied by an increase in the number and diversity of products and services offered. Incumbent banks also responded to this entry by consolidating and rationalising their various operations (Kayawe and Amusa, 2003).

The regulatory structure in Botswana's banking sector has evolved from being restrictive between 1976 and 1990 to become more competition-friendly within a broader national objective of promoting financial sector development (BoB, 2003). Following the reforms that started in the early 1990s, new market participants are actively encouraged, provided they meet the minimum thresholds for licensing (prudential requirements) and have the expertise to safety and soundness, as well as integrity of the financial system (Bank of Botswana's Banking Supervision Annual Reports). Although vital, the regulation and supervision of the banking sector can also be a barrier to potential new entrants resulting from required high standards. Studies have, however, stressed that not all banking regulations necessarily restrict competition. In some instances, measures promoting competition as well as supporting prudential supervision can be put in place as has been the case in Botswana (Harvey, 1996).

2.2 The Changing Industry Structure

Botswana's largest four banks have maintained a market share of approximately 80 percent for over a decade. Generally, in situations of limited competition, distribution of market shares of dominant firms remains the same or stable over a long period of time (Gort, 1963). Figure 1 shows that although the overall market share of the largest four banks have remained the same, there is evidence of changes in the distribution of market shares within the sub-group. For instance, First National Bank Botswana (FNBB) overtook Barclays Bank as the biggest bank in 2009. Furthermore, the relative market share of the latter dropped as the shares of the other two banks increased. The market shares of the smallest two banks also increased in the period under consideration. This could be a result of competitors coming up with innovative ways to attract customers from the dominant banks. It could also suggest existence of relatively low bank switching costs for customers in which large banks are unable to use their relative market power to remain dominant (Smirlock, 1985).

