

## INSURANCE - ECONOMIC GROWTH NEXUS: EVIDENCE FROM BOTSWANA



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### ABSTRACT

#### Article History

Received: 12 April 2018

Revised: 22 June 2018

Accepted: 26 June 2018

Published: 29 June 2018

#### Keywords

Insurance penetration  
Economic growth  
ARDL bounds test  
Botswana

#### JEL Classification:

G20, G22, G28

The paper investigates the influence of insurance penetration on economic growth in Botswana for the period 1994-2013. Using the autoregressive distributed lag (ARDL) bounds test approach to Cointegration by Pesaran *et al.* (2001) the study finds a negative long-run relationship between insurance penetration and economic growth. This suggests that the recent rapid expansion of the insurance sector could be hurting the economy's long-run growth. We contend that this finding could reflect a saving-substitution effect in which insurance assets mobilized locally are invested abroad. However, the effect is economically small and statistically significant only at the 10 percent level. Furthermore, there is no evidence that insurance penetration affects growth in the short-run. Nonetheless we argue that there is a need to pay more attention to the insurance sector in financial sector policy analysis, lest it becomes a significant leakage of funds from the income-expenditure stream.

**Contribution/ Originality:** This study contributes to the existing literature on the insurance-growth relationship. The study uses the autoregressive distributed lag (ARDL) bounds test approach to Cointegration to estimate the impact of insurance penetration on the economic growth of Botswana. It is the first study to gauge the quantitative effect of insurance sector development on Botswana's economic growth.

### 1. INTRODUCTION

The insurance industry has grown in importance worldwide. In 2014 for example, the industry was estimated at 6.5% of global GDP (EY, 2014). Although developed countries account for a larger share as expected, the industry is growing fast in developing countries as well. The question is, is this expansion good for economic growth? The question is of interest to researchers and policy makers. This paper investigates this question, albeit with a sharp focus on Botswana, a developing country in Sub-Saharan Africa.

Essential to the investigation is an understanding of the role of insurance in the economy. Firstly, it facilitates investment by reducing uncertainty and risk through its risk sharing and transfer mechanisms (see Han *et al.* (2010)). Without adequate insurance against risk of negative business outcomes for instance, financial intermediaries are likely to be reluctant to lend long term and companies may be averse to investing in innovation (Ward and Zurbruegg, 2000). This may in turn lead to reduction in aggregate investment and consequently,

growth of the economy. This channel is important especially in developing countries which are, in general, characterized by information frictions in financial markets (Torbira and Ogbulu, 2014). Secondly, Haiss and Sumegi (2008) emphasize that insurance stimulates domestic savings which can be invested in equity, bonds and real estate. As institutional investors, insurance companies can channel savings into productive sectors of the economy. The availability of alternative sources of investment funds stimulates competition that is necessary to improve efficiency in the allocation of capital (Han *et al.*, 2010).

Although a large volume of literature finds that insurance positively influences economic growth, a number of studies have also revealed that insurance may actually dampen economic growth. Such a scenario is likely to arise if insurance provides incentive for the insured to engage in risky behaviour. Cummins and Doherty (2006) emphasize that when the insured take less precaution to safeguard their assets, their total exposure to risk increases, which escalates total average risk borne by insurance companies. This behaviour, if practiced by a large proportion of insurance companies can increase average risk, which may potentially dampen economic growth as insurance companies face large risk to cover than investing into the economy. Haiss and Sumegi (2008) also caution that moral hazard may increase with increase in insurance penetration rates.

Haiss and Sumegi (2008) also suggest that insurance can negatively affect the economy through adverse selection which occurs in the process of securitization. As evidenced by the 2008 financial crisis, credit risk insurance enabled banks to lend out more and more money to various customers who had different risk profiles. The banks had assurance that in the event of credit default, insurance would provide compensation. This did not materialise as insurance could not cover the catastrophic loss, leading to the global financial crises (Helleiner, 2011). Premium miscalculations can also escalate the price of insurance. In the worst case scenario, continued increase in premiums leads to decreased customer base as those with lower risk profiles find it way too expensive to purchase insurance. This could potentially push insurance companies out of business, resulting in the inability of those most exposed to cover their losses. The economy is negatively affected when few customers are attracted to bank securities, and banks are not able to provide liquidity to the market, which reduces investment, which in turn reduces economic growth. Lee *et al.* (2016) argues that the impact that insurance assets have on economic growth depend on where those assets are invested: at home or abroad - the savings-substitution effect. If a larger proportion is invested abroad that would represent a leakage from the income-expenditure flow. This is likely to affect economic growth negatively.

