The Research Bulletin

December 2016

Research and Financial Stability Department
Bank Of Botswana

Volume 29 No. 1

The Research Bulletin

December 2016

Research and Financial Stability Department
Bank Of Botswana

Volume 29 No. 1

The Research Bulletin, December 2016, Volume 29, No 1

Published by
The Research and Financial Stability Department, Bank of Botswana
P/Bag 154, Gaborone, Botswana.

ISSN 1027–5932
This publication is also available at the Bank of Botswana
website: www.bankofbotswana.bw

Typeset and designed by
Joseph Henry Tapela (Impression House)
Tel: +267 3922984, e-mail: gmail@impressionhouse.com
www.impressionhouse.com

Printed and bound by
Impression House

Comments: The Bank would welcome any comments/suggestions on papers published on the bulletin. Such communication should be addressed to:

The Director
Research and Financial Stability Department
Bank of Botswana
Private Bag 154
Gaborone

Or, e-mail to: jamesl@bob.bw

Additional copies of the Research Bulletin are available from The Librarian of the Bank of Botswana at the above address. A list of the Bank's other publications, and their prices, are given below.

Bank of Botswana Publications

		Domestic	SADC Members	Rest of the World
1.	Research Bulletin (per copy)	P11.00	US$10.00	US$15.00
2.	Annual Report (per copy)	P22.00	US$15.00	US$20.00
3.	Botswana Financial Statistics (annual: 12 issues)	Free	US$30.00	US$50.00
4.	Aspects of the Botswana Economy: Selected Papers	P82.50	US$29.00	US$42.00

Please note that all *domestic* prices cover surface mail postage and are inclusive of VAT. Other prices include airmail postage and are free of VAT. Cheques, drafts, etc., should be drawn in favour of Bank of Botswana and forwarded to the Librarian, Bank of Botswana, Private Bag 154,Gaborone, Botswana.

Bank of New York, New York (SWIFT code: IRVTUS3N)
Account Number: 8900331348
ABA Number: 021000018
Account Name: Bank of Botswana

Please always indicate the purpose of payment for easy reference. All customers are urged to use the Bank's website www.bankofbotswana.bw from which most of the publications listed above can be downloaded free of charge.

Contents

The Structure of Commercial Banks'Loan Portfolio in Botswana and the Effect on Asset Quality

Lesedi Says Senatla and Gonaya Basutli[1]

ABSTRACT

Banks in Botswana have experienced rapid credit growth in the past, with most of the lending concentrated on household loans. It is crucial to determine the impact, if any, this structure of the loan book and the pace of credit growth have had on banks' asset quality. Using a Fixed Effects Model on a panel data from a cross section of five banks for the period 2001 - 2014, this paper finds that banks' asset quality is primarily a function of economic performance. It is further found that, contrary to econometric results in other countries, e.g., Australia and the United States of America, past rapid growth in commercial bank credit has not adversely affected the quality of the loan book in Botswana. The paper also finds that the stock of household loans or unsecured personal loans issued by banks have not had statistically significant harmful effects on loan quality. The paper attributes the good performance of personal loans to arrangements with some employers for 'direct deduction from source. Hence, the findings suggest that banks' loan offers must be anchored on a satisfactory understanding of economic trends and forecasts. Put differently, to safeguard financial stability, the economic performance should be strong and sustainable.

1. Introduction

Total commercial bank credit in Botswana has been growing rapidly over the years, although this growth is from a low base. Of particular interest is the greater proportion of credit to the household sector as compared to the business sector. In turn, the largest proportion of the household credit is "unsecured personal loans". In turn, the highest share of non-performing loans is attributable to household loans, reflecting the structure of the loan book.

This paper follows the existing literature in considering whether growth in household credit, personal loans' share of household lending and real Gross Domestic Product (GDP) growth affect the quality of commercial bank household loan book. It contributes to the literature by testing whether banks use Bank of Botswana Certificates as a hedge against household loan losses or not. Furthermore, the paper tests whether real GDP growth, personal loans' share in total loans, growth of household loans and growth of business loans influence total non-performing loans.

Using the Fixed Effects Model and annual panel data spanning 2001 to 2014 from a cross section of 5 banks, namely Barclays Bank of Botswana Limited (Barclays Bank), Stanbic Bank Botswana Limited (Stanbic Bank), First National Bank of Botswana Limited (First National Bank), Standard Chartered Bank Botswana Limited (Standard Chartered) and Bank of Baroda (Botswana) Limited (Bank of Baroda), the paper finds that asset quality in banks is principally a function of economic performance. This result is based on the 95 percent confidence interval (5 percent significance level) in the case of the household non-performing loans' model and 99 percent confidence interval for the total non-performing loans' model. In other words, there is a strong rejection of the hypothesis that the coefficient of the real GDP variable is zero. Other variables were found to be less reliable or were insignificant determinants of loan impairments. The decision to focus the econometric investigations only on the 5 banks that have been in existence for a longer time period was based on the need to increase the degrees of freedom, for more robust results, and to ensure a balanced panel. Other banks such as Bank Gaborone Limited and Capital Bank Limited did not start operations until much later[2].

This paper is divided into 6 sections. Section 2 surveys studies on the determinants of asset quality; Section 3 focuses on stylised facts on the composition of credit and the structure of the loan impairments, and the associated mathematical derivations; Section 4 presents the econometric model; Section 5 provides panel regression results; while Section 6 concludes.

2. Literature Survey

The literature makes it clear that, while engaging in the lending business to maximise profits for shareholders, bank managers are acutely aware of the risks posed by bad assets on the viability of the banking business. Hence, a bank will typically seek to distinguish a good borrower from a bad one during the loan assessment stage, by considering a borrower willing to pay high interest rates as a worse risk, thus denying them the loan (Stiglitz and Weiss, 1981). On the other hand, low-risk borrowers try to differentiate themselves from high-risk ones by willingly pledging collateral so as to engage in loan contracts with low interest rates (Besanko and Thakor, 1987). On the whole, banks ration (or limit) credit to creditworthy borrowers partly to safeguard the quality of the loan book. Typically, wage increases

1 Director, Banking Supervision Department and Senior Financial Stability Analyst, Research and Financial Stability Department, respectively. The views expressed in the paper are those of the authors and do not necessarily reflect those of the Bank of Botswana.

2 Capital Bank Limited started operations in 2008 while Bank Gaborone Limited started in 2006.

(or income growth) tend to facilitate better selection (by banks) of creditworthy borrowers in the market and hence reduce the extent to which banks ration credit (Ghatak *et al.*, 2002).

Assuming that credit has been rationed, and hence that those considered creditworthy have obtained the loans, it is crucial to identify the factors that may influence the quality of the loans going forward. This is important for purposes of gauging the solvency and/or stability of the banking system. The next sub-section samples the empirical literature that studies the determinants of asset quality.

2.1 Empirical Literature

Clair (1992) used a logit model to study the impact of internal loan growth, loan growth through bank mergers and acquisitions, bank size, loan composition, non-agriculture employment growth and the bank equity capital/total assets ratio on the delinquency rates in Texas banks. The dependent variables were the non-performing loan ratio and the charge off rate or default rate changes; and the (annual) data periods were 1984 to 1990 and 1980 to 1990, respectively. All the variables were found to be statistically significant and, hence, had an effect on loan quality. Of particular significance is that the data suggested that rapid loan growth was associated with deteriorating loan quality in Texas.

Keeton (1999) argues that faster loan growth driven by supply side factors, such as the lowering of the minimum credit standards, tends to lead to higher loan losses. This could be in the form of the reduction in collateral requirements or accepting borrowers with poor credit histories. By contrast, loan growth driven by increases in loan demand from customers or productivity of borrowers' investment projects need not be associated with future loan losses, as these factors may not lead to the loosening of credit standards. Keeton used United States' commercial bank data over the period 1982-1996 and vector autoregression (VAR) method to test the relationship between loan growth and loan losses. The results indicated that increases in business loans increase the delinquency rate and further that increases in earnings reduce the delinquency rate.

Using Fixed Effects Model, Gizycki (2001) tested the effect of interest payments by corporates and households, credit growth, real GDP growth, real interest rates, commercial property inflation and share of construction in GDP on banks' credit risk on a panel of Australian banks. The dependent variable was impaired assets/total assets and the data period was June 1990 to September 1999. All the variables were found to be statistically significant and hence had an effect on loan quality.

Applying Ordinary Least Squares on data from 16 Australian banks for the period 1990 to 2001 and 1994 to 2001, Esho and Liaw (2002) found that real GDP growth, loan growth, the capital ratio, i.e., the ratio of regulatory capital to risk adjusted assets, and capital charges or risk weights explained movements in loan quality. The dependent variables were impaired assets and credit losses as measures of loan quality.

The latest study by Rodgers (2015) used a Fixed Effects Model on a panel of 26 Australian banks and largely confirmed previous studies' findings that credit losses are explained by business sector conditions, loan growth, real GDP growth, business share of lending, personal share of lending and business credit growth. The data period was 1980 to 2010.

This literature survey thus provides the basis for a model and variable selections which shall be applied in Sections 4 and 5 in the context of the Botswana data.

3. Stylised Facts

3.1 Composition of Credit

Total commercial bank credit (TL_t) primarily comprises household (HH_t) and business loans (BL_t)[3]. Mathematically, this can be expressed as follows[4]:

$$TL_t = HH_t + BL_t$$

$$\text{Let } \propto = \frac{HH_t}{TL_t} \qquad \text{Equation 2}$$

It follows from equation 2 that:

$$HH_t = \propto TL_t$$

BL_t is a residual and hence

$$BL_t = 1 - \propto TL_t \qquad \text{Equation 4}$$

The ratio of business loans to household loans (θ) can be expressed as

$$\theta_t = \frac{1-\propto}{\propto} TL_t \qquad \text{Equation 5}$$

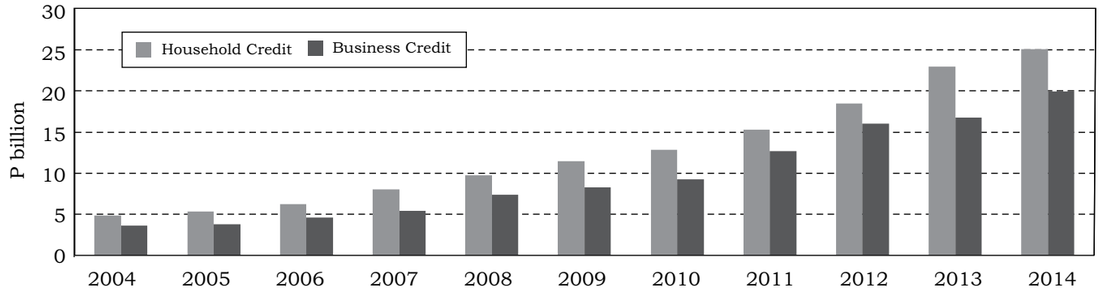
Since $HH_t > BL_t$ (Chart 1), it follows that $\theta_t < 1$. Thus, banks in Botswana operate with a low θ, i.e., offer more household loans than business loans,in part because of the high interest rates charged on (unsecured) personal loans[5].

3 See Table 3.18 of the Botswana Financial Statistics.

4 Commercial bank loans to the government are negligible, and to meet temporary revenue shortfalls, as the Botswana government (mostly) operates with budget surpluses. In cases where the government has borrowed substantially, this will usually be from multinational organisations, concessionary loans by foreign governments or through the issuance of treasury bills and bonds.

5 Unsecured personal loans, or salary-backed loans, constitute the majority of household loans as shown in subsection 3.3 below. It is not uncommon for some banks to charge interest rates of 30 percent on unsecured personal loans. In general, these types of loans are mitigated by life and disability insurance cover.

CHART 1: NOMINAL HOUSEHOLD AND BUSINESS CREDIT



Source: Botswana Financial Statistics

Household credit has grown rapidly, on average, in the past 10 years (Table 1), driven by a variety of factors, including competition[6] for customers, high personal loan demands by salaried employees, mainly in the public service, in anticipation of, and response to, annual salary increases by the government[7] and monetary policy easing[8]. Table 1 also shows that annual rapid growth in the components of credit gave rise to equally faster growth in total credit.

TABLE 1: ANNUAL CREDIT GROWTH BY SECTOR (PERCENT)

	Household	Business	Total Credit
2004	26.6	4.3	16.1
2005	9.3	4.8	7.4
2006	16.7	21.8	18.8
2007	29.4	17.6	24.4
2008	21.5	36.9	27.7
2009	17.1	12.6	15.2
2010	12.5	11.3	11.9
2011	18.8	36.9	26.4
2012	21.0	26.8	23.6
2013	24.2	4.6	15.1
2014	9.4	19.1	13.5
Min	9.3	4.3	7.4
Median	18.8	17.6	16.1
Geometric Mean	17.6	13.9	17.0
Max	29.4	36.9	27.7

Source: Botswana Financial Statistics

6 Newer banks, in particular, tend to lure customers away from existing banks by offering loans, presumably at better terms, and this may include offering slightly higher loan amounts or topping-up outstanding balances. In cases where the customer does not change banks, he may end up with multiple loans from banks. Furthermore, banks bolster the size of their loan books by taking mortgage loans from, say, the Building Society in some instances. The end result of this competition for customers is growth in household loans by commercial banks.

7 After 2008, the Government discontinued the habitual annual salary increases announced during the reading of the Budget Speeches as the effects of the global financial crisis began to be felt and, instead, deferred salary negotiations to the Bargaining Council comprising the representatives of the Government and those of the trade unions. The Bargaining Council was formed under the Public Service Act 2008.

8 For example, the Bank Rate fell from 15 percent in 2006 to 7.5 percent in 2014. Furthermore, the decision to reduce the holding of Bank of Botswana Certificates to no more than P10 billion in 2011 and subsequently to P5 billion in 2013 had the effect of easing monetary policy.

3.2 TREND IN THE FINANCIAL INTERMEDIATION RATIO

Rapid growth in credit is further reflected in the financial intermediation ratio or loans-to-deposit ratio ($\Gamma = 0$). In this case we have:

$$\Gamma = \Gamma(\Phi, \Omega) \qquad \text{Equation 6}$$

where Φ are total loans and Ω are total deposits. In turn, the intermediation ratio is calculated as:

$$\Gamma = \Phi\Omega^{-1} \qquad \forall t \in T \qquad \text{Equation 7}$$

Equation 7 can be rewritten elegantly as

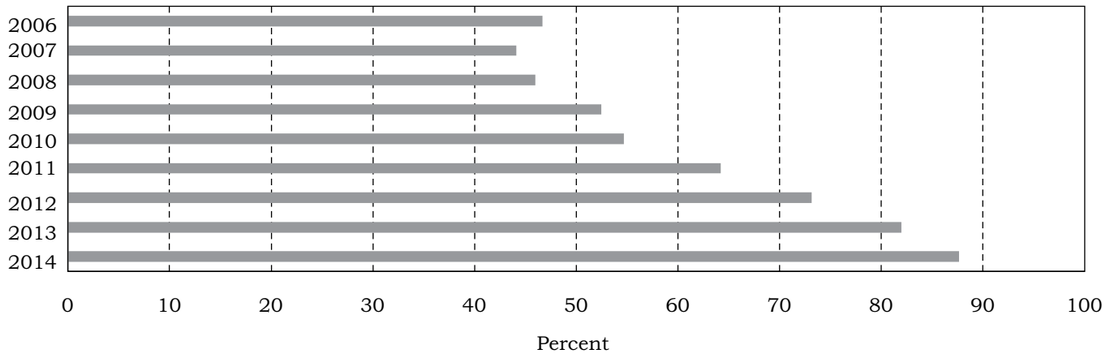
$$\frac{\Gamma}{\Phi} = \Omega^{-1} \qquad \text{Equation 8}$$

Or equivalently

$$\frac{\Phi}{\Gamma} = \Omega \qquad \text{Equation 9}$$

Chart 2 shows that the intermediation ratio increased from 47 percent in 2006 to 88 percent in 2014. When household's loans and deposits are isolated and the intermediation ratio is recalculated – on a monthly basis, the effect is a much higher average ratio (Table 2). This implies a low savings rate culture by households, at least in banks.

CHART 2: FINANCIAL INTERMEDIATION RATIO



Source: Botswana Financial Statistics

Table 2: Household Advances to Deposits ratio (Percent)

	2011	2012	2013	2014
Min	151.2	170.2	190.6	190.1
Median	171.1	180.4	203.5	205.8
Max	195.0	190.6	220.4	244.4

Source: Botswana Financial Statistics

3.3 THE COMPONENTS OF HOUSEHOLD CREDIT

Household credit[9] (HH_t^l) can be decomposed into its constituent parts as follows:

$$HH_t^l = P_t + M_t + C_t + \eta_t \qquad \text{Equation 10}$$

In this case P, M, C and η_t are property, motor vehicle, credit cards and 'other' or unsecured personal loans[10], respectively.

Equation 10 can be rewritten taking into account the proportionate shares of each loan category[11] as follows:

9 Chart A1 in the appendix compares household debt to GDP ratio in Botswana with a few selected countries and finds that household indebtedness in Botswana is low by international standards.

10 It is possible that unsecured loans may be used to buy property and/or motor vehicles as well. But what these are used for is not relevant for our purposes here as their ultimate use does not invalidate their classification or treatment.

11 We drop the subscripts and superscripts for neatness.

$$HH = \alpha HH + \beta HH + \theta HH + \gamma HH \qquad \text{Equation 11}$$

Here the parameters $\alpha, \beta, \theta,$ and are defined as:

$$\text{or} \quad \alpha = \frac{P}{HH} \quad \text{or} \quad P = \alpha HH \qquad \text{Equation 12}$$

$$\beta = \frac{M}{HH} \qquad \text{Equation 13}$$

$$\theta = \frac{C}{HH} \qquad \text{Equation 14}$$

$$\gamma = \frac{\eta}{HH} \qquad \text{Equation 15}$$

Proportionate shares of the components of household credit are shown in Table 3 below and it can be seen that 'other' loans or unsecured personal loans are the largest segment of household loans. Given the disproportionate share of unsecured personal loans in the household loan portfolio, it is fitting to be concerned about risks, if any, that these pose to the quality of the household loan book and the entire loan book.

TABLE 3: HOUSEHOLD LOANS BY PURPOSE AS A PROPORTION OF TOTAL HOUSEHOLD LOANS (PERCENT)*

Year	Property	Motor Vehicle	Credit Cards	Other
2004 Mar	20.6	29.0	…	50.4
2004 Dec	21.6	22.6	…	55.8
2005 Mar	21.8	21.9	…	56.3
2005 Dec	22.5	16.7	…	60.8
2006 Mar	23.8	15.7	…	60.4
2006 Dec	23.6	12.9	…	63.4
2007 Mar	23.3	12.4	…	64.3
2007 Dec	19.4	12.3	…	68.3
2008 Mar	20.6	10.8	…	68.6
2008 Dec	21.2	10.2	…	68.6
2009 Mar	20.2	9.3	…	70.5
2009 Dec	22.3	8.2	…	69.6
2010 Mar	22.6	9.5	…	67.9
2010 Dec	25.1	6.5	…	68.4
2011 Mar	25.7	7.8	…	66.4
2011 Dec	22.7	6.9	3.9	66.6
2012 Mar	21.9	6.8	3.6	67.7
2012 Dec	23.6	5.9	2.9	67.5
2013 Mar	25.3	6.0	3.1	65.5
2013 Dec	28.9	5.6	2.7	62.8
2014 Mar	29.9	5.7	2.7	61.6
2014 Dec	30.6	5.7	2.6	61.0

Source: Botswana Financial Statistics (various issues).
*The focus is on March and December figures only to save on space.

3.4 THE STRUCTURE AND BEHAVIOUR OF LOAN IMPAIRMENTS

Consistent with the structure of the loan book, the greater proportion of non-performing loans[12] is from the households (Table 4). This implies that the quality of the loan book is intrinsically connected with the performance or the financial status of households.

Table 4: Household and Total Non-performing Loans

	Total NPL (P million)	Household NPL (P million)	Household NPL as a proportion of Total NPL (Percent)
2004	69.7	58.5	84.0
2005	86.1	80.6	93.6
2006	158.4	145.2	91.7
2007	183.1	155.7	85.0
2008	157.9	145.5	92.1
2009	169.2	142.0	83.9
2010	594.7	552.3	92.9
2011	568.4	518.0	91.1
2012	772.2	694.3	89.9
2013	1205.5	927.4	76.9
2014	1304.4	796.0	61.0

Source: Botswana Financial Statistics

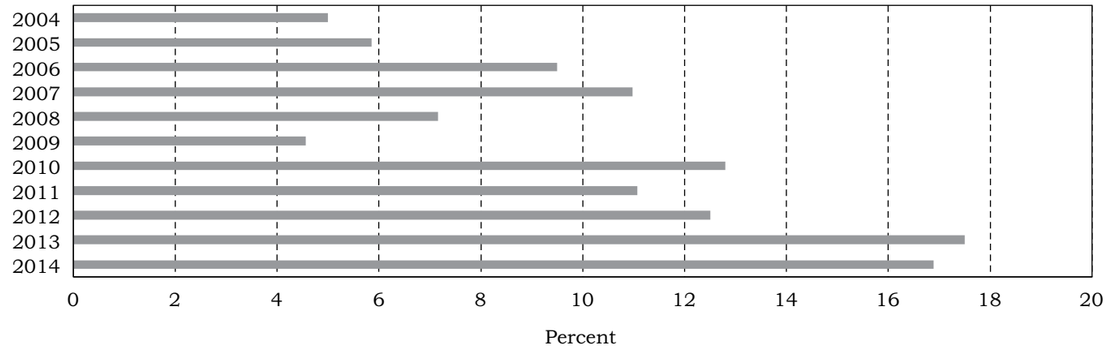
Chart 3 shows that non-performing loans[13] have steadily been reducing the capital and reserves cushion of banks as more reserves were progressively dedicated to absorbing expected losses[14]. Nevertheless, the extent of the capital erosion has historically been manageable.

12 Non-performing loans are loans and advances that have been in arrears for 90 days or more. In effect, these are incurred losses for which a bank commits capital reserves, thus reducing profitability.

13 Chart A2 in the appendix compares non-performing loans to total loans ratio in Botswana with a few selected countries and finds that Botswana does rather well, if not better than most other countries in managing loan losses.

14 It is possible that some banks may be running down their capital and reserves to fund their lending activities in the event where they are finding it difficult to raise enough deposits. But, in the process, they must not violate the prudential capital adequacy ratios.