FIGURE 1: MARKET SHARE OF THE LARGEST SIX COMMERCIAL BANKS: 2005-2019

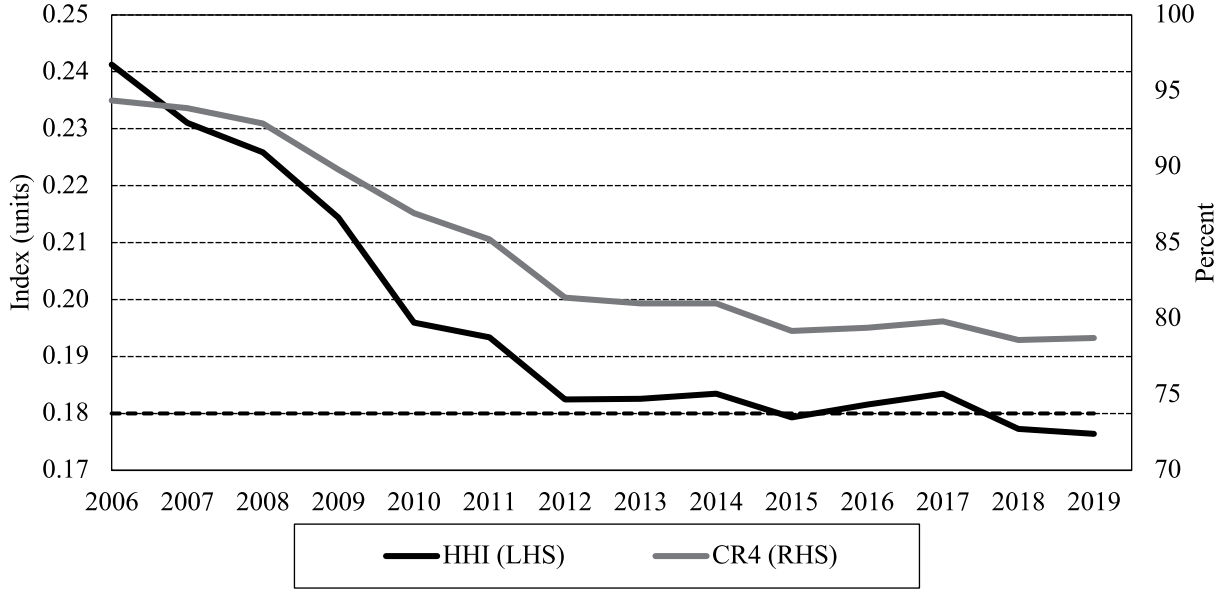


Source: Authors' compilation using data from Banking Supervision Annual Reports

Several indicators have been computed and recorded to track structural transformations. It is generally accepted in industrial economics literature that for a given industry price-elasticity of demand, the extent to which a firm or group of firms can exercise market power varies directly with its or their market share (Church and Ware, 2000). Therefore, market shares are some of the important structural attributes that have been tracked to infer the degree of competition in an industry. Although market shares provide useful insights on the level of industry competition, concentration is generally regarded as the dimension of structure most closely related to possession of market power (Burgess, 1989). Trends in recorded concentration are frequently used to indicate changes in the levels of competition. Figure 2 presents the time paths of the four-firm concentration ratio (CR4) and the Hirschman-Herfindahl Index (HHI), which are the most commonly used measures of industry concentration.[3] The CR4 is a sum of the market shares of four largest firms in the industry and shows the proportion of the market supplied by the four leading firms. Generally, a CR4 of more than 0.75 is believed to be indicative of high concentration. While useful, the concentration ratio provides an incomplete picture as it neither uses the market shares of all the firms in the industry nor does it provide information about the distribution of firm size. In contrast, the HHI takes into account the differences in sizes of the market participants, as well as their number. An HHI between 0.1 and 0.18 represents moderately concentrated markets, while an HHI of over 0.18 represents high concentration. The CR4 and HHI range from zero (representing perfect competition) to one (monopoly). Figure 2 shows a rapid decline in the level of concentration as measured by HHI from 2006 to 2012, which then stabilised around 0.18 and even dropped below the 0.18 theoretical level of moderate concentration in 2015 before picking up slightly and falling below 0.18 in 2018 and 2019. This trend is mirrored, although less dramatically, by the CR4. The general trend provides tentative evidence of improved competition in the banking industry over the past fourteen years.

3 CR4 is the share of the largest four banks' deposits to the total banking industry deposits. HHI is calculated by summing the squares of the market shares (deposits of each bank divided by total industry deposits) of all banks in the industry. It is thus a weighted sum of the market share of all banks in the industry. It is calculated by the formula: $HHI = \sum_{i=1}^{x}(ms_i)^2$, where ms_i is the percentage market share of the i^{th} firm.

FIGURE 2: CONCENTRATION IN THE BANKING SECTOR 2006 – 2019

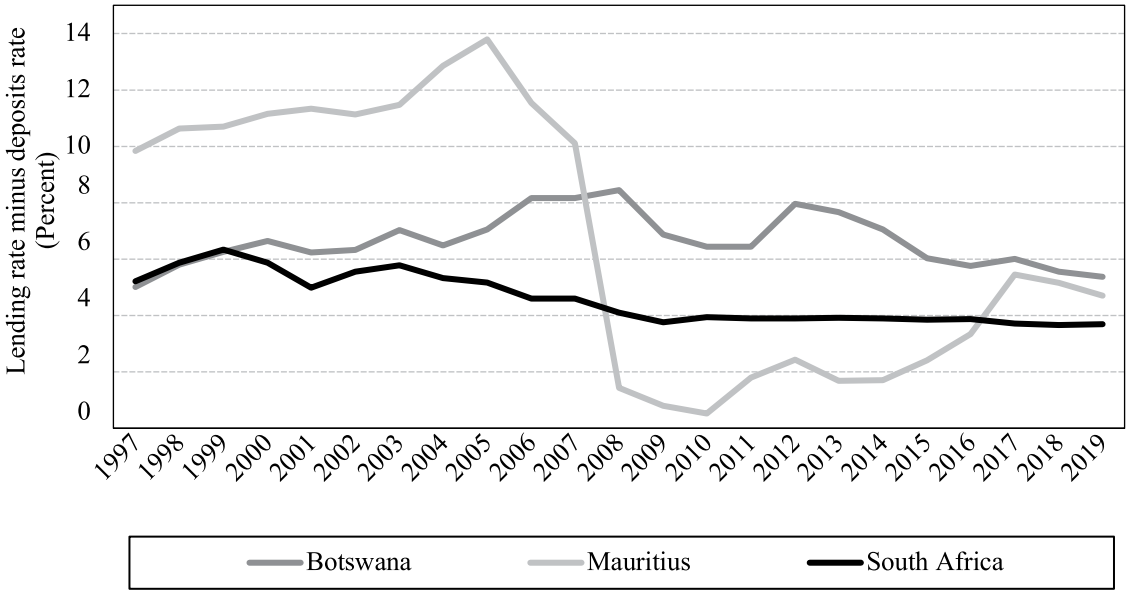


Source: Authors' compilation using data from BoB Annual Reports

2.3 Bank Performance

The three main indicators that have been used as measures of bank performance are; the interest rate spread, return on assets and return on equity. If we take intermediation as the main activity of commercial banks, then the interest rate spread can be considered as the main indicator of price-to-cost margin. Interest rate spread is measured as the difference between the interest rate charged by banks on loans and advances to customers and the interest rate banks pay for demand, savings and time/term deposits by customers. Figure 3 shows that Botswana's interest rate margin has remained higher than that in South Africa and Mauritius since 2007. This could suggest that Botswana's commercial banks have relatively more market power in the pricing of their main products than their aforementioned counterparts. However, the fact that the spread seems to be trending slightly downwards since 2012 could suggest convergence to those of the other two countries.