While insurance has grown in importance, research on the subject remains limited. Existing studies are often narrow in scope and focused on developed countries (see for example, (Ward and Zurbruegg, 2009; Haiss and Sumegi, 2008; Olayungbo and Akinlo, 2016)). Even so, there is no regularity in the findings. The lack of uniformity underlines the continuing debate on the relationship between insurance and economic growth. Quite obviously, the lack of consistency in the findings has important implications for policy, more so for developing countries due to limited empirical evidence. Drawing policy implications for developing countries from findings of studies on developed countries almost guarantees erroneous policy focus, especially because developing countries tend to have information frictions, unlike developed countries which have smoother financial markets. To address this literature gap, this paper investigates the relationship between insurance and economic growth in a developing country context. The paper sharply focuses on Botswana, which has seen the insurance industry grow at an average annual rate of 7% between the years 2010 and 2015, almost twice the average rate of growth of real GDP. Specifically, the paper empirically examines the impact of insurance penetration on economic growth in Botswana.

In recognition of the need to capture both the long-run and short-run relationships as well as the short sample size the study employed the autoregressive distributed lag (ARDL) bounds test approach to cointegration proposed by Pesaran *et al.* (2001). The main result of the study is that insurance penetration has a negative, albeit small, influence on economic growth. Moreover, the effect is felt only in the long-run.

## 2. INSURANCE-ECONOMIC GROWTH NEXUS: LITERATURE SURVEY

The insurance-economic growth nexus is frequently explained using the finance-growth link. Two main hypotheses are encountered in the literature: the supply-leading and the demand-following hypotheses. In the supply-leading hypothesis, a robust financial sector, characterized by technological advancement, product and service innovation is considered to accelerate economic growth. That is, financial development leads to higher rates of capital accumulation and improvements in the efficiency with which an economy employs capital, which results in higher rates of growth (King and Levine, 1993). By contrast, in the demand-following hypothesis, economic growth stimulates the demand for financial services. That is, as real incomes rise, households and firms demand for financial services increases. The hypothesis is attributed to Robinson (1952). Patrick (1966) tried to reconcile the two hypotheses. He argued that the supply-leading hypothesis is more applicable in the early stages of development, while the demand-following hypothesis is more applicable in the latter stages. According to Patrick (1966) in the early stages of development, financial development promotes economic growth while economic growth boosts financial development in the latter stages. The Feedback hypothesis postulates bi-directional causality between financial sector development and economic growth (see Greenwood and Jovanovic (1990)). These hypotheses have been tested, in many different ways. Some have tested the correlation between insurance and economic growth, while some have tested the causal relationship between insurance and economic growth, with different researchers arriving at varying conclusions.

For example, Akinlo and Apanisile (2014); Alhassan and Fiador (2014); Verma and Bala (2013); Victor (2013); Han *et al.* (2010) and Arena (2008) tested the correlation between the two and found a positive relationship. Haiss and Sumegi (2008) analysed the relationship in an endogenous growth framework and also found a positive relationship. In contrast, Yinusa and Akinlo (2013) estimated a negative relationship. Olayungbo and Akinlo (2016) found mixed results for different countries included in their sample. Kugler and Ofoghi (2005) tested causality and found that economic growth causes insurance for the United Kingdom. Ward and Zurbruegg (2000) found that insurance leads to economic growth in some OECD countries, but found no relationship for some. Lee *et al.* (2013) estimated bi-directional causality for a sample of 41 countries. This lack of regularity in the findings clearly underlines the need for further research on the relationship, particularly in developing countries, where very little empirical evidence exists.