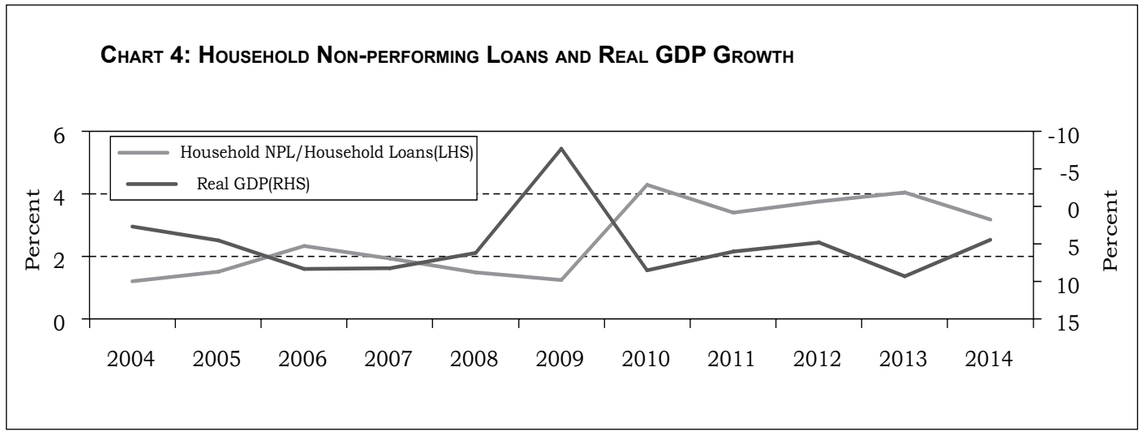
CHART 3: NON-PERFORMING LOANS AS A PROPORTION OF CAPITAL AND RESERVES



Source: Botswana Financial Statistics

Chart 4 shows that household non-performing loans and real GDP growth have an inverse relationship as the literature suggests. However, a more robust or objective technique is needed to establish whether there exists a statistically significant relationship between non-performing loans and real GDP growth.

CHART 4: HOUSEHOLD NON-PERFORMING LOANS AND REAL GDP GROWTH



Source: Botswana Financial Statistics

4. ECONOMETRIC MODEL

We specify the model as $E(LQ_{it} \mid X)$. In this case LQ_{it} is a measure of loan quality, while X is a set of explanatory variables. Drawing on the empirical literature, in terms of the variable selection as noted above, the following reduced form dynamic model is estimated:

$$\Delta HHNPL/HHL_{it} = \alpha_i + \beta_0 \Delta(B)HHNPL/HHL_{it} + \beta_1 \Delta RGDP_t + \beta_2 \Delta PL/HHL_{it} + \beta_3 \Delta HHL_{it} + \beta_4 \Delta BoBCs_{it} + \varepsilon_{it} \quad \text{Equation 16}$$

where HHNPL/HHL is household non-performing loans[15] to household loans ratio; B is the backward shift operator and the coefficient of the lagged past values of non-performing loans is expected to be positive; ΔRGDP is real GDP growth and real GDP growth is expected to have a negative influence on loan defaults; PL/HHL is the share of personal loans in the household loan portfolio and this is expected to have a positive influence on loan defaults as in Rodgers (2015); ΔHH is household credit growth

15 Non-performing loans are as defined in footnote 12.

and is expected to have a positive coefficient as in Gizycki (2001) and Rodgers (2015); and BoBCs capture Bank of Botswana Certificates[16] and these are expected to be negatively correlated with loan losses; α captures the effects of variables specific to the individual entities, i.e., banks, while ε is the stochastic error representing omitted variables.

Furthermore, we specify the total non-performing loans to total loans equation as follows:

$$\Delta TNPL/TL_{it} = \alpha_i + \beta_0\Delta(B)TNPL/TL_{it} + \beta_1\Delta RGDP_t + \beta_2\Delta PL/TL_{it} + \beta_3\Delta HHL_{it} + \beta_4\Delta BL_{it} + \beta_5\Delta BoBCs_{it} + \varepsilon_{it}$$

Equation 17

In this case, TNPL/TL is total non-performing loans to total loans ratio. BL captures business loan growth and is expected to have a positive influence on loan defaults under the assumption that faster loan growth leads to higher loan defaults as in Keeton (1999) and Rodgers (2015). The rest of the variables have been defined above.

5. PANEL REGRESSION RESULTS

Table 5 presents panel data results based on a cross section of five banks, namely Barclays Bank, Stanbic Bank, First National Bank, Standard Chartered Bank and Bank of Baroda. Annual data from 2001 to 2014, on the variables described above, are used for estimation purposes. However, the time series dimension of the data is truncated to 2003 - 2014 because of differencing[17] and lags. As already stated, the decision to focus only on these banks was dictated by the need to increase the degrees of freedom[18] based on the time dimension and in the context of a balanced panel.

The Analysis-of-Covariance model or Fixed Effects Model results[19] (Table 5) confirm that (lagged) output growth[20] is a statistically significant determinant of household loan defaults[21]. In this case, a 1 percentage point growth in real GDP leads to a fall of 0.11 percentage points in household loan impairments. On the other hand, the coefficient of the household credit growth variable – while positively associated with loan impairments – is not statistically significant; thus, implying that household credit growth is not an important driver of household loan losses. Put another way, household credit extension by banks seems to have been accompanied by careful selection of creditworthy borrowers.

The coefficient of the BoBCs variable has the correct sign, but is not statistically significant. This implies that BoBCs may not be held primarily as a hedge against household loan defaults. Rather, they might be useful to banks in terms of facilitating interbank lending, accessing credit from the central bank or meeting prudential requirements. Likewise, the holding of personal loans in the household loan portfolio does not significantly (or adversely) affect the credit quality of household loans. This might be because unsecured personal loans are primarily extended to individuals with traceable incomes or with permanent jobs. Furthermore, the fact that some banks, at least, deduct repayment instalments from salaries directly at source may account for a lack of statistically significant relationship between delinquent loans and unsecured personal loans. In other words, direct deduction from source is less likely to result in default[22].

There is also no strong statistical evidence that current household loan delinquencies depend on their past performance[23].

TABLE 5: HOUSEHOLD NPLS PANEL DATA REGRESSION RESULT

VARIABLES	FIXED EFFECTS MODEL
HH NPL (-1)	0.066 (0.165)
Real GDP growth (-2)	-0.114** (0.045)
Personal share of lending (-1)	0.019 (0.014)
Household credit growth (-2)	0.008 (0.007)
BOBCs (-1)	-0.001 (0.001)
Observations	59
AIC	3.759
Schwarz Criterion	4.111

Note: The dependent variable is household NPLs as a ratio of household loans. The estimation period is 2001 to 2014 (annual data). Standard errors are in parenthesis and ** indicates significance at the 5 percent level.

16 Bank of Botswana Certificates are central bank paper introduced in 1991 to absorb excess liquidity.
17 Largely because of differencing, the data were found to be stationary. There were also no serial correlation problems.
18 Large degrees of freedom are important since the covariance estimator β is consistent when either the cross section (N) or the time series (T) are large (Hsiao, 1996).
19 We follow the empirical literature on studies of asset quality in using the Fixed Effects Model results. This modeling framework represents well the effects of variables that are unique to the individuals under study (Hsiao, 1996).
20 This result is intuitive in that when the economy collapses and the borrowers lose their jobs, they might temporarily use the benefits derived from their pay packages to repay the loan. But when these run out eventually, they default.
21 Small value of the Akaike Information Criteria show the robustness or goodness of fit of the model selected.
22 Besides the direct deduction from source arrangement, most banks insist that salary accounts be kept with them to ensure immediate payment of loan installments and the monitoring of financial behaviour. This could reduce the risk of default.
23 The paper also experimented with the interest expenditure burden variable; this was dropped as it was insignificant.

Table 6 presents the results from the application of equation 14 and, in this case, household non-performing loans were replaced with total non-performing loans ratio. The results are similar to those obtained in Table 5 and further confirm that output growth is a key factor affecting the quality of the loan portfolio. In this case, the t-statistic is much stronger at -4.11. We experimented with business credit growth and, as is the case with household credit growth, there is no evidence that extension of business credit compromised the quality of the loan book. This result is to be expected as business loan defaults are a negligible part of the total loan delinquencies as shown in Table 4.

TABLE 6: TOTAL NPLS PANEL DATA REGRESSION RESULT

VARIABLES	FIXED EFFECTS MODEL
Total NPL (-1)	0.016 (0.136)
Real GDP growth (-2)	-0139*** (0.034)
Personal share of lending	-0.034 (0.019)
Household Credit growth (-2)	0.003 (0.005)
Business Credit growth (-2)	0.002 (0.003)
BOBCs (-1)	-0.001 (0.001)
Observations	59
AIC	2.924
Schwarz Criterion	3.311

Note: The dependent variable is total NPL as a ratio of total loans. The estimation period is 2001 to 2014 (annual data). Standard errors are in parenthesis and *** indicates significance at the 1 percent level.

6. CONCLUSION

It is important for banks and the regulator to understand the factors driving asset quality and their magnitudes to help inform credit risk management processes[24]. Selecting the variables suggested by the literature, this paper has shown that – and contrary to the statistically significant results found by, for example, Keeton (1999) using USA data, Esho and Liaw (2002) and Rodgers (2015) both using Australian data, on household credit growth variable in particular – movements in household credit growth have not compromised either household or total asset quality in the case of Botswana. This finding is not surprising as banks in Botswana tend to mitigate credit risk by deducting (household) loan payments from the employer. In addition, credit risk may also be mitigated by requiring a borrower to open a salary (or some other income, say rentals) account with the lending bank. That way, the bank in question will have privileged access to the account to enable the scrutiny of the monetary behaviour of the borrower and to deduct payments on due or salary dates[25]. Furthermore, the paper clearly finds that (negative) shocks, or disturbances, to the economy adversely affect asset quality as these result in indebted bank customers losing their jobs and, hence, the ability to service loan obligations.

The regression results also suggest that (the risk free) BoBCs holdings by banks may not principally be for purposes of hedging against loan defaults. Rather, these might be useful to banks in terms of smoothing interbank lending, easing credit access from the central bank or compliance with prudential requirements, as necessary.

Overall, it is clear that loan offers must be anchored on a good understanding of economic trends and forecasts. This means that strong economic performance contributes to the safeguarding of banking and hence, financial stability; an area which is the major focus of this paper.

24 Going forward, it will be worthwhile to ascertain empirically how the decision by the Government to discontinue annual salary increases –after 2008 – impacted, if at all, on asset quality and the magnitude of this effect.
25 When the income (or salary) account is with a particular bank, concerns about multiple borrowings are less of an issue for that bank as it, presumably, has first access to the account and pays itself before all others.

REFERENCES

Besanko, D., and Thakor, A.V (1987), 'Collateral and Rationing: Sorting Equilibria in Monopolistic and Competitive Credit Markets', International Economic Review 28, 671-689.

Botswana Financial Statistics, Bank of Botswana (various issues).

Clair, R.T. (1992), 'Loan Growth and Loan Quality: Some Preliminary Evidence from Texas Banks', Federal Reserve Bank of Dallas, Economic Review, Third Quarter.

Esho, N. and Liaw A. (2002), 'Should the Capital Requirements on Housing Lending be Reduced? Evidence from Australian Banks' Working Paper 2002-02, Australian Prudential Regulation Authority.

Fernandez de Lis, S., Pages J.M., and Saurina J. (2001), 'Credit Growth, Problem Loans and Credit Risk Provisioning in Spain', BIS Paper No. 1.

Ghatak, M., Morelli M., and Sjostrom T. (2002), 'Credit Rationing, Wealth Inequality, and Allocation of Talent', http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1160986

Gizycki, M. (2001), 'The Effect of Macroeconomic Conditions on Banks' Risk and Profitability', Research Discussion Paper 2001-06, Reserve Bank of Australia.

Hsiao, C. (1996), 'Analysis of Panel Data', Cambridge University Press, New York.

Keeton, W.R. (1999), 'Does Faster Loan Growth Lead to Higher Loan Losses?', Federal Reserve Bank of Kansas City, Economic Review, Second Quarter.

Rajan, R.G. (1994), 'Why Credit Policies Fluctuate: A Theory and Some Evidence', The Quarterly Journal of Economics, Vol. 109, No. 2, pp 399-441.

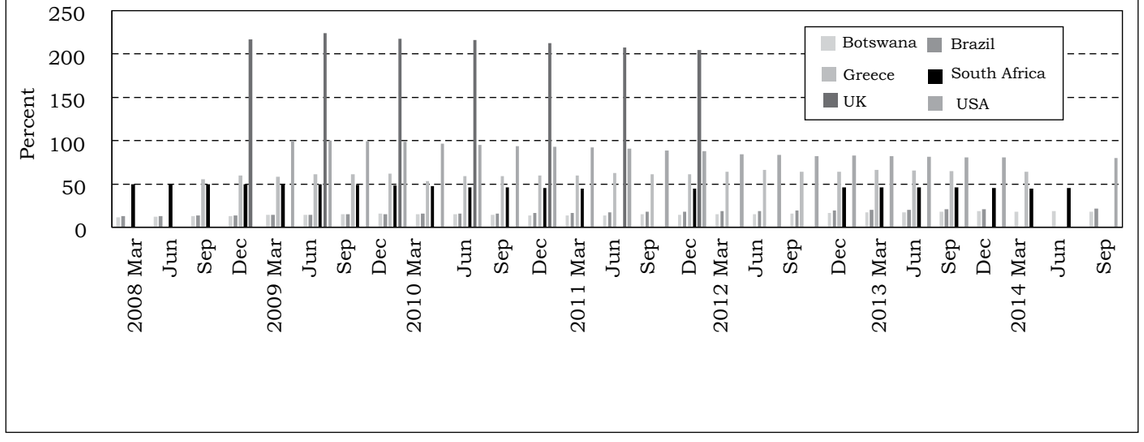
Rodgers, D. (2015), 'Credit Losses at Australian Banks: 1980 – 2013', Research Discussion Paper 2015-06, Reserve Bank of Australia.

Stiglitz, J.E., and Weiss A. (1981), 'Credit Rationing in Markets with Imperfect Information' American Economic Review 71, 393-410.

APPENDIX

Chart A1 shows that household indebtedness as a proportion of GDP is low by international standards. This implies that there is room for further growth in household credit to match international standards. However, accumulation of credit beyond the economy's capacity to sustain can harm financial stability. This must be avoided.

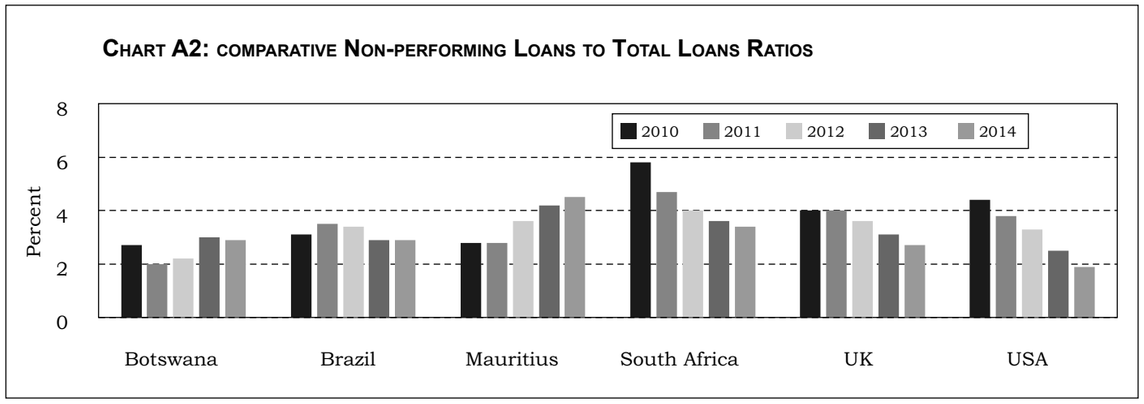
CHART A1: HOUSEHOLD DEBT TO GDP RATIO OF SELECTED COUNTRIES



Source: International Monetary Fund (available at http://fsi.imf.org) and Botswana Financial Statistics.

Table A2 shows that the non-performing loans ratio in Botswana compares favourably with the rest of the world and that it is lower than that obtained in the Republic of South Africa and Mauritius.

CHART A2: COMPARATIVE NON-PERFORMING LOANS TO TOTAL LOANS RATIOS



Source: International Monetary Fund (available at http://fsi.imf.org) and Botswana Financial Statistics.

Inflation and Economic Growth: Estimation of a Threshold level of Inflation in Botswana

Moemedi Phetwe and Lesego Molefhe[1]

Abstract

This paper examines the possibility of a threshold effect of inflation on economic growth in Botswana over the period 1994 to 2014. The estimated threshold regression models indicate a non-linear relationship between economic growth and inflation in Botswana and that the threshold level of inflation for GDP growth is 6.9 percent. The implication of these results is that, below this level (6.9 percent), inflation has a statistically significant positive effect on GDP growth. However, a negative relationship is observed once inflation is above the 6.9 percent level. The results confirm the efficacy of the 3 to 6 percent desired inflation objective range, as pronounced by the Bank of Botswana; it is well below the estimated 6.9 percent threshold level of inflation. Consequently, the set inflation objective range contributes to the Bank's goal of achieving its primary statutory objective of price stability and, therefore, in support of the broader national objective of sustainable economic diversification and development.

1. Introduction

Knowing what inflation rate to aim for is critical in the formulation and implementation of monetary policy.[2] In particular, setting an appropriate inflation objective or target requires an understanding of the relationship between inflation and output, as well as how alternative inflation objectives/targets affect economic stability and overall economic welfare. In Botswana, the annual inflation objective was first introduced in 2002, initially at 4 - 6 percent, although subject to subsequent variations.[3] However, in 2008, a rolling medium-term inflation objective of 3 - 6 percent was adopted, which has remained in place, thus becoming the Bank of Botswana's operational definition of price stability. In setting the inflation objective range, the Bank recognised that, in the long run, the options for monetary policy are essentially either a high or low rate of inflation, and that the chances for satisfactory economic performance are enhanced by a level of inflation that is low, stable and predictable. In this respect, a low, stable and predictable level of inflation, alongside a conducive financial environment fosters savings mobilisation, productive investment and international competitiveness of domestic producers; thus contributing towards the broader national objective of sustainable economic diversification and development. In addition, given Botswana's close trade links with its neighbour, South Africa, the 3 - 6 percent is consistent with the target adopted by this country.[4] However, in principle, it is crucial that the inflation target set by the authorities be as close as possible to a level of inflation which is considered optimal for the growth of the economy. There is so far no known research that has definitively determined the optimal level of inflation for Botswana; this paper attempts to fill this void.[5]

Against this background, the purpose of this paper is to estimate an optimal or threshold level of inflation for Botswana and to assess whether the Bank of Botswana's current medium-term inflation objective of 3 to 6 percent is consistent with the objective of sustainable economic growth. The rest of the paper is organised as follows. The next section presents a brief review of the literature of the relationship between inflation and economic growth. Section 3 reviews some stylised facts on inflation and economic growth in Botswana. Section 4 outlines the methodology and data description, while Section 5 presents empirical estimation results, and Section 6 concludes the paper.

2. Literature Review

This section briefly reviews studies which have been devoted to the investigation of threshold effects of inflation on economic growth. In general, it appears, both in terms of cross-sectional evidence and country-specific experiences, that the relationship between inflation and economic growth is non-linear. Specifically, empirical literature provides evidence that once the threshold level of inflation is exceeded, inflation has a statistically significant negative impact on growth while below the threshold level, the relationship could be positive or non-existent. Moreover, while high inflation hurts growth, too low inflation rate might also impose opportunity costs in terms of forgone growth and employment creation.

1 Messrs. Phetwe and Molefhe are Deputy Director (Monetary Policy and Forecasting) and Economist, respectively, in the Research and Financial Stability Department, Bank of Botswana. The views expressed in the paper are those of the authors and do not necessarily reflect those of the Bank of Botswana.

2 Many benefits have been outlined in the literature, most important ones being; reduced inflation volatility (see, for example Svenson, 1997); reduced inflationary impacts of shocks (Mishkin, 2004); and increased anchoring of inflation expectations (Kohn, 2007; Swanson, 2006; Levin et al., 2004)

3 The annual inflation objective was set at 4 to 6 percent from 2002 to 2003. Between 2004 and 2007, it was set at 4 to 7 percent with the exception of the first half of 2005, where the annual inflation objective was set at 3 to 6 percent.

4 The South African inflation target is 3 to 6 percent and was formally introduced in 2000 when the country adopted an inflation targeting monetary policy framework.

5 Setlhare and Feger (2014) estimated the optimal inflation for economic growth in Botswana; however, their results are inconclusive, as all the coefficient estimates in their model are statistically insignificant.

Khan and Senhadji (2001) explored the relationship between growth and inflation using panel data for 140 industrialised and developing countries covering the period from 1960 to 1998. Using an endogenous threshold model, their results suggest the existence of a threshold beyond which inflation exerts a negative effect on economic growth. Specifically, they found estimates of 1 to 3 percent and 7 to 11 percent for industrial and developing countries, respectively.

Younus (2012) assessed the inflation-growth nexus in Bangladesh for the period 1976 to 2012. Employing a quadratic regression model and various data analysis techniques, the study found the relationship between inflation and growth to be non-linear, with an existence of a threshold level of inflation ranging between 7 and 8 percent.

Tarawalie *et al.* (2012), using an endogenous threshold model, show that West African Monetary Zone (WAMZ) countries' threshold inflation rates lie within the convergence criterion of maintaining inflation not exceeding 10 percent. In particular, the study found the following ranges for the threshold inflation rates for WAMZ countries; Gambia (7-11 percent), Ghana (6-11 percent), Guinea (3-9 percent), Liberia (3-9 percent), Nigeria (9-14 percent) and Sierra Leone (7-12 percent).

Frimpong and Oteng-Abaye (2010) studied the threshold effect of inflation on economic growth in Ghana for the period 1960 to 2008 using an endogenous threshold regression model. Their results indicate an inflation threshold level of 11 percent, beyond which inflation starts to significantly hurt growth in Ghana. The results also indicate that, below the 11 percent threshold, inflation is likely to have a mild effect on economic activity.

Sindano (2014) estimated the optimal inflation rate for Namibia by employing a quadratic threshold model technique for the sample period 1980 to 2012. According to the model results, the impact of inflation on economic growth in Namibia is positive at lower rates of inflation and becomes negative as inflation rises above 12 percent.