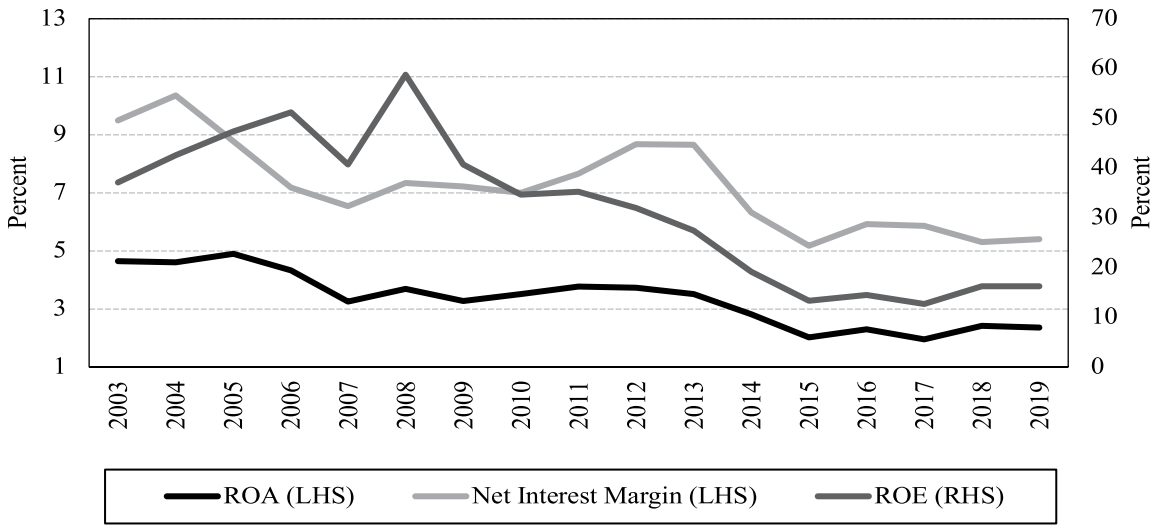
FIGURE 3: BANK PROFITABILITY IN SELECTED COUNTRIES (1997 – 2019)



Source: Authors' compilation from BoB Annual Reports and World Development Indicators

Figure 3 shows that the trend in the interest rate spread reversed slightly since 2012. This decline in profitability is supported by other measures such as return on assets (ROA) and return on equity (ROE) (Figure 4). ROA is defined as the ratio of net income before-tax to total assets, while ROE is defined as the ratio of net income before-tax to total shareholders' funds. Taken as a whole, plots of time paths show that there have been some improvements in the measures of competition over the sample period.

FIGURE 4: BANK PROFITABILITY IN BOTSWANA



Source: Authors' compilation from BoB Annual Reports

3. LITERATURE REVIEW

3.1 Theoretical Literature Review

The relationship between market structure and performance has been explained within three different approaches of Structure-Conduct-Performance (SCP) hypothesis by Bain (1956), Relative Market Power (RMP) hypothesis developed by Shepherd (1982) and Efficiency-Structure (ES) hypothesis proposed by Demsetz (1973). The SCP paradigm postulates that firms in highly concentrated industries or markets are able to extract higher profits (monopolistic rents) because such firms can resort to anti-competitive behaviour and collusive arrangements. Thus, according to this paradigm, a positive correlation between the market concentration and profitability indicates that there is not enough competition in the industry. As noted earlier, banks in highly concentrated industries may agree not to compete with one another and hence refrain from raising deposit rates during a contractionary monetary policy period, but raise lending rates. This conduct tends to raise intermediation margins and hence profits. Unlike the SCP hypothesis, the RMP hypothesis postulates that profitability of individual banks is based on their own market shares, hence, firms with large market shares and well-differentiated products can exert market power to gain profit (Berger, 1995). Alternatively, Demsetz (1973) and others contend that high profitability and market concentration are a result of efficiency of leading firms. Their main argument is that firms with a comparative advantage in production gain market share and become large at the expense of inefficient ones and as a result the market will become concentrated. However, Berger (1995) and Berger and Hannan (1997) argued that market share captures more than just efficiency. They instead favoured using two explicit measures of efficiency known as X-efficiency and Scale efficiency. According to X-efficiency hypothesis, the costs incurred by banks with efficient management and technology are lower, hence, higher profitability. On the other hand, the scale efficiency hypothesis states that a bank is more efficient because it produces at a lower unit cost compared to its competitors, resulting in higher unit profitability. That is, the differences in the level of economies of scale are responsible for the profit differentials among banks (Smirlock, 1985).

3.2 Empirical Literature Review

Several studies have been done on the relationship between bank market structure and performance using both developed and developing countries data. However, the results of these studies are inconclusive. Smirlock (1985) used a sample of 2700 unit banks (from the 10th Federal Reserve District) operating between 1973 and 1978. He found evidence of positive correlation between market share and profitability. Similarly, Evanoff and Fortier (1988) find strong support for the ES hypothesis and limited support for SCP hypothesis when markets are characterised by significant entry barriers. Their 1984 sample of banks from 30 states was split according to those operating under unit banking laws and those with state-wide branching.