## 3. METHODOLOGY

### 3.1. Theoretical Model

In estimating the empirical relationship between insurance penetration and economic growth, this study follows Eller *et al.* (2005) and Haiss and Sumegi (2008) and adopts an endogenous growth model with a modified Cobb-Douglas production function, assuming constant returns to scale.

$$Y = AK^\alpha H^\beta L^{1-\alpha-\beta} \quad (1)$$

Where, Y denotes output (GDP),  $A$  represents technological progress, K is physical capital, H stands for human capital and L symbolizes used labour force. Haiss and Sumegi (2008) contend that availability of insurance services can make business participants accept higher risks, which in turn can support technical innovation and technological progress that can significantly influence economic growth. Therefore insurance premiums enter the production function through technological progress by improving the efficiency of both capital and labour. The technological progress in Eq. (1) is therefore decomposed into a constant component and an insurance premium component as follows:

$$Y = e^{c_0+c_1ins} K^\alpha H^\beta L^{1-\alpha-\beta} \quad (2)$$

Transforming Eq. (2) into the intensive form yields:

$$y = e^{c_0 + c_1 ins} k^\alpha h^\beta \quad (3)$$

Where;  $(k)$  is the capital-labour ratio,  $(h)$  is the human capital-labour ratio and  $(ins)$  represents insurance. The variables in Eq. (3) are transformed into their logarithmic form to make it easy for interpretation of regression coefficients as elasticities. The model is then extended with control variables whose omission could bias the results. Following [Arena \(2008\)](#) bank credit to the private sector is included to capture the level of financial sector development. In developing countries, bank credit is the main source of funding and thus significantly influences aggregate demand. Deposit interest rates influence the availability of investments funds. High deposit interest rates encourage saving and thus providing commercial banks with deposit inflows well beyond their required reserve ratios. This enables banks to lend out for investment purposes, which ultimately leads to economic growth ([Akinlo and Apanisile, 2014](#)). Inflation is included because of its influence on aggregate demand. According to [Han et al. \(2010\)](#) high inflation rates cause banks to charge a premium on credit, which could lead to loan defaults and thus affecting the level of available investment capital. High inflation rates can also lead to reduced purchasing power which can dampen aggregate demand. The baseline extended model is therefore expressed as:

$$\ln y_t = \alpha_0 + \alpha_1 \ln ins_t + \alpha_2 \ln k_t + \alpha_3 \ln h_t + \alpha_4 \ln cpi_t + \alpha_5 \ln dint_t + \alpha_6 crt_t + \varepsilon_t \quad (4)$$

Where:  $\alpha_0 = c_0$ ,  $\alpha_1 = c_1$ ,  $\alpha_2 = \alpha$ ,  $\alpha_3 = \beta$ ,  $cpi_t$  is consumer price index,  $dint_t$  is deposit interest rate,  $crt_t$  represents bank credit and  $\varepsilon_t$  is a white noise error term. All other variables are as defined before.

### 3.2. Estimation Method and Data

In order to capture both the short-run and long-run relationships between insurance penetration and economic growth, this study employed the autoregressive distributed lag (ARDL) bounds test approach proposed by [Pesaran and Shin \(1999\)](#) and [Pesaran et al. \(2001\)](#). The statistic underlying the procedure is a Wald or F-statistic in a generalized Dickey-Fuller type regression, which is used to test the significance of lagged level variables in a conditional unrestricted equilibrium correction model ([Narayan and Narayan, 2004](#)). According to [Narayan \(2004\)](#) this procedure has several advantages over other Cointegration approaches such as the [Engel and Granger \(1987\)](#) and [Johansen and Juselius \(1990\)](#). First, the bounds testing procedure is applicable irrespective of whether the underlying regressors are purely I(0), purely I(1) or mutually cointegrated. Second, it is said to perform better for small samples sizes, which is an advantage when working with developing countries data, which are usually short. Third, estimating the long-run and short-run components of the model simultaneously eliminates problems associated with omitted variables and autocorrelations.

The first step in the implementation of the bounds test approach is to re-specify Eq. (4) as a conditional error correction model:

$$\begin{aligned} \Delta \ln y_t = & \alpha_0 + \alpha_1 \ln y_{t-1} + \alpha_2 \ln ins_{t-1} + \alpha_3 \ln k_{t-1} + \alpha_4 \ln h_{t-1} + \alpha_5 \ln cpi_{t-1} + \alpha_6 \ln dint_{t-1} + \alpha_7 \ln crt_{t-1} + \\ & \sum_{i=1}^p \theta_i \Delta \ln y_{t-i} + \sum_{i=0}^p \delta_i \Delta \ln ins_{t-i} + \sum_{i=0}^p \mu_i \Delta \ln k_{t-i} + \sum_{i=0}^p \pi_i \Delta \ln h_{t-i} + \sum_{i=0}^p \varphi_i \Delta \ln cpi_{t-i} + \sum_{i=0}^p \sigma_i \Delta \ln dint_{t-i} + \\ & \sum_{i=0}^p \tau_i \Delta \ln crt_{t-i} + \varepsilon_t \end{aligned} \quad (5)$$