Seleteng (2005) also estimated an inflation-growth threshold model for Lesotho using quarterly time series data for the period 1981 to 2004. The study established that the optimal level of inflation, above which inflation is detrimental to economic growth in Lesotho, is 10 percent.

In the case of South Africa, Leshoro (2012) estimated an endogenous threshold model developed by Khan and Senhadji (2001) using quarterly data over the period 1980 to 2010. The results show that the inflation threshold level occurred at 4 percent. At inflation levels below and up to 4 percent, there is a positive, but insignificant relationship between inflation and growth. The relationship becomes negative and significant when the inflation rate is above 4 percent.

In Botswana, Setlhare and Feger (2013) analysed the inflation-economic growth relationship using a threshold model from the period 1995 to 2013. The model results show that there is a non-linear relationship between growth and inflation, and that the threshold value of inflation for Botswana is 11.4 percent. The results of this study are however inconclusive as all the coefficient estimates of the model are statistically insignificant.

The reviewed studies provide important guidance on the methodological approach to estimating the level of optimal inflation for economic growth; however, no guidance is provided on estimating the level of inflation that is too low for growth. Table 1 presents a summary of studies that estimated the *Optimal Inflation Threshold* in the inflation-growth relationship across different countries.

TABLE 1: THRESHOLD STUDIES IN THE INFLATION-ECONOMIC GROWTH RELATIONSHIP

Authors	Sample Period	Estimated Threshold	Threshold Model	Relationship between Inflation and Growth	
				Above threshold	Below threshold
Khan and Senhadji (2001)	1960 -1998	Developed: 1-3 percent Developing: 7 – 11 percent	Endogenous (2SLS)*	Negative	Positive
Younus (2013)	1976-2012	Bangladesh: 7.4 percent	Quadratic (OLS)	Negative	Positive
Tarawalie et al .(2012)	1970-2010	WAMZ: < 10 percent	Endogenous (CLS)	Negative	Positive
Frimpong and Oteng-Abaye (2010)	1960 - 2008	Ghana: 11 percent	Endogenous (OLS)	Negative	Positive
Sindano (2014)	1980-2012	Namibia: 12 percent	Quadratic (OLS)	Negative	Positive
Seleteng (2005)	1981-2004	Lesotho: 10 percent	Endogenous (OLS)	Negative	Positive
Leshoro (2012)	1980-2010	South Africa: 4 percent	Endogenous (GMM)	Negative	Positive
Setlhare and Feger (2013)	1995-2013	Botswana: 11.4 percent	Endogenous (OLS)	Negative	Positive

* Two Stage Least Squares (2SLS) is used in the estimation of the inflation-growth relationship to control, at least partially, for the problem of simultaneity bias. However, where causality between inflation and growth is one-way (running from inflation to growth or the reverse) the problem of simultaneity bias is not important, and the Ordinary Least Squares (OLS) method yields the best estimates (Fischer, 1993; Khan and Senhadji 2001)

3. STYLISED FACTS ON INFLATION AND GROWTH IN BOTSWANA

Before undertaking any estimation, it is important to present a visual analysis of the relationship between inflation and economic growth in Botswana. In this analysis, economic growth is disaggregated to filter out economic sectors with low inflation elasticities of production. These are sectors for which aggregate output is either (i) predominantly driven by non-monetary factors (example, climatic conditions)[6] and (ii) returns on investment are not directly financial or (iii) too large in nominal terms as to render concerns about inflation of secondary importance (Kahuti and Wright, 1997; Barriorsa et al., 2008). In Botswana, the outlined conditions apply to the agricultural, general government and mining sectors, respectively. Charts 1(a) and 1(b), therefore, present the inflation-growth relationship (from 1994 to 2014) excluding the above mentioned sectors in the measurement of the country's economic activity growth.

Chart 1(a) shows the relationship between inflation and non-mining GDP while Chart 1(b) shows the relationship between inflation and non-mining, non-government, non-agriculture GDP. As reflected in the two charts, a non-linear relationship between economic growth and inflation can be inferred throughout the period under study.

CHART 1(A): REAL NON-MINING GDP GROWTH AGAINST INFLATION

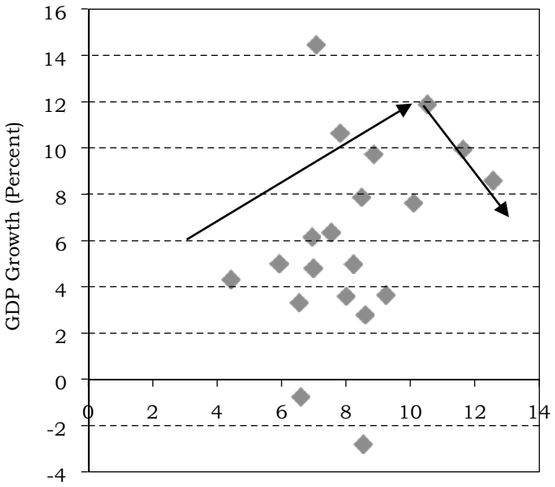
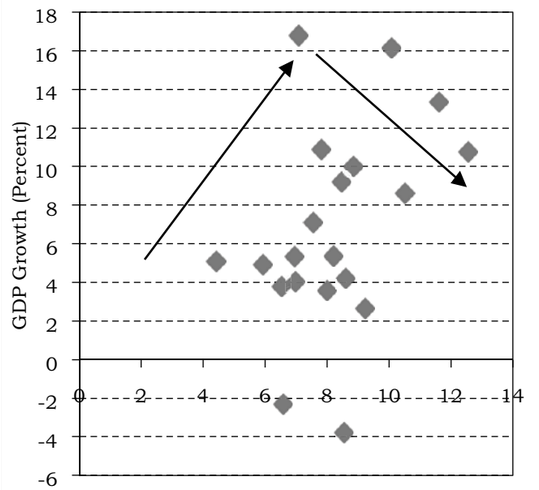


CHART 1(B): REAL NON-(MINING, GOVT & AGRIC) GDP GROWTH AGAINST INFLATION



In Chart 1(a), at low rates of inflation to about 10.9 percent, the relationship between non-mining GDP and inflation is positive, and beyond this point the relationship is negative. This suggests that the threshold level is around 10.9 percent, and that beyond this level, inflation may negatively affect economic growth. Similarly, in Chart 1(b), at inflation levels of up to around 6.8 percent, the relationship between non-mining, non-government, non-agriculture GDP and inflation is also positive and becomes negative beyond that level. This also suggests that the threshold level of inflation in this case is around 6.8 percent. The two charts report different inflexion points of inflation, the difference emanates from the measurement of economic growth used in each individual chart. Nevertheless, the simple analysis in the two charts conveys a common message, thus, at a very low level of inflation, the relationship between growth and inflation is positive, but after a certain point, the relationship becomes negative. Therefore, the relationship is non-linear. As a result, the simple graphical evidence can justify the use of the threshold model for Botswana.

6 Barriorsa *et al.* (2008), using a cross-country panel climatic dataset in an agricultural production framework, show that climate, measured as changes in country-wide rainfall and temperature, has been a principal determinant of agricultural production in Sub-Sahara Africa.

4. METHODOLOGY AND DATA DESCRIPTION

4.1 MODEL SPECIFICATION

The paper uses the quadratic and endogenous threshold models to analyse the optimal inflation level for economic growth in Botswana. The quadratic threshold model (*Model 1*) is adapted from Younus (2012). The model analyses a quadratic equation of inflation and

growth to determine the inflexion point of inflation in the inflation-growth relationship. The model estimation includes other economic growth determinants or 'control variables' identified in the literature as statistically important in the inflation-growth estimation model.[7] A simple rule of optimisation, which entails setting the partial derivative of growth with respect to inflation to zero and solving the resulting equation is applied to determine the inflexion point of inflation or the value of inflation that maximises output growth. The quadratic model specification is presented below.

$$Y_{it} = \beta_0 + \beta_1 \pi_t + \beta_2 \pi_t^2 + \beta_3 X_t + u_t \quad \text{..... (1)}$$

i = 1, 2; t =1, … ,T

Where: is the log of economic growth captured by non-mining GDP growth and non-(mining-government-agricultural) GDP growth. These are the measures of economic growth that were found to be responsive to changes in the inflation rate. Model estimations, where economic growth is measured by aggregate economic activity (Total GDP) growth, do not yield any significant relationship between inflation and growth. According to Kahuti and Wright (1997), this is largely explained by the fact that much of the growth in Botswana emanates from sectors with very low inflation elasticities of output. These include mining, government and the agricultural sector. The relationship posited in theory and validated by a wide range of empirical studies between inflation and growth is observed for Botswana once these inflation-inelastic economic sectors are excluded from the country's measure of economic activity.

is the inflation rate, is the squared inflation rate and is a vector of control variables identified as fundamental sources of economic growth in both theory and empirical literature, and they include investment growth, population growth and openness index.

The second model used is the one developed by Khan and Senhadji (2001) for endogenously estimating the optimal threshold level of inflation in the inflation-growth relationship. The model involves estimating equation (2) specified below and computing the residual sum of squares (RSS) for the threshold levels of inflation π^* (chosen arbitrarily) ranging from $\pi 1^*$ to πT^*. The optimal threshold level of inflation (πk^*) is the one that minimises the sequence of RSSs. The endogenous model is specified as follows;

$$Y_t = \beta_0 + \beta_1 (\pi_t) + \beta_2 d_t^{\pi} [\log(\pi_t) - log(\pi^*)] + \beta_3 X_{it} + u_t \text{ ..... (2)}$$

Where π^* is arbitrary threshold level of inflation

$$d_t^{\pi} = \begin{cases} 1 \text{ if } \pi_t > \pi^* \\ 0 \text{ if } \pi_t \leq \pi^* \end{cases} \quad t = 1, \dots, T;$$

All variables are as defined above in the first model except the dummy variable which captures higher levels of inflation in the model. The dummy variable assumes the value 1 for inflation levels above each chosen threshold level, and zero for inflation levels equal to or less than the threshold level. Subtracting log (π^*) from log (π_t) in the measurement of the dummy variable makes the inflation-growth relationship continuous at every assumed threshold level π^*.[8]

4.2 DATA

The study uses quarterly time series data, from relevant official data sources as published in the Bank of Botswana regular statistical publications, for the period 1994 to 2014 on the following variables: economic growth measured by the growth rate of (i) non-mining GDP and (ii) non-mining, non-government, non-agriculture GDP in local currency at constant 2006 prices; inflation computed as the growth rate of the consumer price index; population growth; gross fixed capital formation growth (which is used to proxy real investment growth) and the openness index measured as the ratio of the sum of exports and imports to total GDP. The economic growth variables were derived after transforming the series for the level of GDP into logarithms to harness some of the established benefits associated with logarithm operations in non-linear models.[9]

5. EMPIRICAL ESTIMATION RESULTS AND IMPLICATIONS FOR THE BANK OF BOTSWANA MEDIUM-TERM INFLATION OBJECTIVE RANGE

5.1 UNIT ROOT AND GRANGER CAUSALITY TESTS

As a pre-requisite condition in time series analysis, the stationarity properties of the variables were examined before model estimations using both the Augmented Dickey-Fuller and Philips-Perron tests. All the variables were found to be stationary at levels. Linear causation test between inflation and growth was also conducted using the Pair-wise Granger-Causality test as a preliminary assessment of the existence of the inflation-growth relationship posited in theory and confirmed by a vast number of empirical studies. The results of the test are presented in Table 2 below.

7 Adding 'control variables' in the growth-inflation model, according to Khan and Senhadji (2001), does not necessarily enhance the robustness of the relationship between inflation and growth nor affect the position of the threshold level of inflation. However, it boosts the goodness of fit of the model.

8 It is a requirement that the inflation-growth relationship be continuous at every assumed threshold level of inflation, otherwise small changes in the inflation rate around the threshold will give different impacts on growth (Khan and Senhadji, 2001).

9 According to Ghosh and Phillips (1998), in a class of non-linear models, log transformation gives the best fit.

TABLE 2: PAIR-WISE GRANGER CAUSALITY TEST

Lags:4 Null Hypothesis:	Observations	F-Statistics	Probability
Non-Mining Growth does not Granger Cause Inflation	78	0.4719	0.7561
Inflation does not Granger Cause Non-Mining Growth	.	2.1175	0.0878*
Lags:3			
Non-(Mining-Government-Agriculture) Growth does not Granger Cause Inflation	79	1.5535	0.2081
Inflation does not Granger Cause Non-(Mining-Government-Agriculture) Growth		2.4248	0.0726*

** implies significance at 10 percent level*

According to the test results in Table 2, there exists a causal relationship between inflation and economic growth in Botswana. The causality, which is statistically significant at the 10 percent level of significance, runs from inflation to growth. The results are found to be consistent with theory and empirical evidence on the linear causation between inflation and growth in both developed and developing economies (Khan and Senhadji, 2001; Seleteng, 2005; Leshoro, 2012).

5.2 QUADRATIC MODEL ESTIMATION RESULTS (*MODEL 1*)

TABLE 3(A): NON-MINING GDP GROWTH AND INFLATION MODEL RESULTS

Method of Estimation: Ordinary Least Square Method (OLS)		
Dependent Variable: log(Non-Mining GDP Growth)		
Explanatory Variables	Coefficient	Probability
C	0.0377	0.1954
Inflation	0.3878	0.8279
Inflation (squared)	-0.0167	0.2646
Population growth	0.0007	0.4961
Investment growth	0.0090	0.1499
Openness index	0.0713	0.6499

The results confirm the existence of a non-linear relationship between economic growth and inflation established by a number of empirical studies (Fischer, 1993; Khan and Senhadji; 2001; Seleteng, 2006; Younus, 2012). The results indicate that, at lower levels of inflation, there exists a positive relationship between inflation and growth, and at higher levels of inflation the relationship is negative. Therefore, by implication, there exists an inflexion point or a threshold level of inflation beyond which inflation becomes detrimental to growth. Using a simple rule of optimisation (shown below), the inflexion point or the optimal threshold level of inflation is estimated at about 11.6 percent for non-mining economic growth. The results are consistent with Setlhare and Feger (2014), who estimated the optimal threshold level of inflation for non-mining economic growth in Botswana at 11.4 percent. However, all the estimates in their study were statistically insignificant as is the case with the estimates in Table 3(a). The depth of implications that can be drawn from these estimated thresholds is, therefore, limited because of the statistical insignificance of the model estimates.

OPTIMISATION RESULTS

$$dy_t/d\pi_t(0.387799\pi_t - 0.016711\pi_t^2) = 0$$

$$\pi_k^* = 0.387799/0.033422 = 11.6$$

Where; π_k^* is the threshold level of inflation

Table 3(B): Non-Mining, Non-Government, Non-Agriculture GDP Growth And Inflation Model Results

Method of Estimation: Ordinary Least Method (OLS)		
Dependent Variable: log(Non-Mining-Government-Agriculture GDP Growth)		
Explanatory Variables	**Coefficient**	**Probability**
C	0.5202	0.0264**
Inflation	0.2632	0.1005*
Inflation(squared)	-0.0191	0.0686*
Population growth	0.0004	0.5570
Investment growth	0.0311	0.7116
Openness Index	0.2600	0.0561*

*** implies significance at 5 percent level while * implies significance at 10 percent level*

The influence of inflation on non-mining, non-government, non-agriculture economic growth presented in Table 3(b) is, however, found to be statistically significant at the 10 percent level of significance. Using the same simple rule of optimisation, the optimal inflation threshold for non-mining, non-government, non-agriculture economic growth is estimated at 6.9 percent. The equation also satisfies the Second Order Condition of growth maximisation ($d^2Y_t/d^2\ \pi_k^*$) < 0.

Optimization Results

$dy_t/d\pi_t(0.263213\pi_t - 0.019066\pi_t^2)= 0$

π_k^*= 0.263213/0.038132= 6.9

5.3 Endogenous Threshold Model Results (*Model 2*)

On the basis of empirical evidence regarding the significance of inflation and non-mining growth relationship in Botswana, it is trivial to re-estimate the relationship in *Model 2*. Two different methodological frameworks (Setlhare and Feger (2014) and *Model 1* in this paper) unanimously found the relationship to be statistically insignificant. As such, there is no reason to believe that *Model 2* could produce unique results. *Model 2* is, therefore, only used to assess the inflation – non-mining, non-government, non-agriculture growth relationship and the corresponding optimal threshold level of inflation in the relationship.

Table 4: Model Estimation Results (At π^*=3 To 8)

Model Variables	3 percent		4 percent		5 percent		6 percent		6.5 percent	
C	0.0468	(0.1595)	0.0370	(0.2862)	0.0383	(0.2389)	0.0396	(0.2325)	0.0452	(0.1774)
Inflation	0.0006	(0.6740)	0.0018	(0.3164)	0.0014	(0.3616)	0.0014	(0.3282)	0.0007	(0.5915)
Inflation Dummy	0.0052	(0.1389)	-0.0213	(0.5251)	-0.0012	(0.9631)	-0.0071	(0.0147)	-0.0052	(0.1482)
Population growth	0.0172	(0.0677)*	0.0148	(0.1185)	0.0164	(0.0810)*	0.0159	(0.0815)*	0.0172	(0.0667)*
Investment growth	0.0002	(0.2406)	0.0002	(0.2546)	0.0002	(0.2554)	0.0002	(0.2425)	0.0002	(0.2422)
Openness Index	0.1342	(0.0054)***	0.1290	(0.0075)***	0.1297	(0.0068)***	0.1312	(0.0058)***	0.1337	(0.0061)***
RSS	**0.174**		**0.176**		**0.177**		**0.176**		**0.175**	

	6.8 percent		6.9 percent		7 percent		8 percent	
C	-0.0824	(0.2502)	0.0367	(0.2426)	0.0347	(0.2590)	0.0375	(0.2453)
Inflation	0.0355	(0.1915)	0.0018	(0.2260)	0.0018	(0.2139)	0.0015	(0.3191)
Inflation Dummy	-0.0019	(0.0243)**	-0.0087	(0.1699)	-0.0110	(0.0695)*	-0.0086	(0.5618)
Population growth	0.0126	(0.1251)	0.0153	(0.1076)	0.0152	(0.1090)	0.0155	(0.1052)
Investment growth	0.0147	(0.2231)	0.0002	(0.2396)	0.0002	(0.2263)	0.0002	(0.2488)
Openness Index	0.0002	(0.0054)***	0.1279	(0.0055)***	0.1252	(0.0053)***	0.1266	(0.0069)***
RSS	**0.171**		**0.173**		**0.173**		**0.176**	

Table 4 presents the estimation results of *model* (2) at different threshold levels of inflation. According to the results, the optimal threshold level of inflation in Botswana is at about 6.8 percent, this is the threshold level that minimises the sequence of RSS. Any inflation rate above this level, according to the estimation results, will be detrimental to economic growth.

5.4 COMPARISON OF ESTIMATION RESULTS FROM THE MODELS

The two econometric models used in the paper suggest two different values for the optimal threshold level of inflation. However, the variation between the two values is marginal (6.9 and 6.8). The average of these two models produce an optimal threshold level of inflation of about 6.9 percent and the value is plausible as it accommodates the weakness and strength of each model. Consequently, this paper concludes that the level of inflation optimal for growth in Botswana is about 6.9 percent.

5.5 DIAGNOSTIC TESTS

Various diagnostic tests were applied to all the estimated models to assess whether or not the underlying assumptions on the residuals and model parameters in the method of estimation used hold. A problem of serial correlation and heteroskedasticity was detected in all the models. A heteroskedasticity consistent coefficient covariance (Newey-West) estimation was used to correct the problem. All the assumptions after the Newey-West estimation were satisfied, the results are presented in Table 5.

TABLE 5: DIAGNOSTIC TESTS

	Quadratic Model Results		Endogenous Threshold Model Results ($\pi^* = 6.8$)	
Test for	Probability	Conclusion	Probability	Conclusion
Normality (JB test)	P=0.8909	Residuals Normally Distributed	P=0.8153	Residuals Normally distributed
Stability (Ramsey Reset test)	P=0.6143	Stable	P=0.4083	Stable

5.6 IMPLICATIONS FOR BANK OF BOTSWANA MEDIUM-TERM INFLATION OBJECTIVE RANGE

The estimated optimal level of inflation (6.9 percent) is relatively low compared to that reported in a number of empirical studies for other developing economies.[10] Nevertheless, it is likely the case that the "optimal" rate of inflation would vary across countries and over time as a function of many aspects of the broader economic environment and institutional frameworks. Therefore, the estimated threshold level in this study tends to be plausible and consistent with what the Bank has been using as its medium-term objective range for a number of reasons. Firstly, in theory, the optimal inflation threshold represents the inflexion or turning point in the inflation-growth relationship; any marginal increase in inflation above the threshold impacts negatively on growth. It is, therefore, much safer for monetary authorities to have inflation targets slightly below the optimal inflation threshold so as to maintain positive economic growth even when inflation has slightly eluded the set target. Secondly, global inflation has been much more contained in recent years than was the case in previous decades and most of the literature on estimation of the optimal level of inflation using threshold models covered earlier periods when global inflation was relatively high, which helps explain the estimated higher optimal inflation threshold, particularly for developing countries.

Moreover, it is also possible that optimal inflation for Botswana critically depends on the inflation rate of its major trading partners[11], which have also been experiencing relatively lower levels of inflation.[12] In that respect, it is thought that the current low global inflation is, from Botswana's perspective, a good thing, for growth of the economy. It is further noted that the Setlhare and Feger (2013) study (with an estimated threshold level of 11.4 percent) reports relatively insignificant t-statistics. Their results are consistent with *model 1* results of this study where insignificant t-statistics are also obtained for a threshold level of similar magnitude (11.6 percent). However, when using

10 See Section 2 for discussion of optimal levels of inflation in other economies at the similar stage of development to Botswana. Seperi and Moshri (2004) also found that the estimated turning points vary widely from as high as 15 percent per year for the lower-middle-income countries to 11 percent for the low-income countries, and 5 percent for the upper-middle-income countries.

11 The weight of imported tradables constitute a large share in Botswana's Consumer Price Index, at 45.17 percent.

12 Inflation in South Africa has generally been within the country's target since adoption of the Inflation Targeting framework in 2000, with only few exceptions, while in SDR countries, inflation has generally been lower than their set inflation targets.

non-mining, non-government, non-agriculture GDP more plausible results were obtained. In particular, a 6.9 percent inflation threshold with significant t-statistics was obtained. The use of the non-mining, non-government, non-agriculture GDP was in recognition that, for Botswana, economic growth for sectors such as mining, government and agriculture would not, to a large extent, be influenced by monetary policy and inflation developments.[13]

The study provides an indicative threshold level of inflation (6.9 percent), above which inflation adversely affects economic growth, while below that level, inflation is favourable to growth. However, it is limited in the sense that it does not estimate that level of inflation that is too low for economic growth. Moreover, empirical studies on the relationship between inflation and growth generally do not provide much guidance on the choice among target inflation levels once they are below the estimated threshold level.