Their results illustrated the negative role of legal barriers to entry.

Berger (1995) used measures of concentration, market share, X-efficiency and scale-efficiency in a single specification in order to test all four hypotheses. He tested these hypotheses using 30 separate cross-sectional datasets. The results show some support for the RMP hypothesis and partial support for the X-efficiency approach. The author concluded that neither of these hypotheses are significant in explaining bank profitability, as the respective variables explain little of the variance of profitability.

Chirwa (2003) investigated the relationship between market structure and profitability of commercial banks in Malawi, using time series data for the period 1970-1994. The study used cointegration technique and error-correction mechanism (ECM) to test the collusion hypothesis and determine whether a long-run relationship exists between profits of commercial banks and concentration in the banking industry. The results suggested the existence of a positive long run relationship between concentration and performance, supporting the traditional collusion hypothesis.

Flamini, Schumacher and McDonald (2009) analysed the determinants of banking profitability for 389 banks in 41 Sub-Saharan Africa countries for the period 1998–2006. The study used Arellano-Bond (1991) two-step generalised method of moments (GMM) approach for the analysis. The authors found that apart from credit risk, higher returns on assets are associated with larger bank size, activity diversification and private ownership. The results also indicated that profitability of banks is affected by macroeconomic variables, suggesting that macroeconomic policies that promote low inflation and stable output growth boost credit expansion.

Chortareas, et al. (2011) examined the banking performance in Latin America for the period 1997 to 2005. They tested all hypotheses under market power (SCP and RMP) and efficient structure (X- and scale-efficiency) hypotheses for a sample of over 2500 banks in nine Latin American countries, using Data Envelopment Analysis technique. Their findings are particularly robust for the largest banking markets in the region, namely Brazil, Argentina and Chile. They also found capital ratios and bank size to be among the most important factors in explaining higher than normal profits for Latin American banks. Their findings are in support of the RMP hypothesis.

Garza-Garcia (2011) analysed the determinants of bank performance in the Mexican banking sector for the period 2001–2009, using the GMM approach. The study tested the SCP hypothesis and RMP hypothesis alongside two variants of the ES hypothesis. The results showed that banking profitability is determined by greater market share, confirming the RMP hypothesis. In addition, the study found that profits persist over time and adjust slowly to equilibrium, suggesting that the banking sector was not very competitive during the sample period. Moreover, there is no evidence of a positive relationship between greater efficiency and bank profits. Finally, while capitalisation levels increase bank profits, liquidity risk decreases them.

Using an Ordinary Least Squares (OLS) method, Kapunda and Molosiwa (2012) examined the performance of commercial banks in Botswana by testing the SCP hypothesis. The study found that performance depends positively and significantly on market structure. Ongore and Kusa (2013) used a multiple linear regression model to analyse the determinants of financial performance of commercial banks in Kenya, using panel data for 37 commercial banks. The study found that bank specific factors significantly affect the performance of commercial banks in Kenya, except for the liquidity variable. They argue that there is a moderate role of ownership identity on the financial performance of commercial banks. Therefore, they concluded that the financial performance of commercial banks in Kenya is driven mainly by board and management decisions, while macroeconomic factors have insignificant contribution.

Most studies on market structure and performance analysis use either panel, cross-sectional or time series methods. However, there is limited analysis using panel data, despite its advantages. Furthermore, there appears to be limited or no study with reference to Botswana's banking sector that has tested all hypotheses using panel data. In terms of results, there are no empirical results that seem to emerge from the literature that could, generally, explain the relationship between market structure and profitability among commercial banks in Botswana and certainly not for the recent period that this paper considers.

4. METHODOLOGY

Berger and Hannan (1997) proposed a comprehensive approach for analysing the relationship between market structure and bank performance that tested for the SCP, RMP, X-efficiency and Scale-efficiency in a single specification. This framework has since been used in many banking sector structure-performance empirical studies. The empirical model used in this paper follows this tradition, but is extended to incorporate other determinants suggested by, among others, Berger (1995) and Garza-Garcia (2011). The baseline model is specified as follows:

$$\pi_{it} = \alpha_{it} + \beta_1\pi_{it-1} + \beta_2 ESS_{it} + \beta_3 EXS_{it} + \beta_4 MS_{it} + \beta_5 CR4_t + \delta_i Z_{it} + v_{it}$$