Where;  $\alpha_0$  is the drift component,  $\Delta$  is the difference operator,  $\alpha_i s$  are long run multipliers,  $\theta_i, \delta_i, \mu_i, \pi_i, \varphi_i, \sigma_i, \tau_i$  are short-run multipliers,  $p$  is the lag order of the VAR component of the equation and  $\varepsilon_t$  is the

random disturbance term and other variables are defined as before. The bounds test procedure for the absence of any level relationships between the dependent and independent variables is through the exclusion of the lagged level variables. That is, it involves the following null and alternative hypotheses:

$$H_0: \alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = \alpha_5 = \alpha_6 = \alpha_7 = 0$$

$$H_1: \alpha_1 \neq \alpha_2 \neq \alpha_3 \neq \alpha_4 \neq \alpha_5 \neq \alpha_6 \neq \alpha_7 \neq 0$$

Tests for the existence of level relationships among the variables is done by comparing the model's F-Statistic with the critical values reported in Pesaran *et al.* (2001). Two sets of critical values provide a band for classifying regressors into I(0), I(1) or mutually cointegrated. If the computed F-Statistic falls outside the critical value bounds, a conclusive inference can be drawn without needing to know the integration of the underlying regressors. For instance, if the F-Statistic exceeds the critical value band, then the null hypothesis of no Cointegration is rejected. If the F-Statistic is less than the critical value band, then the null hypothesis of no Cointegration cannot be rejected. However, if the F-Statistic falls inside these bounds, a conclusive inference cannot be made without knowledge of the order of the integration of the underlying regressors.

If there is a long run relationship, Eq. (4) is estimated using the following ARDL ( $m, n, p, q, r, s, t$ ) model:

$$\ln y_t = \sum_{i=1}^m \theta_i \ln y_{t-i} + \sum_{i=0}^n \delta_i \ln ins_{t-i} + \sum_{i=0}^p \mu_i \ln k_{t-i} + \sum_{i=0}^q \pi_i \ln h_{t-i} + \sum_{i=0}^r \varphi_i \ln cpi_{t-i} + \sum_{i=0}^s \sigma_i \Delta int_{t-i} + \sum_{i=0}^t \tau_i \ln crt_{t-i} + \varepsilon_t \quad (6)$$

All the variables are as previously defined. The lag orders in the ARDL model are selected by the Schwartz Bayesian Criterion (SBC) before the model is estimated by the ordinary least squares technique. The short-run elasticities can then be derived from the following corresponding error correction model:

$$\Delta \ln y_t = \sum_{i=1}^m \theta_i \Delta \ln y_{t-i} + \sum_{i=0}^n \delta_i \Delta \ln ins_{t-i} + \sum_{i=0}^p \mu_i \Delta \ln k_{t-i} + \sum_{i=0}^q \pi_i \Delta \ln h_{t-i} + \sum_{i=0}^r \varphi_i \Delta \ln cpi_{t-i} + \sum_{i=0}^s \sigma_i \Delta \ln dint_{t-i} + \sum_{i=0}^t \tau_i \Delta \ln crt_{t-i} + \lambda ECM_{t-1} + \varepsilon_t \quad (7)$$

Where  $\Delta$  is the difference operator,  $\lambda$  is the coefficient of the error correction term and measures the speed of adjustment to equilibrium and  $ECM_{t-1}$  is the error correction term.  $\theta_i, \delta_i, \mu_i, \pi_i, \varphi_i, \sigma_i$  and  $\tau_i$  are coefficients relating to the short-run dynamics of the model's convergence to equilibrium.

The study uses quarterly time series data for the period 1994 - 2013. The data for insurance and other macroeconomic variables such as consumer price index, gross domestic product per capita and gross-fixed capital formation, student enrolment in tertiary education (human capital), and bank credit to private sector are obtained from World Bank Development Indicators Database.