For Botswana, 3 percent is chosen as a lower bound, not because there is robust evidence to suggest that average inflation rates below 3 percent are detrimental to growth, but rather in recognition that modest positive rates of inflation are important for economic growth. In particular, there are four arguments that the majority of economists and central bankers use for a low and positive inflation target and/or objective and these include the following:

First, official price statistics are subject to measurement bias and, as such, consumer price indices (CPI) tend to slightly overestimate actual inflation.[14] While in Botswana there is no empirical estimate for the distortion in the CPI, nevertheless, the general theoretical intuition and empirical investigation conducted in emerging economies has found that, in these countries, the distortion in CPI is greater than in advanced economies.[15] Therefore, it is also plausible to assume that in Botswana, as in other developing economies, where there is also a high possibility that the statistical office is less resourced than in advanced economies, the issue of distortion may also be a problem. Thus, there is scope to use a relatively high low bound of the inflation objective compared to advanced economies.

Another argument in support of a modest and positive inflation objective, rather than a zero or very low inflation is that nominal wages may be downwardly rigid. Therefore, it is argued that a little inflation may make it easier for firms (in Botswana, government is the largest employer) to reduce real wages when necessary to maintain employment. While not aware of any studies that validate this assumption for Botswana, the general view is that in Botswana, nominal wage rigidity is to a large extent prevalent. Government decision to freeze public sector wages for some time because of the 2008 global financial crisis may have achieved a decline in real wage with nominal wages rising less rapidly than prices and, therefore, assisted in maintaining employment levels.[16] It is also the case that the benefits of a slightly high inflation objective may be greater for countries with relatively low labour productivity growth, as is often indicated for a country such as Botswana.[17]

Furthermore, policymakers may choose to aim for a positive inflation objective or target as opposed to zero or very low inflation because they view the cost of deflation as particularly severe compared to inflation. Therefore, aiming for slightly positive inflation objective which is above zero may reduce the risk of the economy ever experiencing deflation and its consequences. In addition, at very low levels of inflation (close to zero), nominal interest rates may be close to zero, limiting a central bank's ability to ease policy in response to economic weakness.

The last two issues are currently of particular relevance and importance for advanced economies, where recently, they have spent some years at the near-zero lower bound, and this has led to a call for inflation targets higher than the 0 to 2 percent used in most of the advanced countries. Increasingly, there are calls to increase inflation targets from 2 percent to 4 percent.[18] For example Blanchard *et al.* (2010) and Paul Krugman (2014) have suggested an increase in inflation targets of advanced economies. Krugman (2014) notes that the 2 percent target has come under scrutiny because the experience of the global financial crisis and its aftermath suggests that advanced economies are far more likely to hit the lower bound than previously believed, and that the economic costs of that constraint on conventional monetary policy are much larger than the pre-crisis conventional wisdom.

13 In particular, for Mining, financial returns on investment may be so large in nominal terms as to make concerns about inflation of secondary importance. In the case of Government output, the return on investment may not necessarily be directly financial as government has a duty to undertake projects that deliver sustainable social change. Finally, output developments in the agricultural sector may be largely influenced by climatic conditions rather than monetary policy.

14 Crawford (1998) describes six sources of bias; commodity substitution bias, formula bias, quality bias, outlet substitution bias, new product bias and new brand bias. Diewert (1998) estimated the total bias in inflation measurement at 1.9 percent in USA, Crawford (1998) found 0.7 percent in Canada and Baxter (1997) estimated it between 0.35 and 0.85 percent in UK. No studies were identified which specifically dealt with the subject of price statistics measurement bias for developing countries.

15 As an example, the commodity substitution bias is likely to be higher for Botswana, given that it takes quite a longer time to update the CPI basket weights (the last exercise was done in 2006 and it uses consumption patterns of the 2002/03 Household Income and Expenditure Survey. In addition, even if the CPI basket update were introduced without delay, the exercise would be based on consumption patterns for 2009/2010, and hence out of date. This is in contrast to advanced economies where CPI basket is often updated on a yearly basis. However, it should be noted that, while measurement bias problems are more acute in developing economies, problems of quality improvements are also more pervasive in the CPIs of advanced economies where the weights of basic commodities such as food and fuel are much lower.

16 The adjustment process in labour markets may break down in a very low inflation regime if nominal wages are rigid downwards, that is, if people are unwilling to accept a cut in their wages and therefore more of a decrease in real wages.

17 It is noted that rigidities in the labour market might be better addressed through specific institutional arrangements in the labour market.

18 See also a recent paper by Ball (2014), who argues that policymakers would do better to target 4 percent in advanced countries. He posits that a 4 percent target would ease constraints on monetary policy arising from the zero bound on interest rates, with the result that economic downturns would be less severe.

However, for Botswana, average inflation and nominal interest rates are still relatively high compared to advanced economies and this suggests that the country has no basis to fear a liquidity trap or nominal interest rates falling to the zero bound. Moreover, Botswana is a small open economy where the exchange rate channel is still relatively important in the monetary transmission mechanism. As a result, through the crawling band exchange rate framework, there is more scope to use the non-interest rate channels to influence the economy if there was ever a possibility of nominal interest rates reaching the zero bound.

Finally, the use of a very low inflation objective may increase risks of monetary authorities being perceived as excessively aggressive in their approach to inflation management. As a result, setting too low an inflation objective may be viewed negatively as it can be taken to impose opportunity costs in the form of loss in output growth and employment creation. However, it is noted that it is the case that there is no strong economic rationale for such perceptions.

6. CONCLUSION

The paper has investigated whether there is a threshold effect of inflation on economic growth for Botswana using data for the period 1994 to 2014. The estimated threshold models indicate the existence of a non-linear relationship between economic growth and inflation in Botswana and that the threshold level of inflation for GDP growth is approximately 6.9 percent. The implication of this result is that, below this level, inflation has a statistically significant positive effect on GDP growth. However, the reverse prevails once inflation is above the 6.9 percent inflation level. The results confirm that the 3 to 6 percent inflation objective set by the Bank of Botswana is sound as it is well below the estimated 6.9 percent threshold level of inflation and allows room for positive economic growth even when inflation has slightly risen above the upper bound of the objective range. Consequently, the set inflation objective range contributes to the Bank's goal of achieving its primary statutory objective of price stability and, therefore, supports the broader national objective of sustainable economic diversification and development. The recent behaviour of inflation in Botswana, remaining within the Bank's medium-term objective range, shows that the set inflation objective range is plausible and the current monetary policy framework is delivering the desired results of price stability (protecting the value of the pula) and increase in living standards.

REFERENCES

Barriosa, S., Ouattarab, B., and Strobl, E., (2008). "The impact of climatic change on agricultural production: Is it different for Africa?". Food Policy, Volume 33, Issue 4, Pages 287–298.

Blanchard, O., Giovanni D., and Paolo M., (2010). "Rethinking Macroeconomic Policy". IMF Staff Position Note, International Monetary Fund.

Ball, L. (2014). "The Case for a Long-Run Inflation Target of Four Percent" ,IMF working paper 14/92, International Monetary Fund.

Baxter, M. (1997). "Implications of the US Boskin Report for the US Retail Price Index". Economic Trends No. 527, pp. 56-62.

Crawford, A. (1998). "Measurement Biases in the Canadian CPI: An Update". Bank of Canada Review, Spring, pp. 38-56.

Diewert, W.E. (1998). "Index Number Issues in the Consumer Price Index". Journal of Economic Perspectives, 12, No. 1, pp. 47-58.

Fisher, S. (1993). "The Role of Macroeconomic Factors in Growth". Journal of Monetary

Economics, 32: 485-512.

Frimpong, J.M., and Oteng-Abayie , E.F. (2010). "When is inflation harmful? Estimating the threshold effect for Ghana". American Journal of Economics and Business Administration, 2:225-232

Kahuti, A., and Wright, M. (1997). "The Real Cost of Inflation in Botswana". Aspects of the Botswana Economy: Selected Papers.

Khan, M.S., and S.A. Senhadji (2001). "Threshold Effects in the Relationship between Inflation and Growth". IMF Staff Papers, 48: 1-21. IMF.

Kohn, D. (2007). "Success and failure of monetary policy since the 1950's". Speech at monetary policy over fifty years, a conference to mark the fiftieth anniversary of the Dutch Bundes Bank, Frankfurt, Gemany.

Krugman, P. (2014). "Inflation Targets Reconsidered" .Draft paper for ECB Sintra Conference.

Sarel, M. (1996). "Nonlinear Effects of Inflation on Economic Growth", IMF Staff Papers, 43:199-215: International Monetary Fund.

Levin, A., Fablo, M., Natalucci, L., and Jeremy, MP. (2004). "The macroeconomic effects of inflation targeting". Federal Reserve Bank of St Louis Review, 86(4), PP.51-80.

Mishkin, F. (2004). "Why the Fed Reserve Bank should adopt inflation targeting". International Finance, Spring, Vol. 7, ISSN.1, pp.117-27.

Pedersen, E.H, and Wagener, T. (2000). "Macroeconomic Costs and Benefits of Price Stability". Danmarks Nationalbank, Monetary Review, 3rd Quarter.

Rutayisire, M.J. (2013). "Threshold effects in the relationship between inflation and economic growth: evidence from Rwanda". A paper submitted to African Economic Research Consortium (AERC).

Seleteng, M. (2005). "Inflation and economic growth: an estimate of an optimal level of inflation in Lesotho". Research Department. Central Bank of Lesotho.

Sepehri, A., and Moshiri, S. (2004), Inflation-Growth Profiles across Countries: Evidence from developing and developed countries, International Review of Applied Economics, Vol. 18, No. 2, 191-207.

Setlhare, L., and Feger, T. (2013). "Assessment of the impact of macroeconomic policy on growth and employment". Ministry of Finance and Development Panning, Botswana

Svenson, L. (1997). "Inflation forecast targeting: Implementing and monitoring inflation targets". European Economic Review 41:111-46

Swanson, E. (2006). "Would inflation target help anchor US inflation expectations?" FRBSF Economic.

Tarawalie, A.B., Sissoho, M., Conte, M., and Ahortor, C. (2012). "Inflation and growth in the WAMZ: Evidence from a threshold analysis". West African Monetary Institute.

Younus, S. (2012). "Estimating growth-inflation trade off threshold in Bangladesh". Bangladesh Bank.

Financial Development and Economic Growth in Botswana: Is there a causal link?

Malebogo Ntsosa[1]

Abstract

The paper examines the causal relationship between financial development and economic growth in Botswana using quarterly time series data for the period 1995Q1 to 2013Q4. In analysing the data, a dynamic error correction model in bivariate form was employed to test direction of causality in the short-run and long-run between the three selected financial development indicators (the ratio of broad money stock to non-mining nominal GDP; the ratio of private sector credit to non-mining nominal GDP; the ratio of banks' deposits to non-mining nominal GDP) and non-mining real GDP growth. Non-mining real GDP growth was used to measure economic growth (as is typically the case in studies of Botswana) because it is generally agreed that the development of mining (dominated by the diamond sector) has been largely independent of the rest of the economy, including the domestic financial sector. Short-run causality results indicate that the relationship between financial development and economic growth is sensitive to the choice of measure for the degree of financial deepening. Financial development leads to economic growth when the ratio of banks' deposits to non-mining nominal GDP is employed, while economic growth also exerts a positive causal short-run effect on financial development in the case where the ratio of broad money stock to non-mining nominal GDP is used. However, when the ratio of private sector credit to non-mining nominal GDP is employed, no causal short-run relationship between the two variables is evident. The study also shows that, in the long-run, economic growth exert a positive causal effect on financial development regardless of the measure of financial deepening used. This implies that, historically, the major boost to growth in Botswana from financial sector developments has been in the short term, whilst sustained growth has provided impetus for further financial development. However, these results should not be seen as discounting the importance of financial sector development in support of future growth and diversification of the Botswana economy.

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.

1. Introduction

The relationship between financial development and economic growth is one of the most debated topics among academics, policy makers and researchers around the world. Fundamental to this discussion is the nature of causality between the two variables. Different opinions regarding direction of causality between these variables are found across the empirical literature, while the issue has an important input into policy formulation and development.

The theoretical groundwork of the relationship between finance and growth can be traced back to Schumpeter (1911), who documented that services provided by financial intermediaries are essential for technological innovation and economic growth and development. However, Patrick (1966) emphasised that the finance-growth link depends on the stage of development that economies have reached. Accordingly, the assertion that "supply-leading" phenomenon[2] dominates during the early stages of development and diminishes as finance and growth deepen; at a later stage, the "demand-following" phenomenon[3] dominates.

Early contributions by Keynes (1930) supported the work of Schumpeter (1911) by pointing out the importance of the banking sector in economic growth. As an extension of earlier empirical studies, Gurley and Shaw (1967), Goldsmith (1969) and McKinnon and Shaw (1973) demonstrated that financial development precedes economic growth. This evidence was later supported by several other authors, including Tuzel et al. (2007), Kar and Pentecost (2000), Darrat (1999), Hartney (1997), and Harber (1991), who analysed the underlying mechanisms of financial structure on growth and emphasise the importance of finance on growth.

However, empirical results on the direction of causality between finance and growth are inconclusive. For example, Aliero et al. (2013), Ozcan and Ari (2011) and Quartey and Prah (2008) are of the view that economic growth leads to financial development, while Stern (1989) and Lucas (1988) find no statistical relationship between financial development and growth.

Meanwhile, Botswana has undergone significant economic and financial transformation making it an interesting case to study. In the 50 years of independence, Botswana has managed to achieve rapid economic growth, which transformed the country from being one of the least developed countries to upper-middle income status. Real GDP growth averaged 8.7 percent per annum in the 42 years to 2007/08, (Republic of Botswana, 2012a). The financial sector also grew rapidly in the post-independence era. This growth has also been attributed to the introduction of national currency in 1976 and significant financial sector reform which took place in 1989 and 1991; including changes to monetary operations, enhancement of

2 "Supply-leading" phenomenon asserts that financial development causes economic growth.

3 "Demand-following" phenomenon contends that economic growth leads to financial development.

prudential supervision, competitive financial sector and improvement in payment systems (BoB Annual Report, 2001).

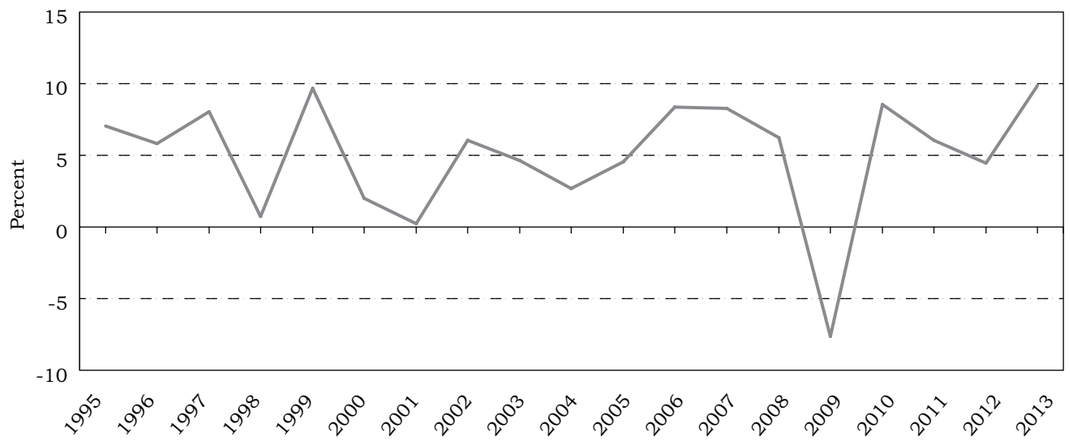
Therefore, the growth of the financial sector and the economy experienced in Botswana over the years provides a basis to investigate whether the "demand-following" or "supply-leading" hypothesis or both, are valid in the case of Botswana. The main focus of this study is to examine the direction of causality between financial development and economic growth in Botswana. This study contributes to the existing studies in the empirical literature on Botswana by employing a dynamic error correction model in bivariate form and using quarterly data for the period 1995Q1 to 2013Q4.

The rest of the paper is structured as follows: Section 2 provides a brief description of Botswana's financial sector reforms and economic performance. Section 3 reviews selected literature of finance and growth, while section 4 explains the data, data sources and modelling procedures used in this study. Section 5 presents the results, while section 6 provides discussion of research findings, and the summary and conclusions of the paper.

2. Overview Of The Financial Sector Reforms And Economic Performance In Botswana

Botswana has experienced significant economic transformation since independence in 1966 from a least developed country to a middle income country within three decades from the time of independence. This economic transformation was attributable to sound macroeconomic policies, good governance, well-functioning institutions and judicious management of diamond revenues. Botswana has generally experienced positive real GDP growth over the years (figure 1).

Figure 1: Annual Real GDP Growth 1995-2013



Source: Statistics Botswana

However, there was a drastic reduction in real output growth in 2009, following the 2008 global financial crisis. The 2008 global financial crisis negatively affected Botswana in a numerous ways; It lowered the international demand for diamonds, and subsequently reduced Botswana's export earnings, which caused the balance of payments to deteriorate, eventually reducing government revenues from the mineral sector, which led to large budget deficits. This negative impact, in terms of economic growth, exports and the resulting loss of government revenues was largely limited to the mining sector: for example, government was able to use its accumulated reserves to maintain spending programmes, thus helping to sustain domestic demand more widely. The economy rebounded in 2010 as it grew by 8.6 percent, up from a contraction of 7.7 percent in 2009. Thereafter, the economy has recorded positive growth rates (6.0 percent, 4.5 percent and 9.9 percent in 2011, 2012 and 2013, respectively).

Like many African countries, Botswana introduced reforms to liberalise its financial sector between 1989 and 1991, after a period of a repressed financial sector in the 1980s. Before the introduction of the reforms, the Botswana financial sector was not diversified, fragmented, and not competitive and a limited range of financial instruments (BoB Annual Report, 2001). At the time, the Bank of Botswana, in its conduct of monetary policy, exercised a significant degree of direct control over operations of commercial banks, particularly with regard to maximum lending and minimum deposit rates.

Other pre-reform characteristics of the Botswana financial system during the 1980s included repressed financial sector which hindered its ability to generate and respond to market-based prices. The financial sector was characterised by low or negative real interest rates, which tended to discourage the accumulation of financial assets, while low lending rates encouraged some inefficient and marginal investments (BoB Annual Report, 2001).

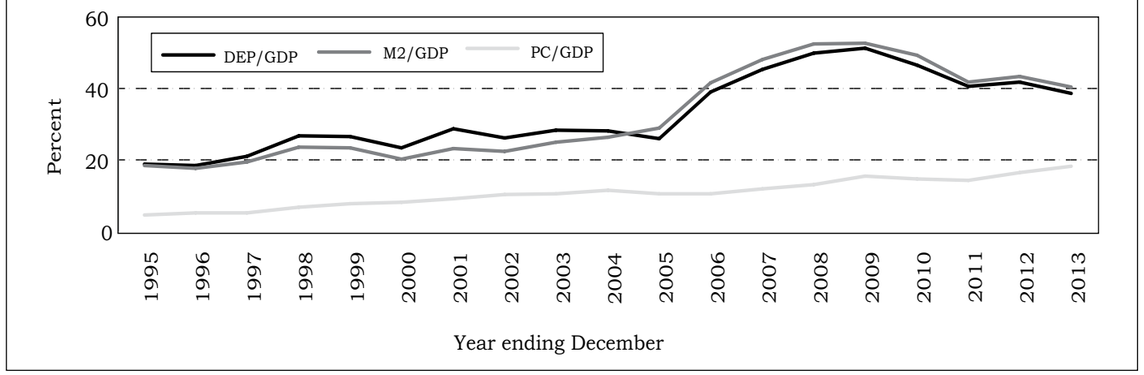
Major steps to reform the Botswana financial sector took place during the early 1990s. These reforms included the introduction of the Bank of Botswana Certificate (BoBCs) as a tool to influence interest rates, liberalisation of the licensing requirements for commercial banks, and diversification of the institutional infrastructure, enhancement of the prudential supervision and improvements in the payment system (BoB Annual Report, 2001).

The Botswana financial sector grew rapidly in the post-reform years, underpinned by the Financial Sector Development Strategy of 1989 that was developed jointly by the Government of Botswana and the World Bank. This strategy contributed to better financial sector regulation, product innovation and increased competition as well as enhancement of financial access and inclusion (BoB Annual Report, 2013).

Financial sector development has generally surpassed average growth in national output; hence, there has been an upward trend in the relevant financial deepening indicators. Figure 2 depicts trends in selected financial deepening indicators from the year ending 2002 to 2013. These indicators include the ratio of banks' deposits to nominal GDP (DEP/GDP), the ratio of broad money stock to nominal GDP (M2/GDP) and the ratio of private sector credit to nominal GDP (PC/GDP).

Financial deepening indicators declined between 2009 and 2010 following the difficult economic conditions arising from the global financial crisis and ensuing economic recession. DEP/GDP, M2/GDP and PC/GDP fell from 51 percent to 47 percent, 53 percent to 49 percent and 16 percent to 15 percent, respectively, in this period. In particular, the decline in PC/GDP was attributable to slower growth in credit to households in 2010 of 12.5 percent, down from 17.1 percent in the previous year. The demand for credit by households was restrained by sluggish growth in personal incomes as the economy experienced a freeze in public service salaries. Money supply during the period was less expansionary as banks took a more cautious approach to lending due to uncertain economic prospects and slow growth in government spending and, hence, leading to a decline in M2/GDP (Bank of Botswana Annual Report, 2010).

Figure 2: Trends in Financial Sector Deepening Indicators



Source: Author's computations using data from various Bank of Botswana Financial Statistics and Annual Reports

The slowdown in DEP/GDP during 2010 was mainly due to the contraction of the deposits by the business sector which recorded a negative growth of 0.7 percent, while deposits by [4]government, parastatals and households sectors at the banks recorded a positive growth of 80.4 percent, 30.7 percent and 10.5 percent, respectively. Businesses were somewhat cautious in producing more output due to restrained demand for their products, subsequently leading to lower revenues and, hence, slowdown in deposits.