where i=1,2,…,N are cross sections, selected commercial banks in Botswana, and t=1,2,…,T, are the time periods, 2011 to 2016. π is a measure of bank performance. Banking studies on structure-performance relationships have used a variety of variables as measures of bank performance. However, Gilbert (1984) has argued convincingly that bank profit rate is the most appropriate measure of bank performance. Many studies have since followed this approach and used either the ROA or ROE as measures of performance (profit). Although Weiss (1974) has argued that ROE is more appropriate than alternative measures because it corresponds most closely to what shareholders seek to maximise, many banking studies tend to emphasise ROA. This study follows much of the empirical literature and uses ROA as proxy for profit. Scale efficiency (ESS) and X-efficiency (EXS) represent the efficiency measures computed using the non-parametric Data Envelopment Analysis (DEA) method. If positive and statistically significant relationships are found, this would support the ES hypothesis, indicating that bank profitability is driven by higher bank efficiency. That is, the cost advantages enjoyed by efficient banks enable them to make higher profits than inefficient banks (Berger, 1995). MS and CR4 measure the market share of each bank and the combined market share (in terms of assets) of the largest four banks, respectively. Positive and statistically significant coefficients on these variables would provide evidence in support of the MP hypothesis in which large banks use their positions of dominance to extract high profits. This may take the form of dominant banks setting high lending rates on their loans, while offering low rates on deposits. Z is a vector of bank-specific and macroeconomic variables that other studies have found to influence bank performance.

From the bank-specific variables, capital asset ratio (CAP) is used as a measure for capital adequacy and much of the literature indicates that it has a positive effect on bank profit (Berger, 1995; Garza-Garcia, 2012). Non-performing loans (NPL) measure credit risk and are expected to decrease bank profits as they tend to reduce the number of profitable loans advanced (Bourke, 1989; Nannyonjo, 2002). On the macroeconomic side, output (GDP) growth and inflation (INF) are likely to influence the profit-making opportunities of banks and have been used as control variables in many structure-performance studies (Frame and Kamerschen, 1997; Garza-Garcia, 2012). Athanasoglou et al. (2008) state that the improvement in economic conditions increases households and businesses demand for credit and, thus, increasing banks' profitability. Although the effect of inflation on bank profitability may depend on how inflation affects salaries and other operating costs as outlined by Revell (1979), much of the recent empirical literature find a positive relationship (see, e.g., Athanasoglou *et al.*, 2008; Seelanatha, 2010; Messai, *et al.*, 2015).

The coefficient of the lagged dependent variable, π_{it-1}, measures the level of profit persistence. Berger et al. (2000) state that the persistence of profits in banks refers to the tendency of a firm remaining in the same profit distribution and is linked to possession of market power.[4] Garza-Garcia (2012) and Athanasoglou et al. (2008) contend that the coefficient of the lagged profitability measure captures the speed of adjustment to equilibrium profits. They state that a value of this coefficient that ranges between 0 and 1 suggests that profits persist, but eventually return to equilibrium state. Thus, a value close to 0 implies that the speed of adjustment is very high indicating that the banking industry is highly competitive, while a value close to 1 indicates that the speed of adjustment is very low, signifying limited competition.

In this model, v_{it} is an error term with two components: unobserved bank-specific time invariant effect, μ_i, and time variant component, ε_{it}. Estimation of the equation above in panel setting poses some common issues, such as the presence of unobserved bank specific effects, common time effects, and potential endogeneity. Therefore, the study employs the system-generalised method of moments (S-GMM) to address these issues[5]. This model allows stronger conclusions to be drawn about any causal relationship between the market structure and performance in the banking industry.

4.1 Data and Variable Description

The study uses annual panel data for selected six commercial banks in Botswana: Barclays Bank, First National Bank, Standard Chartered Bank, Stanbic Bank, Bank Gaborone and Bank of Baroda, for the period 2011 to 2016. The sample period is selected based on the availability of data from the Bank of Botswana Annual Reports and Banking Supervision Annual Reports. The sample size was also influenced by the approach used in the study[6]. Table 1 presents the description of the variables used in this study.

4 Berger *et al.* (2000) argued that without market power, high performance by a firm would be eliminated quickly as other firms enter the market, imitate its transparent techniques or strategies, bid for its most profitable customers, or bid up the price of its managerial talent.

5 Refer to Allerano and Bond (1991), and Blundell and Bond (2000).

6 The GMM approach used in the study is suitable for panel data with small time dimension. This is because if the panel (N) is smaller than the time dimension (T), the autocorrelation test may become unreliable.