## 4. EMPIRICAL RESULTS: UNIT ROOTS, COINTEGRATION, LONG-RUN AND SHORT-RUN RESULTS

### 4.1. Unit Root Tests

Although the test for unit roots is not essential for investigating Cointegration relationship in the ARDL bounds test approach, it is important to ensure that none of the regressors is I(2), which could render the technique inapplicable. We applied the Phillips and Perron (1988) approach to test for unit roots. The Phillips and Perron (PP) test modifies the t-ratio in the non-augmented Dickey-Fuller (ADF) test equation so that it does not affect the asymptotic distribution of the test statistic (Quantitative Micro Software, 1994-2004). It is therefore considered to be more reliable than the ADF.

Table 1 reports the unit root test results. Since the results show that the statistics for all the variables (in absolute terms) do not exceed the critical values, we could not find any significant evidence that the variables are not integrated of order one (I (1)) or above. However, the variables were stationary in their first differences. Having established that none of the variables is I (2), the ARDL bounds test technique to cointegration analysis was applied to the data.

Table-1. Unit Root Test Results

Variable	Levels		1 <sup>st</sup> Difference		Order of integration
	t-Statistic	Probability	t-statistic	Probability	
<i>lny</i>	-0.400	0.903	-3.881	0.003	I(1)
<i>lnk</i>	-1.027	0.740	-3.766	0.005	I(1)
<i>lnh</i>	0.553	0.988	-2.966	0.043	I(1)
<i>lndpi</i>	-1.138	0.697	-3.477	0.011	I(1)
<i>dint</i>	1.886	0.999	-2.878	0.053	I(1)
<i>lnins</i>	-2.201	0.208	-3.085	0.032	I(1)
<i>lnlif</i>	-2.116	0.239	-3.529	0.010	I(1)
<i>lnnlif</i>	-2.433	0.136	-4.340	0.001	I(1)
<i>lnprt</i>	-0.092	0.946	-2.909	0.049	I(1)

#### 4.2. Cointegration Analysis

In the first step of the ARDL analysis, we used Eq. (5) to test for the presence of long-run relationships in Eq. (4). The SBC selected a maximum lag order of 2 for the ARDL model and the test results are presented in Table 2. The calculated F-statistic of 3.869 is higher than the upper bound value of 3.61 at the 2.5 percent level of significance. This suggests that the null hypothesis of no cointegration is rejected, implying long-run cointegration relationship between GDP and its regressors.

Table-2. ARDL bounds tests results (Eq. 8)

K(number of regressors)=6	Critical Value Bounds of the F-Statistic		
Calculated F-Statistic	Significance	I(0)	I(1)
<b>3.869</b>	10%	1.99	2.94
	5%	2.27	3.28
	2.5%	2.55	3.61
	1%	2.88	3.99

Source: The critical value bounds are from Table C(I)ii in Pesaran *et al.* (2001)

#### 4.3. Long-Run and Short-Run Elasticities

Once we established that a long-run relationship existed, we estimated the long-run ARDL model (Eq. 6) and the results are presented in Table 3.

Table-3. Estimated results for the long-run model (GDP per capita is dependent variable)

ARDL (2,2,0,2,1,2,1)

Regressor	Coefficient	t-statistic	p-value
$\alpha_0$ (constant)	5.555***	5.056	0.000
$\alpha_1$ (lnins)	-0.016*	-1.919	0.060
$\alpha_2$ (lnk)	0.675***	2.794	0.007
$\alpha_3$ (lnh)	-0.456***	-3.517	0.001
$\alpha_4$ (lndpi)	0.887***	5.755	0.000
$\alpha_5$ (dint)	0.023**	2.342	0.023
$\alpha_6$ (prt)	-0.125*	-1.924	0.059
R <sup>2</sup> =0.99; adjusted R <sup>2</sup> =0.99; F-Stat.=6078[0.000]			
SER=0.003; RSS=0.000; DW-Statistic=1.87			

\*, \*\*, \*\*\* means significant at 10%, 5% and 1%, respectively.