4 Government deposits are only a small proportion of the total, with the result that relatively small additional amounts of total bank deposits can show up as large percentage increases for such deposits, but with little impact on the overall growth rate.

3. Empirical Literature

The relationship between financial development and economic growth has been extensively studied, both in developing and developed countries. The literature has drawn three different conclusions. In particular, the vast majority of literature supports the "supply-leading" hypothesis, while some research supports the "demand-leading" hypothesis, with a few rejecting the existence of a finance-growth nexus.

Adusei (2013) did a causality analysis of financial development and economic growth for Botswana using annual data ranging from 1981 to 2010. The study used two proxies for financial development (the ratio of domestic credit to the private sector to GDP; the ratio of liquid liabilities (M3) to GDP) and real per capita GDP as a measure of economic growth, to investigate the relationship between the two variables in Botswana. The study employed the Fully Modified Ordinary Least Squares (FMOLS) regression technique and Pairwise Granger Causality to analyse the data. Pairwise Granger Causality tests showed that economic growth leads financial development when the ratio of domestic credit to private sector to GDP is used, while finance precedes growth when the ratio of liquidity liabilities (M3) to GDP is used as the financial development indicator.

Jordaan and Eita (2010) adopted two proxies for financial development: the ratio of banks deposit liabilities to nominal non-mineral GDP and the ratio of credit extended to the private sector to nominal non-mineral GDP. The study analysed the relationship between financial sector development and economic growth in Botswana using annual data ranging from 1977 to 2006. Granger Causality through cointegrated vector autoregression method provided evidence of causality from financial development to economic growth, and vice versa. Causality runs from financial development to economic growth when the ratio of banks deposit liabilities to nominal non-mineral GDP is used to *proxy* financial development. There is also evidence that causality runs from economic growth to financial development when the ratio of private sector credit to non-mineral GDP is employed as a measure of financial development.

Akinboade (1998) reported a bi-directional causal relationship between financial development and economic growth in Botswana. The study used annual data for the period from 1976 to 1995 and adopted the Engle–Granger procedure to test for causality between the two variables. The results show that real per capita income in Botswana and the financial development indicators have a bi-directional causality.

The empirical study by Hartney (1997) provided support for the existence of a positive relationship between finance and growth in Botswana. The study employed a common Granger Causality test and annual data for the period 1976 to 1997. The ratio of bank credit to the private sector to GDP was used as a *proxy* for financial development. The study concluded that causality runs from finance to economic growth.

Aziapono (2003) employed the Zellner Seemingly Unrelated Regressions Estimation technique, which is a panel data econometric technique, to estimate the relationship between financial development and economic growth for selected Southern African Customs Union (SACU) countries including Botswana, Lesotho, South Africa and Swaziland[5]. The study adopted two indicators of financial development: the ratio of private credit to nominal GDP and the ratio of liquid liabilities (demand deposits, time and savings deposits) of commercial banks to nominal GDP. Economic growth was measured by the natural log of real GDP. The results reported mixed evidence of the importance of financial development on promoting growth across countries: South Africa demonstrated strong evidence, while the evidence was weak for Botswana, Lesotho and Swaziland.

Allen and Nkikumana (1998) investigated the relationship between financial development and economic growth employing data for SADC countries. The ratio of private credit to nominal GDP was used as a *proxy* for financial development. In their study, country specific results were not provided. They concluded that a weak link between financial development and economic growth might reflect pervasive inefficiencies in the credit allocation mechanism, probably requiring strengthening of financial sector legislation and banking system supervision as one way of enhancing financial sector efficiency.

The study by Egbetunde and Akinlo (2010) examined the long-run causal relationship between financial development and economic growth for ten countries in Sub-Saharan Africa (SSA) from 1980 to 2005. The vector error correction model drew three different conclusions for different countries. Financial development Granger causes economic growth for the cases of Central African Republic, Congo Republic, Gabon and Nigeria, while Zambia experienced a causal relationship from economic growth to financial development. Bi-directional relationship was found for Kenya, Chad, South Africa, Sierra Leone and Swaziland. The study adopted the ratio of broad money to GDP and per capita real output as measures of financial development and economic growth, respectively.

When analysing the relationship between financial development and economic growth in South Africa, Sunde (2012) employed an error correction model and Granger Causality test to examine the direction of causality between the two key variables. The study adopted broad money stock as percentage of GDP and total credit to the private sector as a percentage of GDP to *proxy* for financial development, using data from 1977 to 2009. Bi-directional causality was reported to exist between financial development and economic growth in South Africa.

5 Namibia was excluded from econometric analysis due to limitations relating to the adopted econometric technique to ensure a balanced panel.

However, the study by Mensah et al. (2013) emphasises that the relationship between the two variables is sensitive to the choice of *proxy* for financial development. When analysing finance growth nexus in Ghana, they found that the ratio of credit to the private sector and GDP are conducive for growth while, the ratio of broad money stock to GDP is not growth-inducing. The results from the auto-regressive distributed lag (ARDL) model showed that the direction of causality between financial development and economic growth depends on the indicator used to *proxy* for financial development.

Additionally, Quartey and Prah (2008) estimated the causal link between financial development and economic growth in Ghana and concluded that the relationship between the two variables depends on the choice of *proxy* for financial development. They found evidence in support of the "demand-following" hypothesis when the ratio of growth of broad money to GDP was used as a measure of financial development. The study found no significant evidence to support either the "supply-leading" or "demand-following" hypothesis when the ratio of growth in domestic credit to GDP was employed. The ratio of private credit to GDP and the ratio of private credit to domestic credit were used as proxies for financial development.

Kargbo and Adamu (2009) employed the autoregressive distributed lag (ARDL) model to establish the relationship between financial development and economic growth in Sierra Leone for the period 1970 to 2008. The study found a unique cointegrating relationship among real GDP, financial development, investment and the real deposit rate. In their conclusion, they noted that financial development exerts a positive and statistically significant effect on economic growth; and that investment is an important channel through which financial development feeds economic growth.

In summary, empirical literature on Botswana has drawn two different conclusions regarding direction of causality between financial development and economic growth. The relationship was found to be uni-directional (that is, "supply-leading" or "demand-following") and bi-directional, where both "supply-leading" and "demand-following" phenomenona were found to co-exist. In addition to the two conclusions drawn for Botswana, the international empirical literature also suggests that the relationship between the two variables can be causally independent, implying that there may be no relationship between financial development and economic growth.

4. Data And Methodology

Data Description:

This study employs quarterly time series data (the broad money stock, private sector credit, banks' deposits, non-mining real GDP and non-mining nominal GDP) for the period 1995Q1 to 2013Q4. Quarterly data provide a larger sample and account for important intra-year dynamics and minimise the likelihood of structural breaks, (Martins, 2010). The data are sourced from various Bank of Botswana publications and Statistics Botswana. All variables are converted into logarithm form.

Unlike other empirical studies on Botswana, this study uses recently rebased national accounts estimates, with a new base year 2006 replacing 1993/94.[6] Given that mining is a dominant sector in the Botswana economy and has a limited association with the domestic financial institutions, as it is predominantly financed from foreign financial markets, the non-mineral GDP data series is employed to eliminate the possibility of biased results. The non-mining real GDP growth rates relate to comparison of output for the current quarter with the corresponding quarter in the previous year. A comparison between similar quarters in corresponding periods helps remove seasonal effects.

This paper adopts three different indicators of the degree of financial deepening. The first *proxy* is the ratio of broad money stock to non-mining nominal GDP (M2/NMGDP), following from the study by Darrat (1999). The broad money stock comprises of currency outside depository corporations, transferable deposits (demand deposits), fixed and time deposits. A higher M2/NMGDP implies a larger financial sector and therefore greater financial intermediary development.

The second measure is the ratio of private sector credit to non-mining nominal GDP (PC/NMGDP). Private sector credit includes outstanding loans and advances of the banks to the household sector in the form of property loans, motor vehicle loans and other personal advances. The higher ratio of private sector credit to non-mining nominal GDP indicates more financial services and, hence, greater financial development. The third indicator is the ratio of banks' deposits[7] to non-mining nominal GDP (DEP/NMGDP), adopted from Jordaan and Eita (2010). Banks' deposits comprise of deposits by government, resident business (parastatals and private), non-resident business and households. These three measures provide a more accurate picture than if researchers adopted only a single measure (Levine et al., 2000).

6 The reference year 2006 was chosen particularly because major source data used to obtain new benchmark levels (that is, agriculture census, the annual economic surveys, etc.) were available for the year. During rebasing, some improvements and changes were made in accordance with international practices, comprising of changes in conceptual treatment, methodological changes and revisions in data sources.

7 The banks' deposits include those of the mining sector. The mining sector deposits could not be excluded for the period under investigation since the information on the breakdown of deposits by industry is only available from July 2011. It is also important to note that banks' deposits by the mining sector for this published series is negligible with an average of less than 3 percent.

Methodology:

This study adopts an approach pioneered by Mehrara and Firouzjaee (2011). The approach uses a dynamic error correction model in bivariate form to test causal relationships between the series. This approach has several advantages over methods of analysis adopted in the earlier studies. It accounts for both the short-run and long-run impact of the independent variables on the explained variable. It has more advantages over the standard VAR, as it allows temporary causality to emanate from the sum of lagged coefficients of the independent differenced variables and the coefficient of the error term (Emmanuel, 2001).

The first step involves estimating the residual term from a long-run linear equation:

$$LRGDP_t = \alpha + \beta_i LFDI_t + ECT_t \quad (1)$$

The residual term can be expressed as:

$$ECT_t = LRGDP_t - \alpha - \beta_i LFDI_t \quad (2)$$

Where $LRGDP$ is the log of non-mining real GDP growth; $LFDI$ is the log of the Financial Deepening Indicator (that is, M2/NMGDP or PC/NMGDP or DEP/NMGDP); ECT is the Error Correction Term; β_i is the coefficient; α is an intercept.

The second step relates to addition of the lagged residual term and the lagged dependent variable on the right hand side of the equation. The dynamic error correction model in bivariate form is expressed as;

$$\Delta LRGDP_t = \alpha_1 + \gamma_{1i} ECT_{t-1} + \beta_{1i} \Delta LFDI_{t-1} + \delta_{1i} \Delta LRGDP_{t-1} + \varepsilon_t \quad (3)$$

Table 1: ADF And PP Tests For Unit Root

ADF Test				
	With Trend		Without Trend	
Variables	Level	First Difference	Level	First difference
RGDP	0.0018*	0.0000*	0.1955	0.0000*
M2/NMGDP	0.5657	0.0015*	0.8869	0.0000*
PC/NMGDP	0.1113	0.0001*	0.9997	0.0000*
DEP/NMGDP	0.7720	0.0000*	0.7867	0.0000*
PP Test				
	With Trend		Without Trend	
Variables	Level	First Difference	Level	First difference
RGDP	0.0015*	0.0001*	0.1958	0.0000*
M2/NMGDP	0.9917	0.0001*	0.7996	0.0000*
PC/NMGDP	0.1113	0.0001*	0.9999	0.0000*
DEP/NMGDP	0.8350	0.0000*	0.8150	0.0000*

Source: Author's computations using Eviews

** Denotes the rejection of the null hypothesis of non-stationary at 5 percent level of significance.*

$$\Delta LFDI_t = \alpha_2 + \gamma_{2i} ECT_{t-1} + \beta_{2i} \Delta LFDI_{t-1} + \delta_{2i} \Delta LRGDP_{t-1} + \varepsilon_t \quad (4)$$

ε_t are error terms uncorrelated with zero mean.

According to Mehrara and Firouzjaee (2011), short-run causality can be identified by testing for the significance of the coefficients on the lagged variables in equations (3) and (4). That is, testing the null hypothesis that the coefficients $\beta_{1i} = 0$ and $\delta_{2i} = 0$. The null hypothesis also applies to check if the coefficients $\beta_{2i} = 0$ and $\delta_1 = 0$, for all i's in equations (3) and (4).

On the other hand, long-run causality is identified by testing for the significance of the coefficients of the lagged error correction term in equations (3) and (4). That is, testing the null hypothesis that $\gamma_{1i} = 0$ and $\gamma_{2i} = 0$ and the alternative hypothesis that $\gamma_{1i} \neq 0$ and $\gamma_{2i} \neq 0$.

5. Presentation Of Results

This section provides empirical findings of the unit root, single-step Engle-Granger cointegration, Lagrange Multiplier and the error correction model.

Unit Root Results

Time series analysis always starts with a unit root test to ascertain the stationarity property of variable series. Table 1 depicts that all the variables are stationary and integrated of the same order, I(1), assuming that non-mining real GDP growth has no trend. The null hypothesis of the series being non-stationary is rejected at the 5 percent level of significance.

The ADF specified with a trend shows that at level, non-mining real GDP growth series is stationary at the 5 percent significant level. This result is the same for the PP test without specifying the trend. The conclusion is that real GDP growth series in Botswana is stationary in its first differences I(1). This is because growth is the first differencing of output. The ADF and PP tests applied on the trending and non-trending behaviour of the ratio of broad money stock to non-mining nominal GDP suggest that the series became stationary in its first difference. The same results hold when applying both tests on the other two financial deepening indicators; that is, on the ratio of banks' deposits to non-mining nominal GDP and the ratio of private sector credit to non-mining nominal GDP. Hence, the conclusion reached is that all selected financial deepening indicators' series are I(1).

Cointegration Results

The Engle-Granger single-step cointegration test was carried out, since all the variables were found to be integrated of the same order, I(1). The results of the cointegration tests are given in Table 2 below. The test was applied on residuals of non-mining real GDP growth and each financial deepening indicator. The null hypothesis of no cointegrating relationship is rejected if the ADF test statistic is greater than underlying critical values.

Table 2: Engle-Granger One-Step Test Results

Residuals	ADF Test Statistic	Critical Value	Probability Value
RGDP,M2/NMGDP	-7.280195	5% level = -3.498692	0.0000
		10% level = -3.178578	
RGDP,DEP/NMGDP	-11.73625	5% level = -3.162948	0.0001
		10% level = -3.471693	
RGDP, PC/NMGDP	-12.52335	5% level = -3.162948	0.0001
		10% level = -3.471693	

Source: Author's computations using Eviews

Since the ADF test statistic values are greater than their critical values, this suggests that there is a long-run relationship between non-mining real GDP growth and all financial deepening indicators. This long-run relationship exists at 5 percent significance level.

Diagnostic Test Results

With the optimal lag length of 4, selected for the dynamic error correction model by the Akaike Information Criterion (AIC) and Schwarz Information Criterion (SIC), the residuals do not show evidence of any serial correlation at 5 percent significance level. The Lagrange Multiplier (LM) results are reported in Table 3.

Table 3: Serial Correlation Test Results Using Lagrange Multiplier

Residual	LM Statistic	Probability Value
(LRGDP, L(M2/NMGDP))	6.002814	0.0143
(LRGDP, L(DEP/NMGDP))	8.337201	0.0039
(LRGDP, L(PC/NMGDP))	8.565494	0.0034

Source: Author's computations using Eviews

The null hypothesis of no serial correlation for all the three models is not rejected at 5 percent significance level, implying that the model passes the stability test for all three financial deepening indicators.

Error Correction Model Results

An Error Correction Model is the appropriate model, since the long-run relationship exists between the variables. Three models of the Error Correction Model were estimated. Each model comprises of only one

proxy for financial development, non-mining real GDP growth and the error correction term. The short-run and long-run relationships of the quarterly estimates between financial development and economic growth in Botswana for the period 1995_{Q1} to 2013_{Q4} results are reported in Table 4:

TABLE 4: TIME SERIES GRANGER CAUSALITY IN BIVARIATE MODEL

Dependent variable	Coefficient	Short-Run Causality		Long-Run Causality
				ECT(-1)
		L(M2/NMGDP)	LRGDP	
LRGDP	1.642009	0.122097	-0.283242	0.009260
	(2.44956)**	(0.16525)	(-1.59638)	(2.52617)**
L(M2/NMGDP)	-0.809580	0.063888	0.033393	-0.004495
	(-18.6142)*	(1.33273)	(-2.90071)*	(-18.8989)*
		L(DEP/NMGDP)	LRGDP	
LRGDP	3.969044	2.433363	-0.222901	0.021446
	(2.66746)*	(2.65587)**	(-1.34762)	(2.72650)*
L(DEP/NMGDP)	-0.833069	0.141536	-0.006879	-0.004414
	(-10.5445)*	(2.90937)*	(-0.78330)	(-10.5687)*
		L(PC/NMGDP)	LRGDP	
LRGDP	2.647923	1.117462	-0.094706	0.051226
	(6.65983)*	(0.91145)	(-0.80977)	(6.72724)*
L(PC/NMGDP)	-0.314748	0.094054	-0.018431	-0.006428
	(-5.75802)*	(0.55800)	(-1.14628)	(-6.14017)*

Source: Author's computations using Eviews

Note: The numbers inside the parenthesis represent t-statistics.
** and ** denote the rejection of the null hypothesis of no causality at 1 percent and 5 percent level of significance, respectively.*

SHORT-RUN CAUSALITY

Like the empirical study by Jordan and Eita (2010), this study's short-run results reveal that causality between financial development and economic growth in Botswana is sensitive to the choice of the measure of financial development. Each model shows a unique short-run result. The second model produced the important causality result that is relevant for Botswana by yielding evidence that is strongly supportive of the positive influence of the ratio of banks' deposits to non-mining nominal GDP on economic growth. This observation is expected and is consistent with the policy thrust of providing scope for financial sector growth in order to boost economic growth and development. The evidence supports the notion that further development of the financial sector matters for sustaining diversified economic growth for Botswana and resilience to shocks.

The results also indicate that economic growth exerts a causal significant positive effect on financial development, in the case where the ratio of broad money stock to non-mining nominal GDP is used to *proxy* for financial deepening, thus, supporting the validity of "demand-following" hypothesis. This implies that, when the economy grows, there is greater demand for financial services, hence, resulting in an even greater expansion of the financial sector.

However, the short-run results remain inconclusive when the ratio of private sector credit to non-mining nominal GDP is employed. No causal relationship between finance and growth is evident, as depicted by the insignificance of the coefficients of these two variables in the third model, implying that the two variables are causally independent.

Long-run Causality

As reported in table 4, the coefficients of the lagged error terms of all the three equations are significant at the 5 percent significance level. But, it is required that the coefficients of the error correction term should carry a negative value. With negative error correction

term coefficient, the variables adjust upwards in the next period, and hence, the long-run equilibrium gets restored. Therefore, the results reported in table 4 reveal that there is long-run uni-directional causality running from economic growth to financial development, for all selected financial development indicators. This result accords with the findings by Adusei (2013), who employed the Pairwise Granger Causality test to estimate the finance-growth relationship for Botswana and concluded that economic growth Granger-causes financial development when domestic credit to GDP ratio is used as a *proxy* for financial development. However, the results suggest that the financial development indicators do not exert any long-run causal effect on economic growth, since the coefficients of their lagged error correction terms carry a positive value.

SUMMARY OF THE ECM RESULTS

Whereas short-run causality suggests the co-existence of the "supply-leading" and "demand-following" phenomena, the long-run relationships in Botswana support the validity of "demand-following" hypothesis across all measures of financial deepening. Although the short-run causality between financial development and economic growth in Botswana is sensitive to the choice of measure for financial deepening, the "demand-following" phenomenon tends to dominate in the long-run despite the measure being used. Therefore, the past values of non-mining real GDP growth have predictive values in determining the present values of the financial development indicators in the short-run and long-run. The study results show that it takes four quarters (a year) for economic growth to exert this significant causal effect on financial development.

6. CONCLUSIONS AND POLICY IMPLICATIONS

This study employed a causality test in the context of dynamic error correction model in bivariate form to examine the relationship between financial development and economic growth in Botswana for the period 1995_{Q1} to 2013_{Q4}, using quarterly time series data. The dynamic error correction model in bivariate form is superior to methodologies adopted in earlier empirical studies, as it measures causality in both the short-run and long-run. This study also contributes to the limited existing literature on Botswana by using the most recently rebased data. The results of this paper suggest support for both "supply-leading" and "demand-following" hypotheses in the short-run, while the "demand-following" hypothesis also prevails in the long-run.

In particular, supportive short-run evidence for the "supply-leading" and "demand-following" phenomena were found in the cases where the ratio of banks' deposits to non-mining nominal GDP and the ratio of broad money stock to non-mining nominal GDP were employed as proxies for financial deepening, respectively. Thus, in the short-run, there is a symbiotic growth inducing process for both financial sector and non-mining real GDP (economic expansion). Therefore, it appears that financial sector reforms and improvements in financial intermediation can have a positive influence on economic growth in the short-run. Subsequently, robust economic growth could stimulate financial deepening, by stimulating the supply of financial services. It is noted, however, that the study did not find significant evidence to support either "supply-leading" or "demand-following" hypothesis when the ratio of private sector credit to non-mining nominal GDP was employed.

For the long-run, economic growth was found to have significant causal effect on financial development, regardless of the measure for financial deepening. Thus, as Botswana's real sector grows and develops, it generates increased and new demand for financial products and services, resulting in expansion of the financial sector.

Conversely, the results do not show any significant long-run causal role of financial development on economic growth. Given the structure of the Botswana economy, it is perhaps not surprising that, even for non-mining GDP, financial development is found not to have a causal effect on economic growth. One reason could be the relatively large government contribution to GDP and finance to the economy which, like mining, could mask the impact of financial sector development. For many years, economic growth in Botswana has been driven mainly by growth in the mining sector and its spill over to the growth of government and its expenditure programmes. However, looking ahead, it is not unreasonable to anticipate a more meaningful relationship between finance and growth as the influence of government lessens as in the context of a more diversified economy.

Bibliography

Adusei, M. (2013). Does Finance Promote Growth in Botswana? (1981-2010). Research in Applied Economics. Vol 5, No 2 (2013).

Akinboade, O. A. (1998). Financial Development and Economic Growth in Botswana: A Test for Causality. Savings and Development. Vol.22.No.3.1999.

Aliero, H, M. Adullahi, Y. Z. Adamu, N. (2013). Private Sector Credit and Economic Growth Nexus in Nigeria: An Autoregressive Distributed Lag Bound Approach. Mediterranean Journal of Social Sciences. ISSN 2039-9340. Vol. 4(1) January 2013

Allen, D.S.L. and Nkikumana; S. (1998). Financial Intermediation and Economic Growth in Southern Africa. Working Paper Series 1998–2004, The Federal Reserve Bank of St Louis.

Aziakpono, M. J. (2003). Financial Development and Economic Growth in Southern Africa.