TABLE 1: DESCRIPTION OF VARIABLES AND EXPECTED SIGNS

Variables	Description
Return on Assets (ROA)	It is an indicator of bank performance, calculated as a ratio of net income before tax to total assets.
Inflation rate (INF)	Inflation rate refers to the annual change in the consumer price index (CPI), and the expected sign is ambiguous (Garza-Garcia, 2011)
Gross Domestic Product (GDP)	This is a measure of economic growth, and the expected sign is positive (Demirguc-Kunt and Huzinga, 2000; Garza-Garcia, 2011)
Capital Assets Ratio (CAP)	It is a proxy measure for capital adequacy, calculated as the ratio of total capital over total assets. CAP sign is expected to be positive (García-Herrero, Gavilá et al. 2009).
Non-Performing Loans (NPLs) Ratio	It is a measure of credit risk, calculated as non-performing loans over total loans. NPL (s) are expected to have a negative impact on the performance of the banking industry (Nannyonjo, 2002).
Scale-Efficiency (ESS)	ESS is computed using DEA. The ESS hypothesis states that firms that produce at more efficient scales achieve lower unit costs and higher profits. This hypothesis holds if the ESS coefficient is positive and statistically significant (Berger, 1995).
X-efficiency (EXS)	EXS is a measure of managerial cost efficiency where firms with superior management have lower costs, therefore, higher profits (Berger, 1995). A positive and statistically significant coefficient on EXS indicates that bank profitability is a result of superior managerial and technical efficiency.
Market Share (MS)	MS is calculated as the proportion of the assets of each bank to total assets. A positive and statistically significant coefficient on market share could be taken as support for RMP hypothesis.
Concentration Ratio (CR4)	CR4 measures the degree of market concentration (in terms of assets). It is the cumulative sum of the market share of the largest four banks. A positive and statistically significant coefficient on concentration ratio would be taken as evidence in support for SCP paradigm.

Table 2 summarises the descriptive statistics of the data used in this study. The ROA varies from a minimum of 0.04 to maximum of 4.65. The efficiency scores range from 0.61 to 1.00 suggesting that there is not much difference in the relative efficiencies of the six banks. The standard deviations for all variables, except GDP growth, which was adversely affected by the 2009 recession, show small statistical dispersion in data used for regression results. The recorded low standard deviations indicate that the data points are not highly variable. Furthermore, these statistics show that there are no outliers in the data set.

TABLE 2: DESCRIPTIVE STATISTICS

Variable	Obs.	Mean	Standard Deviation	Min	Max
ROA	30	2.546045	1.647889	0.035000	4.653772
ESS	30	0.873477	0.161065	0.626823	1.000000
EXS	30	0.939589	0.107063	0.606346	1.000000
MS	30	0.226497	0.047002	0.155385	0.316112
CR4	30	0.865192	0.057127	0.791964	0.943689
INF	30	7.877939	3.034883	3.111147	13.69485
GDP	30	5.013922	5.272826	-7.65231	11.34342
CAP	30	0.089215	0.028764	0.046784	0.140247
NPL	30	6.175016	0.950720	5.062139	7.666316

5. REGRESSION RESULTS

Table 3 shows results from the system-generalised method of moments (S-GMM) estimation. The Wald-test results show that all the coefficients are jointly significant. The consistency of the S-GMM estimator depends on the validity of the moments conditions. Therefore, it is critical to perform the specification tests, especially the Hansen J-statistic test of over-identifying restrictions. The J-statistic test of over-identifying restrictions is conducted to test the overall validity of instruments by analysing the sample moments conditions used in the estimation process (Baum et al., 2003). The J-statistic results indicate that the over-identifying restrictions are satisfied. In other words, J-statistic is insignificant at all significance levels, implying that all models are well specified.

TABLE 3: SYSTEM GMM DYNAMIC PANEL MODEL RESULTS: DEPENDENT VARIABLE, ROA

	Model I	Model II	Model III	Model IV
ROA(-1)	0.520	0.820	0.446	0.512
	(3.50)***	(5.20)***	(2.51)**	(3.42)***
ESS	-0.038	-0.198	0.016	
	(-0.045)	(-0.17)	(0.02)	
EXS	0.695	1.269	0.820	
	(4.01)***	(2.24)**	(3.14)***	
MS	0.005	0.008		0.003
	(0.252)	(0.39)		(0.15)
CR4	0.096	0.336		0.130
	(0.364)	(1.53)		(0.56)
INF	0.420		0.386	0.504
	(3.04)***		(2.85)***	(3.60)***
GDP	-0.001		0.005	-0.003
	(-0.01)		(0.02)	(-0.06)
CAP	0.336		0.450	0.380
	(1.07)		(2.77)***	(1.41)
LNPL	1.136		0.840	1.470
	(1.45)		(1.07)	(1.78)*
F-Statistic/ Wald *X*	93.34	153.33	27.85	18.72
	[0.000]	[0.000]	[0.000]	[0.000]
J-Statistic/AR (2)	0.644	3.69	0.099	2.54
	[0.422]	[0.158]	[0.754]	[0.111]
JBNormal/sargan test	1.49	4.39	1.12	1.09
	[0.475]	[0.112]	[0.570]	[0.581]

Notes: *,**,*** denotes the level of significance at the 10 percent, 5 percent and 1 percent level, respectively. The numbers in round brackets are the values of the t-statistics, while those in square brackets are the probability values.

The coefficient of the lagged dependent variable is used to test the persistence of profitability over the study period. The results indicate that the coefficient of the lagged dependent variable is positive and statistically significant at 1 percent level in all models. The results from Model I, III and IV indicate a moderate persistence of profitability. This reflects that competition in Botswana's banking industry can be regarded as average. This result is consistent with the observed level of competition as measured by the HHI, which averaged around 0.29 during the sample period. The results from Model II differ from those of the other models and could have been affected by the omission of the control variables in the estimation and are therefore not interpreted here.

The coefficient of CR4 is not significant in all models. This indicates a rejection of the SCP hypothesis and any possible collusion among market leaders in the banking industry. Similarly, MS has no significant relationship with ROA in all the estimated models, which is a rejection of RMP hypothesis. This result rules out the possibility that large banks obtain higher profits through pricing above competitive levels. These results do not change even when efficiency measures are excluded from the estimation as in model IV. This is not surprising in view of the fact that relative market share of the dominant banks changed during the sample period, which indicates competition or rivalry among the dominant banks. These results are consistent with that of Kayawe and Amusa (2003), which suggests that in Botswana's case, the relationship between profits and structure could be influenced by factors other than market power or its abuse.

Regarding the Efficient Structure hypothesis, the estimation results show that the coefficient on technical or X-efficiency (EXS) variable is positive and statistically significant in all models. This implies that banks that maximise the use of their inputs in terms of deposits and technology are able to lower unit costs and thereby earn more profits. In contrast, the scale efficiency (ESS) variable is not significant in all models and, thus, rejecting the scale efficiency hypothesis. Therefore, bank profits are not determined by their scale of operation, that is, size does not matter for profitability. These results show that managerial efficiency and efficient use of technology were the main drivers of bank profits during the period under consideration.

Among the control variables, GDP growth is surprisingly insignificant in all models. Moreover, it has a negative relationship with profitability in two of the three models. NPL ratio has a positive and statistically significant effect on bank profitability in model IV, implying that higher credit risk translates into higher profitability. This could suggest that banks transfer costs of non-performing loans to customers in the form of higher interest margins (Garza-Garcia, 2012). INF has a positive relationship with banking profitability across all models, suggesting that banks tend to make profit in inflationary environments. A similar result was obtained by Demirguc-Kunt and Huizinga (1999) when analysing the determinants of commercial bank profitability for a sample of 80 countries. Finally, as expected, CAP has a positive and significant effect on banking profitability, indicating that greater capital in banks does influence their profitability.

6. CONCLUSION

The paper examined the relationship between market structure and performance in Botswana's banking sector within the framework of SCP, RMP, X-efficiency and Scale-efficiency hypotheses. Using efficiency scores obtained from DEA estimations, in order to allow for a test of individual bank effects, the study differs from its closest antecedent (Molosiwa and Kapunda, 2012) by employing a S-GMM approach to investigate the sources of bank profitability for the period 2011-2016. The study also explicitly accounted for efficiency by incorporating efficiency scores estimated by DEA in the estimation model. The empirical results reject the SCP, RMP and scale-efficiency in favour of the X-efficiency hypothesis. In other words, the results indicate that bank profitability is driven by superior managerial and technical efficiency of banks as opposed to use of market power to influence prices or collusive behaviour of dominant banks or enjoyment of economies of scale. This finding is unsurprising because the changes in the distribution of relative market shares within the largest six banks indicates healthy competition in the industry. High competition in turn encourages banks to devise better and more efficient ways of providing their services and products. This paper concludes that the improvement in banking sector profitability does not raise any competition concerns as they are driven by adoption and use of organisational strategies and technologies that improve the efficiency rather than market power or its abuse.

REFERENCES

Arellano, M., and Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *The review of economic studies, 58*(2), 277-297.

Athanasoglou Panayiotis, P., Brissimis Sophocles N. and Delis Matthaios D.(2008):"Bank-Specific, Industry-Specific and Macroeconomic Determinants of Bank Profitability". *Bank of Greece Working PaperNo, 25*.

Bain, J. S. (1951). Relation of profit rate to industry concentration: American manufacturing, 1936-1940. *The Quarterly Journal of Economics*, 293-324.

Baum, C. F., Schaffer, M. E., and Stillman, S. (2003). Instrumental variables and GMM: Estimation and testing. *Stata Journal, 3*(1), 1-31.

Berger, A. N. (1995). The profit-structure relationship in banking-tests of market-power and efficient-structure hypotheses. *Journal of Money, Credit and Banking, 27*(2), 404-431.

Berger, A. N. and Hannan, T. H. (1997). Using efficiency measures to distinguish among alternative explanations of the structure-performance relationship in banking, *Managerial Finance, 23*, 6-31.

Berger, A. N., Bonime, S. D., Covitz, D. M., and Hancock, D. (2000). Why are bank profits so persistent? The roles of product market competition, informational opacity, and regional/macroeconomic shocks. *Journal of Banking and Finance, 24*(7), 1203-1235.