Bank of Botswana (various). Bank of Botswana Annual Report. Bank of Botswana.

Bank of Botswana (various). Botswana Financial Statistics. Bank of Botswana.

Darrat, A. (1999). Are Financial Deepening and Economic Growth Causality Related? Another Look at the Evidence. International Economic Journal, Volume 13, number 3.

Egbetunde, T. and Akinlo, E. A. (2010). Financial Development and Economic Growth: The experience of 10 Sub-Saharan Countries Revisited. The Review of Finance and Banking. Volume 02, Issue 1, Pages 017-028. S Print ISSN 2067-3828.

Emmanuel, A. (2001). Saving-Investment Connection: Evidence from the Asian Countries. American Economist. Vol. 54, page 1-145.

Goldsmith, R.W. (1969). Financial Structure and Development Role: Does finance Exert a Causal Influence on Economic Growth? The Economic Journal. Vol.80, No.318, Pages 365-367.

Haber, S. H. (1991). Industrial Concentration and the Capital Markets: A Comparative Study of Brazil, Mexico, and the United States, 1830-1930. The Journal of Economic History, Vol.51, No.3, page 559-580.

Hartney (1997). Financial Development and Economic Growth in Botswana.

Jordaan, A. C. and Eita, J. H. (2010). A Causality Analysis Between Financial Development and Economic Growth for Botswana. EconPapers. No 200722, Working Papers from University of Pretoria, Department of Economics.

Kar, M. and Pentecost, E. (2000). The Relationship Between Financial Development and Economic Growth in Turkey: Further Evidence on Causality Issue. Loughborough University.

Karbo, S. M. and Adamu, P. A. (2009). Financial Development and Economic Growth in Sierra Leone. Journal of Monetary and Economic Integration.Vol. 9, No.2.

Keynes, J. M. (1930). A Treatise on Money. London: Macmillan.

Levine, R.; Loayza, N.; and Beck, T. (2000). Financial Intermediation and Growth: Causality and Causes. Journal of Monetary Economics, Elsevier, 46: 31-77.

Lucas Jr, R. E. (1988). On the Mechanics of Economic Development. Journal of Monetary Economics, XXII (1988).

Martins, P. (2010). Fiscal Dynamics in Ethiopia: The Cointegrated Model with Quarterly Data. CREDIT Research Paper 10/05: University of Nottingham.

McKinnon, Ronald I. (1973). Money and Capital in Economic Development. Washington, D.C: Brookings Institution.

Mehrara, M. and Firouzjaee, B. A. (2011). Granger Causality Relationship Between Export Growth and GDP Growth in Developing Countries: Panel Cointegration Approach. International Journal of Humanities and Social Science. Vol. 1 No. 16; November 2011.

Mensah, J. T.; Marbuah, G.; and Adu, G. (2013). Financial Development and Economic Growth in Ghana: Does the Measure of Financial Development matter? Review of Development Finance. Volume 3, Issue 4, July-December 2013, Pages 192-203.

Ozcan, B. and Ari, A. (2011). An Empirical Analysis of Relationship Between Financial Development and Economic Growth: The Turkish Case. Business and Economic Research Journal, Vol (2), No (1).

Patrick, H. (1966). Financial Development and Economic Growth in Underdeveloped Countries. Economic Development and Cultural Change, 14(2).

Quartey, P. and Prah, F. (2008). Financial Development and Economic Growth in Ghana: Is There a Causal link? The African Finance Journal, Volume.10, Issue 1. Pages 28-54.

Republic of Botswana. (2012_a). National Development Plan 10, Volume 1. Government Printer: Gaborone, Botswana.

Republic of Botswana. (2012_b). Mid-Term Review of National Development Plan 10. Government Printer: Gaborone, Botswana.

Republic of Botswana. (2013). 2013 Budget Speech. Botswana: Government Printing and Publishing Services.

Schumpeter, J. (1911). The Economics and Sociology of Capitalism, ed. R. Swedberg, Princeton, N.J., Princeton University Press.

Seleka, M. (2009). An Econometric Analysis of the Relationship Between Financial Development and Economic Growth in Botswana (1990-2007). Unpublished.

Stern, N. H. (1989). The Economics of Development: A Survey. Economic Journal, 99. Great Britain.

Sunde, T. (2012). Financial Sector Development and Economic Growth Nexus in South Africa. Int. J. Monetary Economics and Finance.

Tuzel, B.; Safakli, O. V.; and Guryay, E. (2007). Financial Development and Economic Growth: Evidence from Northern Cyprus.

Evaluation of Commercial Banks' Operations in Botswana – Asset Creation and Sources of Income (2001 – 2014)

Kealeboga Masalila, Mosarwana Maramane and Chipo Mpuchane[1]

Abstract

This paper evaluates the structure of commercial banks' operations in Botswana in terms of funding and assets and related costs and income. To this end, the review involves an assessment of trends and relationships among the key balance sheet and income and expense items/variables. In the process, there is an examination of possible influence on performance, including strategic disposition of the banks, size, as well as regulatory and economic developments. It is found that the balance sheet structure for banks in Botswana is consistent with normal banking operations (experienced globally). However, in periods when there was full absorption of endemic excess liquidity by the Bank of Botswana, the monetary operations instrument (Bank of Botswana Certificates) was a significant asset for banks; conversely, relatively low level of financial intermediation. In addition to consistently meeting all the prudential requirements, commercial banks in Botswana, generally reported higher interest margins, mostly influenced by relatively large earnings from unsecured personal loans. It is also found that faster growth in developmental non-interest expense has a positive correlation to earnings and growth/size of individual banks. Overall, the sound, stable and well-funded banking system continues to support economic activity and with potential for fostering enhanced productive absorption and harnessing of financial resources within the domestic economy.

1. Introduction

At a basic level, commercial banking involves financial intermediation, which is the transformation of deposits into loans. Thus, through deposit taking, banks promote saving, which affords safety and return on financial resources. In turn, through lending, banks facilitate the placement of such funds for productive use, which adds to economic activity and at the same time generating a return for the bank; the return garnered by banks also affords payment of interest on deposits. Therefore, this part of bank operations (financial intermediation) allows a bank to earn an interest margin, which is the difference between interest rate charged on loans and the interest paid on deposits. Commonly, banks earn more revenue from this financial intermediation function, i.e., net interest income (interest income less interest expense).

In addition, banks charge fees and commissions for transactions, custodial and other services offered to clients. As banks diversify operations and provide facilities to improve market capture, these aspects of banks' operations also earn significant income after accounting for costs. Like any business, banks also incur non-interest expenses, for administration, staff and other services.

Given the range of banks' operations and their role in supporting economic activity, there is a case for assessing the utility of banking services in terms of access to financial services, growth and return on saving, the range and cost of loan facilities and contribution to economic performance. It is recognised that the intermediation function of banks and associated costs and return are influenced by at least three dimensions of the policy and the regulatory environment.

First, the general policy with respect to financial sector development would influence availability and quality of services; thus, the range and cost of products, competitiveness and pace of innovation and development. Second, regulation affects integrity and confidence in the banking system, and, therefore, patronage of financial institutions and products. Third, monetary policy has a direct impact on the cost of borrowing and return on saving as well as the availability of loanable funds; ultimately decisions to save and borrow.

Abstracting from the myriad of issues surrounding banks' operations, this review focuses on bank funding and how it is deployed and the related returns; therefore, how this might relate to operational strategy of banks and, from the perspective of the authorities, highlight relevant policy, stability and regulatory issues. The following section discusses aspects of commercial banks' operations and balance sheet. Section three examines sources and trends in commercial banks income and Section four discusses the distribution and trends in commercial banks' funding and other expenses. The conclusion is in Section five.

2. Aspects of Commercial Banks' Operations

The four major components of commercial banks operations include capital and customer deposits on the funding (liabilities) side and loans and securities (Bank of Botswana Certificates and government securities in the case of Botswana) on the use (asset) side.

1 Dr Masalila is Director, Reasearch and Financial Stability Department and Ms Maramane is Senior Economist in the same Department. Ms Mpuchane is Senior Bank Examiner, Banking supervision Department. The views expressed in the paper are those of the authors and do not necessarily reflect those of the Bank.

Capital represents owner equity and is basic to banking operations. Elizalde and Repullo (2007) identify three forms of bank capital. First, *regulatory capital* conforms to supervisory requirement and reflects the confidence level of the regulator. In this regard, capital is held as a buffer to absorb losses (retain solvency) that may be incurred by the bank, therefore, ensure that public deposits are protected. For example, a high probability of loan default and loss (given default) would imply a higher regulatory capital requirement. Second, banks also have a view on *economic capital* relating to potential viability of operations as influenced by the prospective intermediation margin and the cost of capital. It is argued that *economic capital* would be higher (lower) than *regulatory capital* when the cost of capital is low (high). Regarding the intermediation margin, *economic capital* would increase in very competitive markets (low intermediation margin), while it would be lower otherwise. Third, *actual capital* reflects the desire by banks to maintain capital above the regulatory requirement to forestall any threat of sanction for undercapitalisation. Owners of bank capital are rewarded through payment of dividend and increase in net worth of the bank (and for individual owners, the value of shares held). On the other hand, sustained losses can lead to diminution of capital, a fall in value of shares and net worth. In Botswana, banks are by statute, required to hold capital amounting to 15 percent of total assets[2].

Overall, commercial banks' capital (and respective components) determine the extent to which they can generate business, especially lending capacity. Thus, abstracting from nuances surrounding risk-weighted assets, a bank with P15 million capital can maintain assets only up to P100 million, while a bank with P150 million capital could have assets up to P1 billion. It follows that a bank with a higher level of capitalisation is able to not only generate a larger volume of lending, but also enhances scope for wider variety of loans and sectoral coverage. Charts 1(A) and (B) show the positive correlation between banks' capital and assets, while Charts 1(C) and (D) show the same relationship with respect to deposit liabilities and loans advances.

CHART 1 (A): BANKS' TOTAL ASSETS RELATIVE TO CAPITAL (P BILLION)

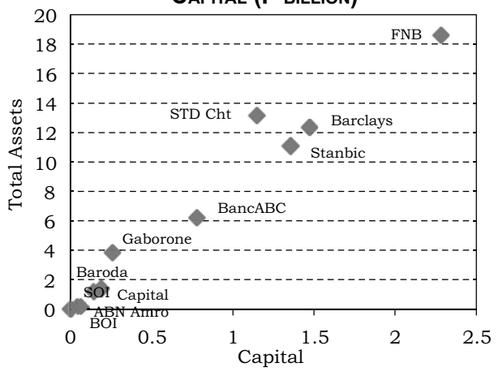


CHART 1(B): COMMERCIAL BANKS' TOTAL ASSETS AND CAPITAL

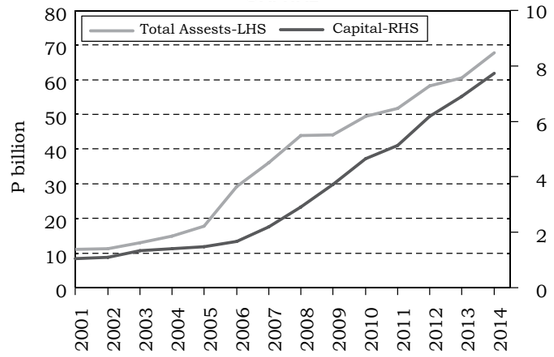


CHART 1 (C): CUSTOMER DEPOSITS AND LOANS AND ADVANCES - (P BILLION)

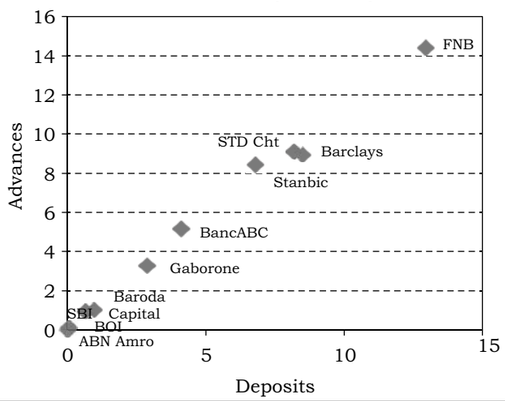
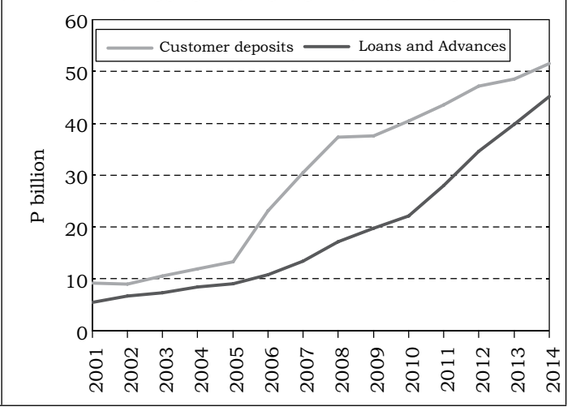


CHART 1(D): COMMERCIAL BANKS' CUSTOMER DEPOSITS AND LOANS AND ADVANCES



Source: Commercial Banks

2 Practically, a lesser amount can be held given the fractional or zero weighting of some assets for the purposes of calculating capital adequacy.

Public deposits at banks represent the main source of funds for asset creation and income generation by the banks (the loan and trading books). Thus, banks use deposit liabilities (and other borrowing) to finance assets, such as loans and interest earning securities. Through this financial intermediation approach, banks can grow in size and generate much higher levels of income than would otherwise be possible using only capital. This is possible because of fractional reserve banking, whereby a bank only holds a portion of customers' deposits in cash to satisfy potential withdrawals and another portion as reserves at the central bank; the rest being used to create income generating assets, principally loans and securities. The practice is based on the observation that generally not all depositors demand payment at the same time. Moreover, banks create additional money (as well as increase their assets) through their lending operations; when giving out a loan (to a business or individual), the bank simply credits the customer's account, creating a deposit, which is then used to pay for goods and services and adding to deposits of these suppliers. The sum of these operations by the banks is the so-called money multiplier. Table 1 illustrates the expansion in deposit, loans and assets induced by banks operations where, for example, starting with a P1000 deposit and with the central bank holding 20 percent of the deposits as reserves, over time this increases to P5000 and P4000 in total deposits and loans, respectively; P4000 of deposits is created solely from loans.

TABLE 1: ILLUSTRATION OF EXPANSION IN DEPOSIT, LOANS AND ASSETS INDUCED BY BANKS OPERATIONS

	Amount Deposited	Amount Lent Out	Reserves
Initial position	1000	800	200
	800	640	160
	640	512	128
	512	410	102
	410	328	82
	328	262	66
	262	210	52
	210	168	42
	168	134	34
	134	107	27
	↓	↓	↓
	0	0	0
	Total Deposits:	Total Loans:	Total Reserves:
End position	5000	4000	1000

Source: Authors' own calculations

The use of depositors' funds for lending is the essence of financial intermediation, with commercial banks considered to be more effective in appraising and pricing credit proposals and, therefore, facilitating efficient allocation of financial resources for productive use; in the process ensuring safety and preservation of the value of deposits. Alternatively, banks can also complement funding through debt securities and interbank borrowing (albeit this aspect being mostly for short-term liquidity needs). To compensate for the funding (and depositors' opportunity cost), banks pay interest on deposits and this, generally, is their main expense; interest is similarly paid on debt securities and interbank borrowing, including borrowing from the central bank. Therefore, along with other economic agents banks play a role in economic activity, helping to add economic value and contributing to growth in national output (Figure 1 - 3).

Figure 1

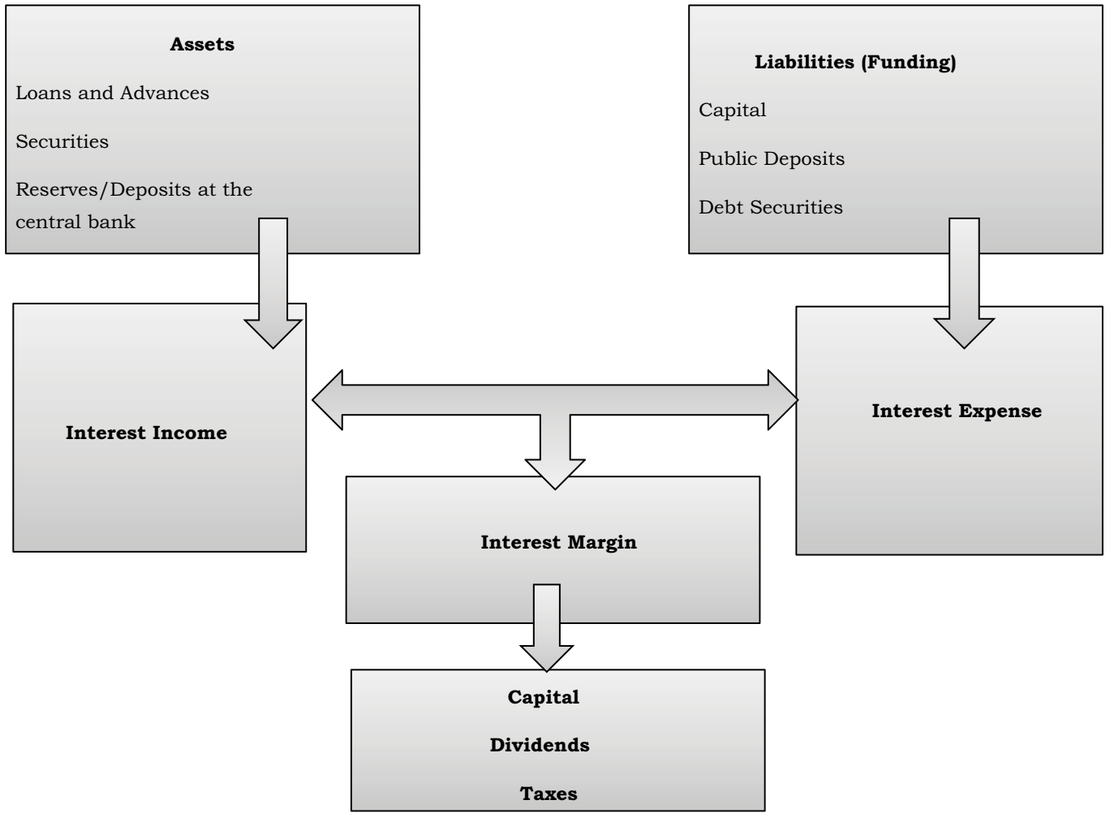


Figure 2

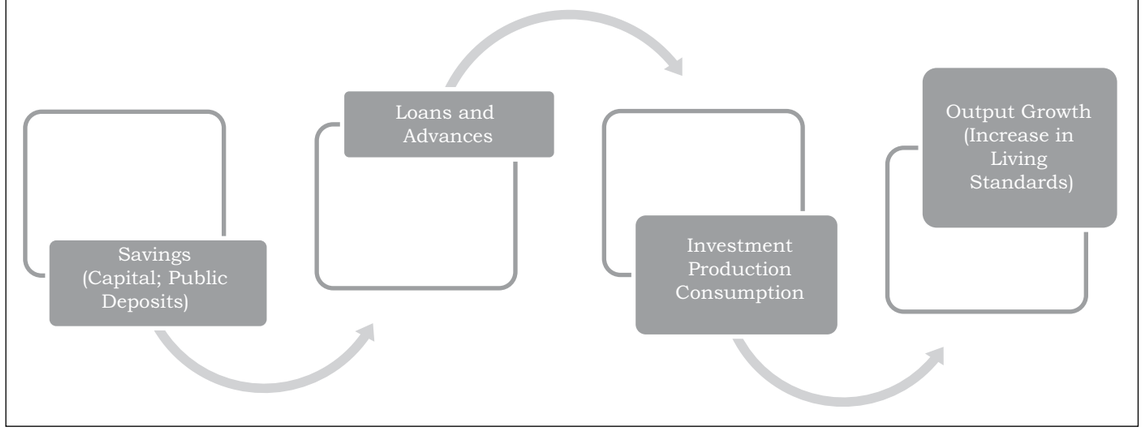
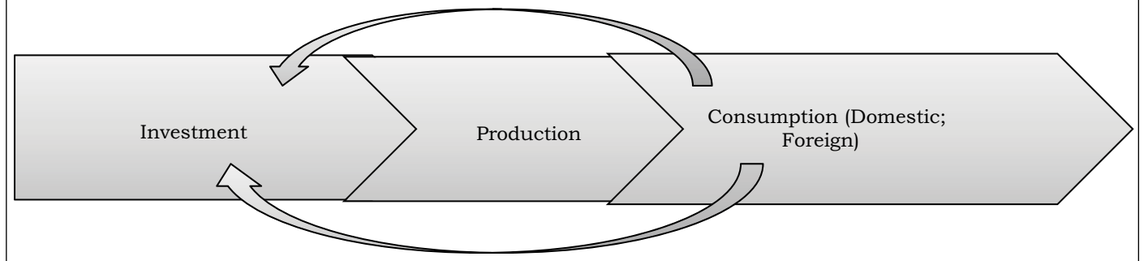


Figure 3



The representation above assumes a virtuous relationship from savings/capital to lending for production, investment and consumption, contributing to growth in national output (and associated increase in employment and income). Investment feeds into production to satisfy consumption; in turn, consumption needs drive investment and production.

In the context of the four main components of banking operations identified above, asset-liability management is core to bank strategy, as it relates to maximising returns and ensuring cost efficient and sustainable operations. In this regard, the important dimensions of strategy are:

(a) *generation of an interest margin* (Figure 1) derived from the difference between the return on assets and the average interest on deposits. In turn, the rates of growth, levels, and structure of both deposits and assets are important influences on the interest margin, and bank profitability (thus, the level of taxes and value added to the economy); and

(b) *maintenance of liquid assets* to ensure that the bank meets deposit withdrawals and other maturing obligations. Table 2 and charts 2 (a) and (b) illustrate a structure of the asset/liability mix which, in terms of relativities of broad categories does not change much over time, reflecting the essence of bank operations.

For Botswana, the relativities for the funding structure have not varied much, with public deposits being the main source, supported by a robust capital base. However, the asset structure has changed significantly in recent years as the Bank of Botswana scaled down the amount of BoBCs in favour of encouraging banks to engage in productive lending. Thus, the share of loans in banks assets has increased with respect to both business and household credit.