Blundell, R., and Bond, S. (2000). GMM estimation with persistent panel data: an application to production functions. *Econometric reviews, 19*(3), 321-340.

BoB. (2013). Bank of Botswana Annual Report (www.bob.bw).

BoB. (2003) Bank of Botswana Annual Report - Feature on Competition, Efficiency and Productivity in the Banking sector (www.bob.bw).

Bank of Botswana (various) Banking Supervision Annual Report (www.bob.bw).

Bond, S. R. (2002). Dynamic panel data models: a guide to micro data methods and practice. *Portuguese economic journal, 1*(2), 141-162.

Burgess, jr., G. H. (1989). *Industrial Organization*, Prentice Hall, New Jersey.

Bourke, P. (1989). Concentration and other determinants of bank profitability in Europe, North America and Australia. *Journal of Banking and Finance*, 13(1), 65-79.

Chirwa, E. W. (2003). Determinants of commercial banks' profitability in Malawi: a cointegration approach. *Applied financial economics*, 13(8), 565-571.

Chortareas, G. E., Garza-Garcia, J. G., and Girardone, C. (2011). Banking sector performance in Latin America: market power versus efficiency. *Review of Development Economics, 15*(2), 307-325.

Church, J. and Ware, R. (2000). *Industrial Organization: A strategic approach*, McGraw-Hill

Demirgüç-Kunt, A., and Huizinga, H. (2000). Financial structure and bank profitability. *World Bank Working Paper*(2430).

Demsetz, H. (1973). Industry structure, market rivalry, and public policy. *Journal of Law and Economics*, 1-9.

Evanoff, D. D., and Fortier, D. L. (1988). Reevaluation of the Structure-Conduct-Performance paradigm in banking. *Journal of Financial Services Research, 1*(3), 277-294.

Flamini, V., Schumacher, L., and McDonald, C. A. (2009). The determinants of commercial bank profitability in Sub-Saharan Africa: *International Monetary Fund*.

Frame, W. S., and Kamerschen, D. R. (1997). The profit-structure relationship in legally protected banking markets using efficiency measures. *Review of Industrial Organization, 12*(1), 9-22.

García-Herrero, A., Gavilá, S., and Santabárbara, D. (2009). What explains the low profitability of Chinese banks? *Journal of Banking and Finance, 33*(11), 2080-2092.

Garza-Garcia, J. G. (2011). Determinants of bank performance in Mexico: Efficiency or market power. *Centre for Global Finance Working Paper Series,(03/11)*.

Garza-Garcia, J. G. (2012). Does market power influence bank profits in Mexico? A study on market power and efficiency. *Applied Financial Economics, 22*(1), 21-32.

Harvey, C. (1996). *Banking policy in Botswana: Orthodox but untypical*: Institute of Development Studies.

Kapunda, S. M., and Molosiwa, T. K. (2012). Economic Performance of Commercial Banks in Botswana: A Structure-Conduct-Performance Approach. *International Journal of Economics and Business Studies, Volume 2*.

Kayawe, T., and Amusa, A. (2003). Concentration in Botswana's banking sector. *South African Journal of Economic and Management Sciences= Suid-Afrikaanse Tydskrif vir Ekonomiese en Bestuurswetenskappe, 6*(4), p. 823-847.

Messai, A. S., Gallali, M. I. and Jouini, F. (2015). Determinants of bank profitability in Western European Countries: Evidence from system GMM estimates, *International Business Research. 8*(7), 1-13.

Morris, F. (1985). India's financial system: an overview of its principal structural features. The World Bank.

Ongore, V. O., and Kusa, G. B. (2013). Determinants of financial performance of commercial banks in

Kenya. *International Journal of Economics and Financial Issues*, 3(1), 237-252.

Nannyonjo, J. (2002). Financial Sector reforms in Uganda (1990-2000): Interest rate spreads, market structure, bank performance and monetary policy. University of Gothenburg: School of Economics and Commercial Law.

Revell, J. (1979). Inflation and Financial Institutions. Financial Times Limited.

Roberts, S. (1994). Competition in Banking. Bank of Botswana Research Bulletin.

Seelanatha, L. (2010). Market structure, efficiency and performance of banking performance in Sri Lanka. Banks and Bank Systems, 5(1), 20-31.

Shepherd, W. G. (1983). Economies of scale and monopoly profits *Industrial organization, antitrust, and public policy* (pp. 165-204): Springer.

Smirlock, M. (1985). Evidence on the (non) relationship between concentration and profitability in banking. *Journal of Money, Credit and Banking*, 69-83.

Tregenna, F. (2009). The fat years: the structure and profitability of the US banking sector in the pre-crisis period. *Cambridge Journal of Economics, 33*(4), 609-632.

Weiss, L. (1974) The concentration-profits relationship and antitrust. In *Industrial Concentration: The New Learning*, H. Goldschimd, H.M. Mann and J. F. Weston (eds), Little, Brown and Company, Boston.

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