Table 2: Distribution of Commercial Banks' Assets and Liabilities in Botswana

Categories							
Assets	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Private business loans	15.3	17.0	18.0	19.7	23.4	24.3	24.6
Parastatals loans	0.3	0.5	0.8	1.3	2.8	3.4	3.4
Households loans	21.5	25.4	25.2	27.3	30.0	35.0	36.4
Government obligations	2.8	1.5	1.3	2.9	3.3	4.3	2.8
Financial investments	18.6	19.3	20.3	22.0	20.7	19.2	22.7
(including assets held for liquidity)	39.5	35.2	33.9	25.5	18.0	12.0	8.4
BoBCs	1.9	1.1	0.6	1.4	1.8	1.9	1.6
Other assets	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
Liabilities							
Term deposits	39.2	38.5	39.6	41.4	40.6	35.4	35.5
Demand deposits	45.4	45.6	42.2	42.5	42.1	44.8	43.2
Liquidity borrowings	5.4	4.4	7.5	4.5	4.5	6.1	7.1
Other liabilities	3.8	3.7	3.0	2.9	2.6	2.3	3.3
Capital and reserves	6.2	7.8	8.6	9.6	10.2	11.4	10.9
	100.0	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Annual averages derived from the consolidated commercial banks' balance sheet.

Source: Commercial Banks.

Note: Capital and reserves presented here are as a percentage of total assets and would differ with the minimum statutory capital adequacy ratio of 15 percent which is calculated as a percentage of risk weighted assets.

Chart 2 (a): Distribution of Commercial Banks Assets

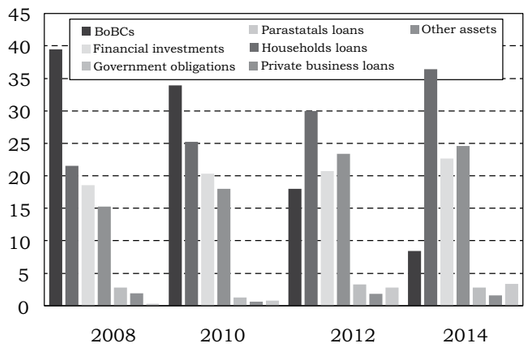
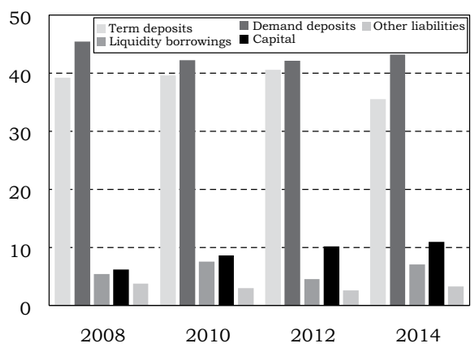


Chart 2 (b): Distribution of Commercial banks Liabilities

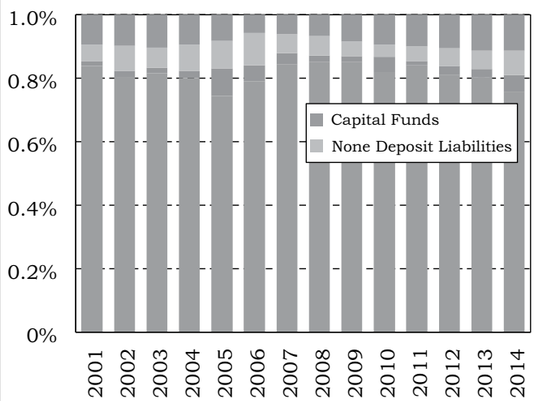


Source: Commercial Banks

Commercial Banks Funding – Deposit Liabilities

Customer deposits averaged 79 percent of liabilities between 2008 and 2014, while the average capital of 19 percent was well above the prudential requirement of 15 percent of risk weighted assets (Chart 3 and 4). However, the intermediation ratio (Chart 5), which shows the transformation of deposits into loans has for a long time been relatively low in Botswana compared to the international norm of above 75 percent. To the extent that the intermediation was relatively low, the excess of bank deposits over loans was invested in Bank of Botswana Certificates (BoBCs) and government securities. It should be noted that in jurisdictions where the intermediation ratio is close to 100 percent or higher, banks have other sources of funding, including own securities and money market instruments; as well as operating in sufficiently liquid and effective markets to facilitate interbank funding. Even then, there has been an increase in the intermediation ratio in the recent past driven by both market developments and changes in policy. For example, the scaling down of BoBCs from 2011 increased the supply of loanable funds, contributing to faster growth in credit and increase in intermediation; thus, the intermediation ratio rose to around 88 percent by the end of 2014.

Chart 3: Sources of Funding for Banks (Share)

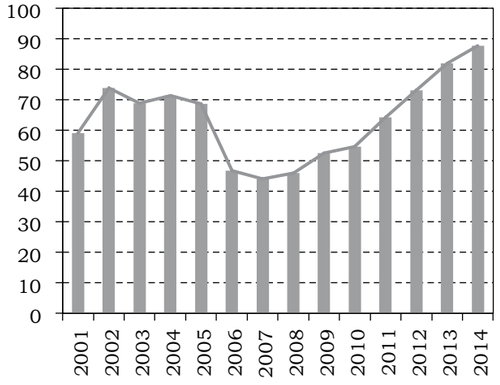


Source: Commercial Banks

Chart 4: Banking Industry Capital Adequacy Ratio

Source: Banking Supervision Annual Reports

Chart 5: Loans to Deposits Ratio - Intermediation



Source: Commercial Banks

Box 1: Bank of Botswana Certificates: Trends and Policy Developments

- Introduced in 1991 to help support monetary policy formulation and anchor market determination of interest rates consistent with prevailing policy stance.
- In order to support determination (estimation) and optimal absorption of excess liquidity in the market and representative yield outcome, participation in BoBCs was opened up to a wide range of entities (such as non-bank financial institutions),which could also hold the securities on behalf of retail customers (including individuals).
- The level of BoBCs rose from P1.6 billion in 1995 to P14 billion in October 2006, with an average of 28.5 percent held on behalf of retail customers. During this time, the share of BoBCs in total assets of commercial banks averaged between 15 percent (in 2004) and 42 percent (in 2006).
- First, in 2006 the holding of BoBCs was restricted to commercial banks (primary counterparts and main transmitters of monetary policy). The initiative was intended to exclusively use BoBCs for monetary policy purposes and not as an alternative investment instrument for banks and non-banks.
- Second, from November 2011, there has been a limit on the amount of excess liquidity mopped through Bank of Botswana Certificates to P10 billion. Again, this had the effect of encouraging banks to seek alternative uses of deposits. This was further reduced to P5 billion in 2013.
- Moreover, the limited supply of BoBCs lowers yields on this asset for banks and inevitably reduces the premium for the riskier loan portfolio, leading to lower cost of funds/lending and increased access to bank funding for economic activity.
- Evidently, the growth in lending initially goes to the easier to capture household sector. However, through both moral suasion on the part of the authorities and a move towards saturation in terms of what can be lent and risk tolerance, the more productive business sector (including SMEs) should get an increasing share of access to bank funding.
- At the same time, the slower growth in deposits in the context of subdued growth in income as well as both lower and greater efficiency in funding of parastatals by the Government also contributed to a reduction in excess liquidity, particularly in 2014.
- As such, two important outcomes are likely to be increased competition for deposits and higher returns thereof, and a more active interbank market to cover liquidity positions.
- A tighter (and perhaps uncertain) liquidity situation has motivated banks to reassess asset-liability management, particularly the extent to which the assets/loan portfolio matches the funding/deposit profile.
- Ultimately, it is possible that the Bank of Botswana will at times be the main source and provider of liquidity (a situation that prevails in a majority of markets); such an environment allows for a more normal and effective control of liquidity (quantity) by the central bank to enforce a policy interest rate (price).

In addition to the overall levels and trends, the term structure of deposits is an important facet of bank operations and has an influence on the profile of loans in terms of both sectoral allocation and maturity spectrum (and ultimately, asset quality and return). Typically, a large number of long-term deposits (savings) of moderate value would represent a stable funding structure and favour long-term lending and a more dispersed sectoral allocation/exposure. Conversely, a system dominated by a small number of large deposits of short-term maturity would be unstable and not conducive for long-term lending. For Botswana, the structure of deposits is skewed towards the demand and shorter maturity type; about 71 percent of total deposits (Chart 6 (a)). This pattern is predominantly driven by what pertains in the largest banks (Chart 6 (b)) while the smallest banks (Chart 6 (c)) tend to be skewed towards time and longer term maturity deposits.[3]

Compared to the maturity structure of deposits, banks predominantly issue medium to long term credit (from three years to above ten years) which, on average, constitutes about 74 percent of total lending (Charts 7 (a) to (c)). Such a relationship between deposits and loans could suggest a maturity mismatch; i.e., the withdrawal of deposits could occur faster than the repayment of loans. There is also the added risk that a large part of the short-term deposits or call deposits are bulky and held by a relatively smaller number of big corporates, such that the impact of any single withdrawal could be significant, especially for smaller banks. However, conventional banking does accommodate the borrow-short and lend-long manner of operation, with the expectation that short-term deposits would be rolled over at maturity and that depositors/customers will continually generate income that goes into transactions balances. Even then, both maturity mismatch between deposits and loans and the ownership structure of deposits (concentration) requires judicious asset-liability management to mitigate liquidity risk.

Chart 6 (a): Commercial Banks Term Structure of Deposits - 2014

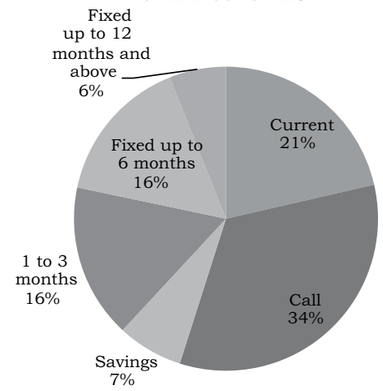


Chart 6 (b): Largest Banks - Term Structure of Deposits - 2014

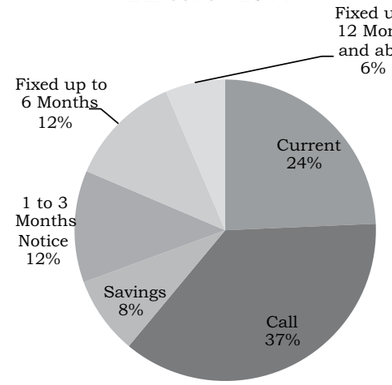


Chart 6 (c): Small Banks - Term Structure of Deposits - 2014

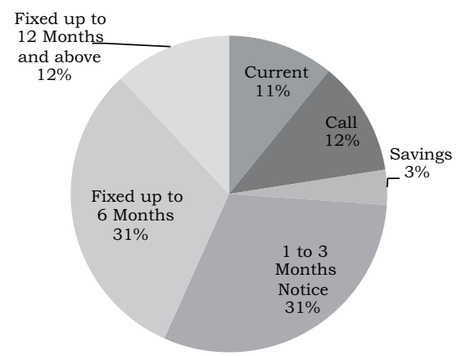
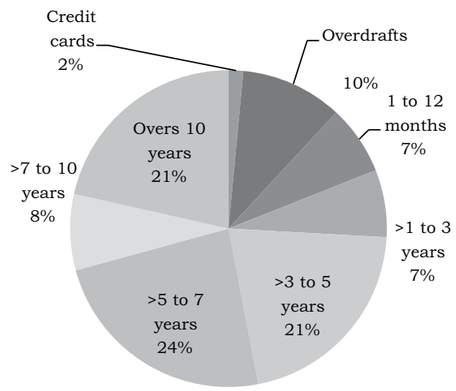


Chart 7 (a): Commercial Banks Credit by Maturity - 2014



Source: Commercial Banks.

3 The smaller banks attract a relatively smaller pool of retail depositors in the transactions based accounts segment. As such, to compete for funding/deposits they have to bid for corporate and longer term savings, with higher interest rates as a selling point.

CHART 7 (B): LARGEST BANKS - CREDIT BY MATURITY - 2014

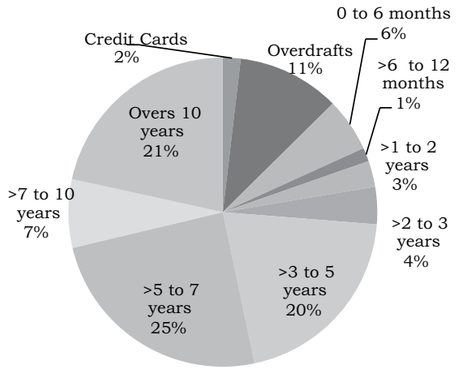
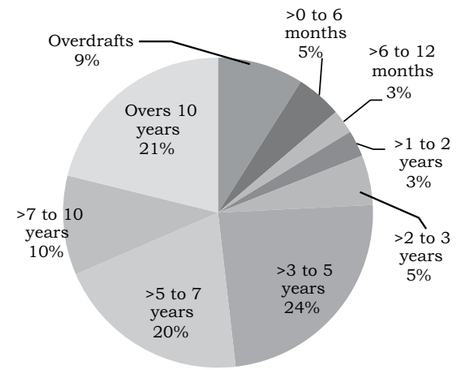


CHART 7 (C): SMALL BANKS - CREDIT BY MATURITY - 2014

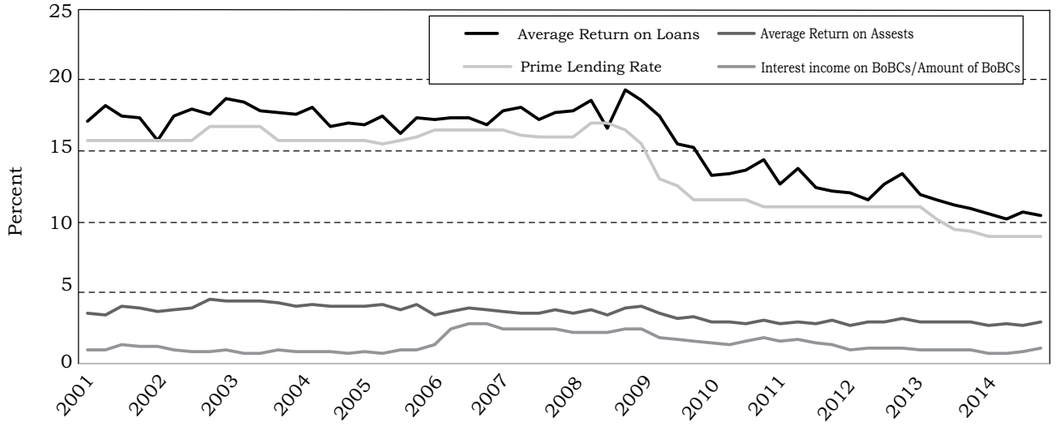


Source: Commercial Banks.

3. Sources and Trends in Commercial Banks' Income

The average return on assets primarily relates to income generated from lending and investment in securities (BoBCs, Treasury Bills and Government Bonds in the case of Botswana) and is a measure of profitability of the bank's main assets. As shown on Chart 8, the return on the former is much higher compared to the latter; it is also consistently higher than the prime lending rate suggesting that on average effective lending rates are higher.[4]

CHART 8: AVERAGE ANNUAL RETURN (LOANS, ASSETS AND BOBCS) AND PRIME LENDING RATE



Source: Commercial Banks and Bank of Botswana.

4 This is evidence that, on average, effective lending interest rates are higher than the prime lending rate of commercial banks.

In terms of levels, it is expected that, save for a sharp fall in interest rates, the interest income will necessarily increase as the asset base grows. In this regard, the distribution of loans will also affect both the level of interest income and the average return on lending. For example, a market dominated by unsecured personal loans which attract higher interest rates and other charges (where credit risk is sufficiently mitigated) will have a higher average return[5] compared to a market dominated by lending to large corporations and Government.

It is also the case that interest income from lending (Chart 10), has close substitutability with interest income on securities (Bank of Botswana Certificates); thus the share of interest on loans increases as interest earned on securities falls and vice versa. This is to be expected as prevailing monetary policy influences the deployment of loanable funds (in the context of excess liquidity). *A priori*, monetary policy tightening or increase in interest rates should result in slower growth in lending and commensurate larger amount of excess liquidity mopped up through BoBCs. Conversely, easing of monetary policy should generate an increase in demand for loans and simultaneous decline in the amount of BoBCs (for the same amount of loanable funds). However, for Botswana, the major factor at play has been the discretion relating to the amount of BoBCs used to absorb excess liquidity.

In general, the share of interest on loans has grown over time and averaged 70.7 percent of total interest income in the review period.[6] This trend is associated with faster growth in loans and, as should be expected, their dominance in bank balance sheets compared to other interest earning assets; and within the loan portfolio, faster increase in household lending, led by personal loans, which attract higher interest rates. The share of interest earned on securities, which rose up to the mid-2000s has been declining since BoBCs were scaled down. Meanwhile, the relatively low level and declining contribution of interest on balances due from banks suggests muted interbank trading. Charts 9 and 10 show the trend and shares for the various categories of bank assets and sources of income.

CHART 9: COMMERCIAL BANKS: SOURCES OF INTEREST INCOME

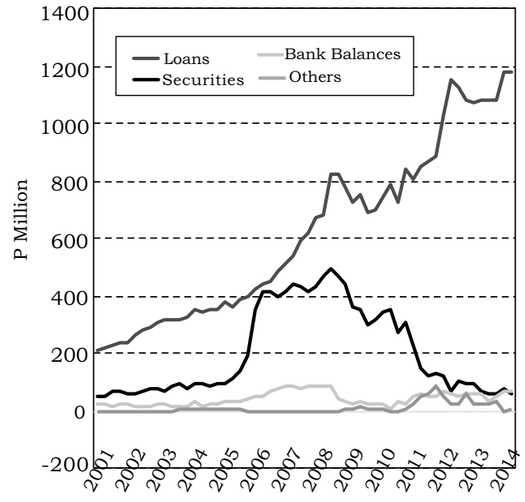
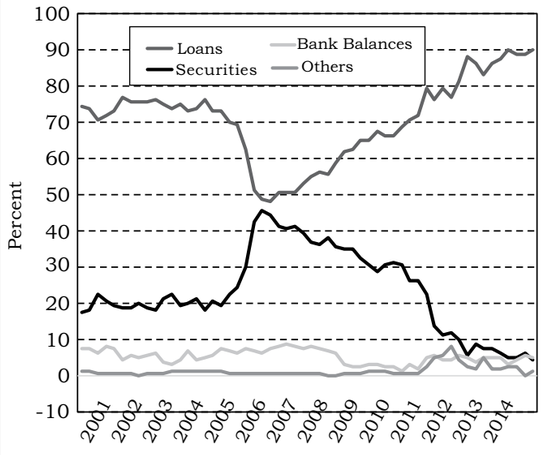


CHART 10: COMMERCIAL BANKS: SOURCES OF INTEREST INCOME (SHARE IN TOTAL)



Source: Commercial Banks.

5 However, the high return, in this instance, could, be offset by a significant component of non-performing loans.

6 The fall in the share of interest income earned on loans between 2005 and 2006 is attributable to the impact of a higher level of BoBCs in the context of a change in policy that limited the holding of BoBCs exclusively to commercial banks.

Within the total, household loans generate the most income at an average of 56.4 percent between 2001 and 2014 and an average return of 13.8 percent. This compares with 42.8 percent share for interest on lending to businesses and a return of 16.2 percent. Personal loans contributed most to earnings from commercial bank lending at 39.5 percent of the total compared to 9.3 percent for interest on mortgages and 5.9 percent for motor vehicle loans, respectively. This pattern is also apparent when looking at the average return on the respective components of household loans. Thus, the average return on unsecured personal loans was 17.5 percent between 2001 and 2014. In comparison, average return on mortgage lending was 11.3 percent and 12.8 percent for motor vehicle loans. However, there has been a marked increase in mortgage loans since 2008, such that the lower relative share of interest income in this regard partly reflects the lower applicable interest rate.

On the surface, the skewed distribution towards unsecured personal loans could suggest greater funding of consumption and purchase of household durables. However, there is some evidence that, given the ease of access and as limits for personal loans have been raised, they also fund asset acquisition (including housing, small business as well as farm equipment and livestock), motor vehicles[7] and education (both for children and self-improvement). The downside is that such acquisition of and build-up of assets comes at a comparatively high cost (albeit relating to short-term loans). Moreover, the funded investment does not necessarily generate sufficient returns (financial returns conventionally measured) to cover the interest costs; although there could be wealth/welfare effects over time. It is also the case that any distinctions by use could be illusory, given that money is fungible in that acquiring funds for "investment" could simply release other funds for consumption. On the other hand, to the extent that the associated debt is sustainable and/or mitigated, consumption is positive for economic performance.

CHART 11: COMMERCIAL BANKS: SOURCES OF LOAN INCOME (SHARE IN TOTAL)

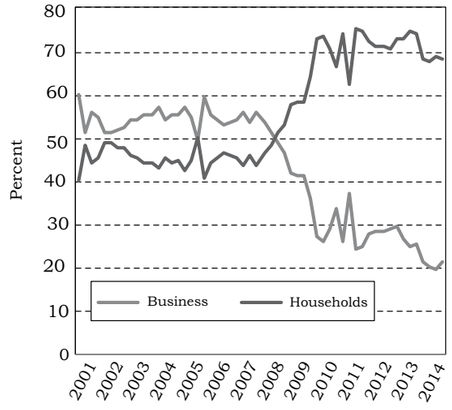


CHART 12: COMMERCIAL BANKS: SOURCES OF HOUSEHOLD LOAN INTEREST INCOME (SHARE IN TOTAL)

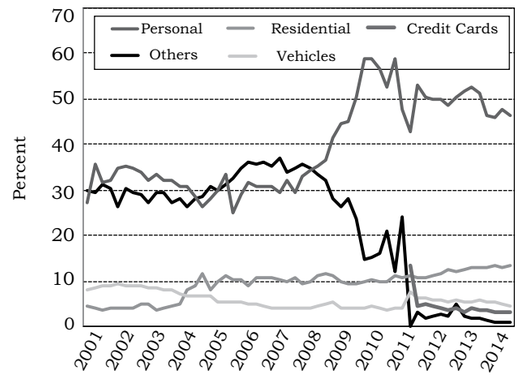


CHART 13: COMMERCIAL BANKS: SOURCES OF INTEREST INCOME (GROWTH)

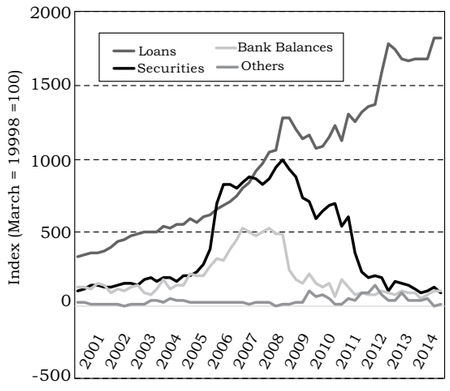
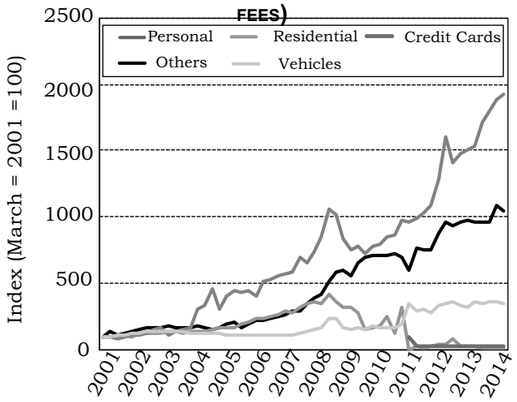


CHART 14: COMMERCIAL BANKS: SOURCES OF HOUSEHOLD LOAN INCOME GROWTH (INTEREST AND FEES)



Source: Commercial Banks.

7 Especially with the advent of imported motor vehicles from Asia and the UK that were initially not covered by the banks' motor vehicle loan schemes.

In terms of growth and trends in contribution to overall interest income, interest on loans has been the fastest growing component[8] with average annual increase of 19.5 percent in the review period compared to average annual expansion of 13 percent for interest income from BoBCs. Again, a lower rate of expansion for interest earned on bank balances (with average annual growth of 6.5 percent) highlights the apparent weakness of the interbank market in Botswana.

The growth in interest earned on household loans averaged 20.3 percent between 2001 and 2014 compared to an annual increase of 9.8 percent for interest income on business lending. Within household lending, interest on unsecured personal loans registered the fastest annual growth rate of 17.6 percent. It is notable, however, that from a flat performance up to 2003, interest derived from mortgage lending increased on average by 29.3 percent annually between 2001 and 2014, reflecting growth in the volume of residential property loans. Annual interest income earned on motor vehicle loans increased at a comparatively slower rate and was notably stagnant in the last few years (Chart 14).

TABLE 3: COMMERCIAL BANKS' ASSET AND INCOME STRUCTURE – PERCENTAGE SHARE

	Share in Total Assets				Share of Interest Income			
	Household Loans	Business Loans	Securities	Other assets	Household Loans	Business Loans	Securities	Other interest income
2001	26.8	22.8	17.2	33.1	32.3	40.4	19.7	7.7
2002	31.8	27.4	15.7	25.1	36.4	39.0	19.1	5.5
2003	30.2	26.1	21.1	22.6	33.9	41.2	19.9	5.0
2004	33.3	23.7	21.6	21.4	33.0	41.4	19.4	6.2
2005	29.9	21.2	25.0	23.9	31.9	39.4	21.8	7.0
2006	21.2	15.7	47.3	15.8	24.0	28.6	41.2	7.0
2007	22.3	15.0	45.8	17.0	23.0	28.1	40.5	8.3
2008	22.2	16.8	41.2	19.7	28.1	28.2	36.5	7.0
2009	25.9	18.9	40.2	15.0	37.9	25.5	33.4	3.3
2010	26.0	18.7	35.7	19.6	47.5	19.6	30.5	2.1
2011	29.5	24.4	21.5	24.6	53.4	20.9	22.4	5.2
2012	33.7	25.6	17.1	23.6	58.0	23.2	9.2	9.2
2013	38.0	27.8	12.3	21.9	62.5	22.7	7.3	7.0
2014	37.4	28.9	9.4	25.8	68.3	20.9	4.3	5.8

Source: Commercial Banks.

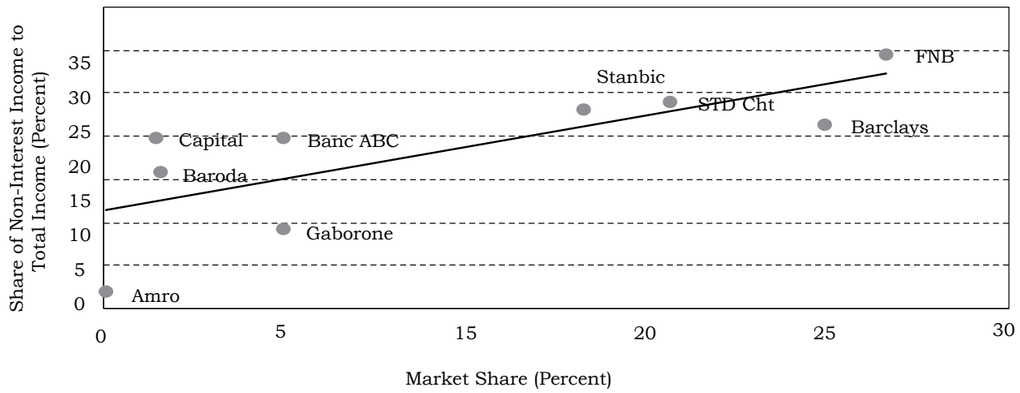
Note: Securities include bonds, BoBCs and T-bills. Other assets include balances at Bank of Botswana, due from other banks and other accounts receivable.

Non-Interest Income

Commercial bank's operations also entail provision of custodial and transaction services for which they charge fees and commission. Indeed with the advent of competition, technological advancement and progress in financial inclusion and sectoral development, such complementary services increase and, therefore, act as a source of income as well (non-interest income). The share of non-interest income in total income averaged 23.2 percent between 2001 and 2014, generally with an upward trend; a development that reflects growth and diversification of banking services. However, there is a noticeable three-phase trajectory: largely stable path with an average of 22.4 percent between 2001 and 2005; a lower average of 17.6 percent up to the middle of 2009 during a period of relatively high interest rates and, therefore, larger share of interest income; followed by a steady increase and average of 27 percent from mid-2009 to the end of 2014, as interest rates fell and other sources of income grew in importance (in the context of greater use of ICT platforms in banking). It is also instructive to examine whether the relative size of a bank influences the relative shares of interest and non-interest income. As shown in Chart 15, it appears that the share of non-interest income rises as market share increases, indicated by the positively sloping trend line in the scatter diagram. This is reasonable, since growth in market (share) is an artefact of innovation, expansion of product range and attraction of larger number of customers, such that the resultant larger volume of services and transactions generates a greater amount of non-interest income and share in total income.

8 However, interest earned on BoBCs increased quickest between 2005 and 2006 (129 percent compared to 11.9 percent for interest income on loans) owing to change in policy to exclude non-banks from holding BoBCs (the interest previously paid to non-bank holders of BoBCs was now being paid to banks).

CHART 15: NON-INTEREST INCOME PER BANK TO MARKET SHARE



Source: Commercial Banks.

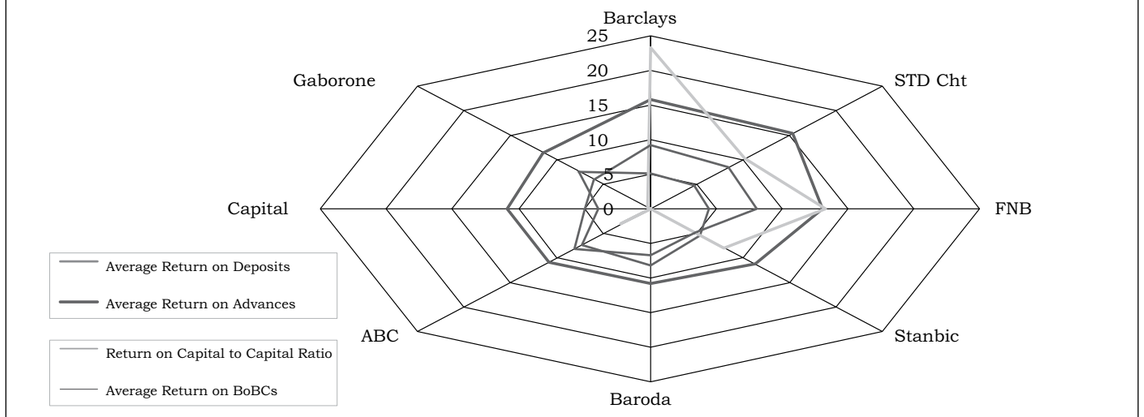
4. Trends in Commercial Bank's Expenses

As highlighted in Section 2, banks' main funding is represented by deposit liabilities and capital, which are compensated for by interest expense and dividends, respectively. Given the larger deposits component, interest expense (should) represents the largest cost of commercial bank operations. Moreover, while dividends could be foregone or deferred, interest expense is a direct cost of operations, which has to be paid. However, the composition of deposits determine the ultimate interest payments; typically bank deposits are dominated by non-interest earning (or low-interest earning) current/transaction accounts, while long-term deposits that attract relatively high interest rates constitute a small proportion. The ultimate interest expense, therefore, relates to the average cost of deposits that includes the non-interest earning component and a spectrum of deposit types that attract various levels of interest rates, normally rising in line with the maturity profile (upward sloping yield curve).

The share of interest on deposits in commercial banks' cost of funds averaged 59.6 percent (Table 5) between 2001 and 2014, while dividends constituted 26.3 percent; this compares with shares of 81.2 percent and 9.1 percent, respectively, in total funding (deposits and capital). In this regard, the average return on deposits was 7.1 percent, while the return on capital was 12 percent (shareholding pays more than being a depositor). Nevertheless, in recent years, there has been relative reduction in dividends paid, which is indicative of the effect of deceleration in credit expansion and lower interest rates as well as restrained growth of commercial banks' profitability. The share of "other liabilities" in commercial banks' funding is relatively small and was 6.5 percent on average. However, between 2006 and 2010, banks incurred significant interest expenses on other borrowed funds beyond customer deposits; the share of this item rose from a trend level lower than 5 percent to a range between 16 percent and 21.5 percent in the reference period. This development is associated with the issuance of debt instruments by banks to raise financial resources. However, the disproportionate share of interest expense on non-deposit funds compared to the share in funding suggests that this manner of funding is relatively costly for the banks (put another way, it generates higher returns for the owners of funds).

It is also noteworthy that there has been virtual absence of borrowing from the central bank, indicative of ample excess liquidity in the banking industry and one-sided monetary operations. The share of interbank loans has also been relatively small at an average of 3.1 percent with respect to funding and 3.5 percent with regard to cost of funds.

CHART 16: RETURN ON DEPOSITS, CAPITAL, ADVANCES AND BOBCS



Source: Commercial Banks

In terms of relativities across the industry, data depict some trade-off between the return on deposits and dividends (return on capital) as shown by the modest negative sloping trend line in Chart 16 and 17 (b). However, it is evident that the smaller banks and start-up pay higher rates of return on deposits compared to capital, since they do not have the benefit of volume, longevity in the market and the pull of wider range of services to attract lower cost funds; start-ups will also have lower profitability (or losses) in the first years of operation, therefore, limited scope for paying dividends.

TABLE 5: COMMERCIAL BANKS LIABILITY AND EXPENSES STRUCTURE – PERCENTAGE SHARE

	Share in Total Liabilities					Share in Total Interest and Dividend Expense				
	Deposits	Inter Bank Loans	Borrowing from BoB	Other liabilities	Capital and Reserves	Deposits	Inter Bank Loans	Borrowing from BoB	Other Liabilities/ Borrowing	Dividend Declared
2001	83.9	1.4	0.0	5.2	9.5	64.1	0.6	0.0	3.6	31.6
2002	80.3	1.5	0.6	7.7	9.9	53.6	1.1	0.0	4.6	40.7
2003	81.6	1.7	0.0	6.4	10.4	63.8	2.0	0.0	3.0	31.1
2004	80.0	2.2	0.0	8.3	9.4	62.1	1.9	0.1	3.2	32.7
2005	74.4	7.8	0.6	8.9	8.3	55.9	2.3	0.0	4.7	37.0
2006	79.0	4.9	0.2	*10.2*	5.7	52.4	5.8	0.0	17.9	23.9
2007	84.4	3.1	0.3	*6.0*	6.1	55.6	6.6	0.0	20.5	17.3
2008	85.0	2.0	0.0	*6.3*	6.6	53.5	4.5	0.0	21.5	20.4
2009	85.3	1.6	0.1	*4.6*	8.4	62.7	3.5	0.0	17.7	16.1
2010	81.8	4.8	0.0	*3.9*	9.4	54.6	4.6	0.0	16.0	24.7
2011	83.9	1.3	0.0	4.8	9.9	53.8	6.7	0.3	5.1	34.1
2012	81.0	2.7	0.0	5.6	10.6	78.5	5.1	0.2	8.5	7.7
2013	80.3	2.6	0.2	5.5	11.4	63.7	3.0	0.1	8.2	25.0
2014	75.7	5.2	0.0	7.7	11.4	65.1	3.5	0.1	5.5	25.8

Source: Commercial Banks.

Note: Dividend declared includes paid and proposed.

Chart 17 (a): Average Return on Advances and Deposits

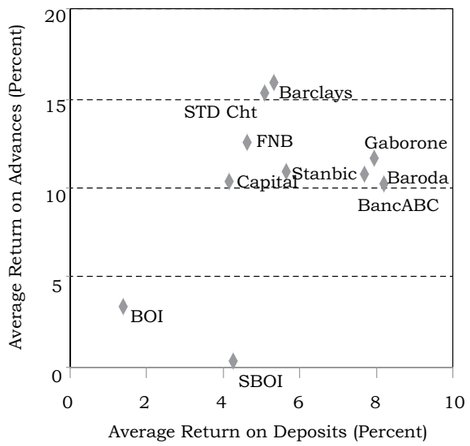
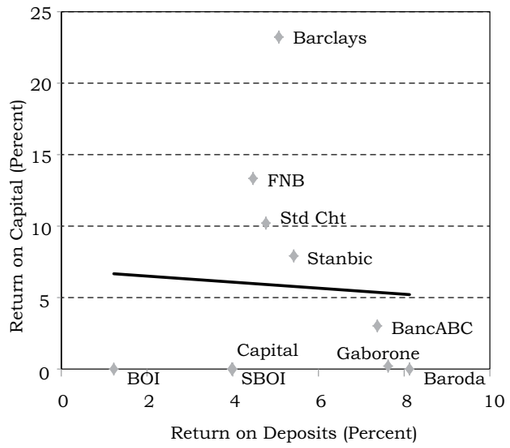


Chart 17 (b): Average Return on Capital and Deposits

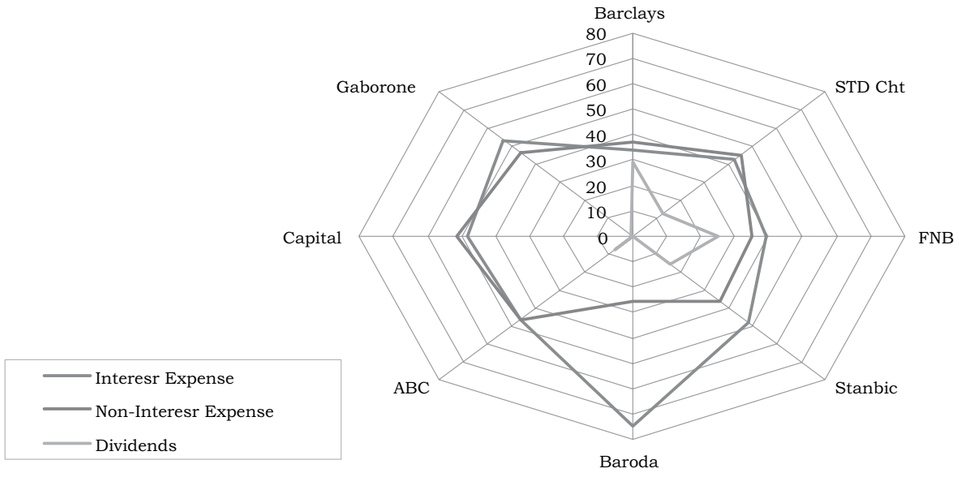


Source: Commercial Banks

Non-Interest Expenses

Beyond the interest cost for customer deposits (a reward for providing banks with funds), the industry also has some non-interest related costs that include, but not limited to, staff remuneration and service delivery network, including costs of adopting innovation and new technology. An annual average growth rate of 17.3 percent (2001 – 2014) for the industry suggests that the expansion of commercial banks' operations has kept pace with the general increase in economic activity (average annual nominal GDP growth of 12.2 percent and average annual inflation of 8 percent); evidently, there has been growth in the range and quality of banking services and delivery platforms, as noted in the various annual Banking Supervision Reports. Indeed, from 2010, banks overall costs were more driven by the expansion of non-interest expenses compared to a lower contribution of interest expenses, an indication of the impact of expansion and improvement of services, although lower interest rates also contributed.

Chart 18: Proportions to Income: Interest Expense, Non-Interest Expense and Dividends



Source: Commercial Banks

Another aspect of commercial banks' operations is that non-interest costs generate growth in income associated with the increase in market and business activity (number and quality of both clientele and range of services); this can be in the form of both interest and non-interest income (expansion of advances and securities and services that attract bank charges and fees). Thus, targeted and controlled expenses can be a source of growth, enhanced competitiveness and profitability.

Chart 19: Average in Non-Interest Expense and Market Share

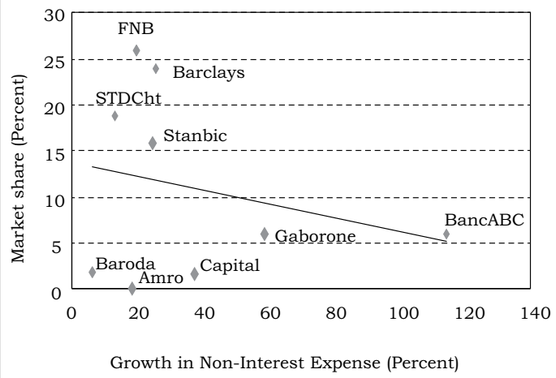


Chart 20: Average Growth in Non-Interest Expense and Total Income

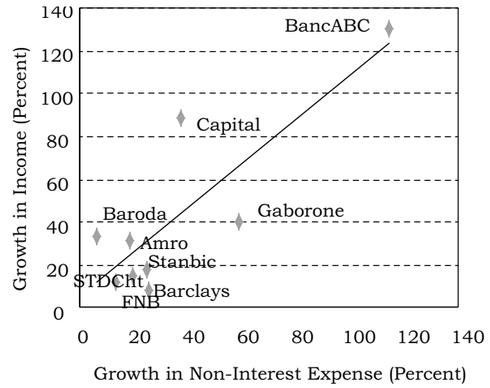
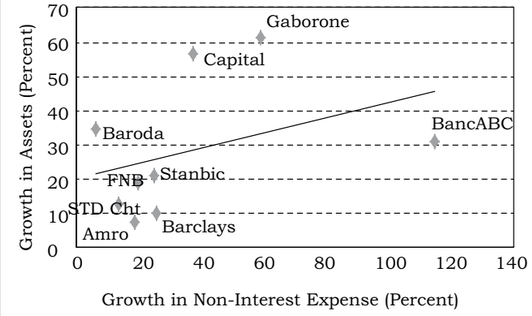


Chart 21: Average Growth in Non-Interest Expense And Assets



Source: Commercial Banks

The ratio of non-interest expenses to total income generated by banks indicates a positive relationship across banks, although new entrants in the industry would tend to have a higher share, particularly during the first years of their establishment. It is also clear that the degree of operational cost is affected by the size of the income generated. On average, banks use 30 percent of the total income generated on operations of the bank, ranging from 23.6 percent to 42.3 percent across banks.

5. Conclusion

Commercial banking supports economic growth through the intermediation process of converting deposits into loans and in the process progressively creating money and augmenting the funding of economic activity. Banks also aid the payments process and conduct of transactions and in this regard continuously adapt to technology to conform to emerging developments and evolving methods of communication, transacting and business conduct. These functions, aided by a sound supervisory/regulatory framework that engenders confidence in the use of the banking system, sustain a critical public good that connects banking to output growth and increase in living standards. The foregoing evaluation validates a similar role and adaptability for banks in Botswana.

Commercial banks' operations in Botswana are underpinned by growth in deposits, supported by generous capital levels on average; thus, mostly short-term (sight) deposits anchor predominantly medium term loans, the bulk of which are to households; and households are the largest source of income for banks. However, funding for the smaller banks (also because of being relatively new in the market) is skewed towards longer maturity and interest earning deposits, while it appears that size is not a factor with respect to the maturity profile of loans and intermediation ratio. It is also evident that the growth in deposits far exceeds

the rate at which these funds are allocated across the economy by the banks. At a macro level, this suggests absorptive capacity constraint (in the first instance for the domestic economy)[9]. However, operational and strategic factors for commercial banks may limit the extent of asset creation and growth of absorptive capacity. In this regard, the persistent and similarity of dominance of household borrowing across the local banks suggests a common strategic approach, which is also unchanging over time.

Against the background of partial allocation of resources to further economic activity and rigid structure of the lending book for banks, it appears that there is scope and indeed, a case to be made for a shift of strategic disposition that will allow some allocation of resources (including credit/project assessment skills) towards a possibly underserved market, in particular, relating to small medium scale enterprises and active engagement of the informal sector. The same sentiment applies with respect to mobilisation of deposits beyond established businesses and (high) wage income earners. In addition, there is some evidence that devoting additional efforts towards increasing capacity, manifested by growth in interest expense, portends future growth and enhanced competitiveness (increase in market share). Even then, maintenance of prudential benchmarks and sound operations are similarly critical for individual banks and enduring stability of the broader financial sector, suggesting a measured approach to risk taking associated with new areas of business/market development.

Overall, the combination of operating environment (macroeconomic policies, regulatory framework and economic performance) in Botswana and structure of banking operations have delivered a sound and profitable banking system; thus with potential for undisrupted support of broader economic activity and greater absorption/harnessing of financial resources.

9 It is recognised that foreign lending and placement of funds is an option for local banks.

References

Bank of Botswana, Annual Reports and Botswana Financial Statistics: various

Bank of Botswana, Banking Supervision annual reports: various

Commercial Banks, annual reports: various

Elizalde and Repullo, (2007), "Economic and Regulatory Capital in Banking: What is the Difference?" International Journal of Central Banking, September, 2007.

Mohanty, M. S., and Philip, T., (2010), "Banks and financial intermediation in emerging Asia: reforms and new risks", BIS Working Papers No. 313. Monetary and Economic Department, June 2010.

Poghosyan, T., (2012), "Financial Intermediation Costs in Low-Income Countries: The Role of Regulatory, Institutional, and Macroeconomic Factors", IMF WP/12/140.