The empirical results indicate that the model's explanatory variables are jointly significant and explain 99 percent of the variations in GDP per capita growth. All coefficients are different from zero, at least at the 10 percent level of significance. The residuals' tests for normality, serial correlation and stability are also examined. Both the cumulative sum (CUSUM) and the cumulative sum of squares (CUSUMSQ) of the recursive residual test for structural stability support model stability. The Lagrange Multiplier (LM) test indicates no evidence of autocorrelation in the residuals at the 5 percent level of significance. Results of the Jarque-Bera test show that all the series are jointly normal. The model is therefore accepted as adequate and reliable for the analysis of insurance-growth nexus in Botswana.

The results show that a 1 % increase in insurance induces a 0.02 % fall in GDP per capita, suggesting that insurance penetration is negatively associated with economic growth in Botswana. Although this result is not supported by the standard Schumpeterian view of the effect of financial sector development (including insurance) on economic growth, it is consistent with the findings of other studies in the continent. For instance, [Olayungbo and Akinlo \(2016\)](#) found negative effect of insurance on economic growth for Nigeria, Tunisia and Zimbabwe. A possible explanation for this seemingly counter-intuitive result could be the savings-substitution effect ([Lee et al., 2016](#)). That is, if insurance premiums are invested abroad this can represent a leakage from the income-expenditure flow which may negatively affect economic growth. [BIFM \(2015\)](#) show that by 1997 life insurance and pension funds could invest up to 70 percent of the assets in offshore markets. [Jefferis and Tacheba \(2009\)](#) note that lack of absorptive capacity in the domestic financial markets has led large proportions of funds invested offshore. However, this result is not only economically small, but is also only statistically significant at the 10 percent level, suggesting insurance penetration's limited influence on economic growth.

The coefficient on the proxy for human capital is also counter-intuitive as it shows that a 1 % increase in tertiary education student enrolment ratio is associated with a 0.46 % decrease in economic growth in the long-run. This finding resembles those of [Yinusa and Akinlo \(2013\)](#) for Nigeria and [Haiss and Sumegi \(2008\)](#) for the European Economic Area countries. A possible explanation for this result could be the quality of the graduates. [International Monetary Fund \(2017\)](#) and [World Economic Forum \(2015\)](#) suggest that the quality of graduates in Botswana is low. [World Bank \(2015\)](#) Systematic Diagnostic Country Report notes that tertiary education in Botswana has long been seen to be out of line with labour market needs. Expenditure on low quality graduates would represent a misallocation of resources, which ultimately lowers economic growth.

Another surprising result is the effect of bank credit provided to the private sector. A 1 % increase in credit provided by banks to private sector, is associated with 0.13 % decrease in economic growth. In developing countries, such as Botswana, bank credit is the main source of investment funds and as such is expected to boost aggregate demand and ultimately economic growth. However, although this counter-intuitive result is consistent with studies from other African countries such as [Yinusa and Akinlo \(2013\)](#) it is not robust as is only statistically significant at the 10 percent level.

The influences of physical capital and deposit interest rate on economic growth are positive and statistically significant as expected. A 1 % increase in physical capital and deposit interest rate is associated with a 0.67 and 0.02 % increase in GDP per capita, respectively. A 1 % increase in inflation is associated with a 0.88 % increase in GDP per capita. The latter can be explained by Botswana's relatively low and stable inflation rate during the time under consideration. Mild inflation is in general expected to boost economic growth as a moderate rise in prices signals increased profits which can encourage firms to expand production. This finding is also consistent with that of [Ward and Zurbruegg \(2002\)](#).

Turning to the short-run model, tests for serial correlation, heteroskedasticity, normality of residuals and misspecification of the functional form were applied to the error correction model (ECM). None of these tests indicate any significant evidence of departure from standard assumptions. The model was also tested for stability using the cumulative sum (CUSUM) and the cumulative sum of squares (CUSUMSQ) of the recursive residual test

for structural stability. The regression equation passes the stability test at the 5 percent level of significance. The empirical model is therefore accepted as adequate and reliable for the analysis of the impact of insurance penetration on economic growth. The adjustment parameter ( $\lambda$ ) is negative and statistically significant, providing further evidence of existence of long-run equilibrium relationships between output growth and its determinants. The coefficient of -0.13 indicates that about 53 percent of disequilibrium will be corrected within a year. The results of the short-run model are presented in Table 4.

**Table-4.** Results of the error correction model (Dependent variable is  $\Delta \ln y$ )

ARDL (2,2,0,2,1,2,1)

Variable	Coefficient	t-statistic	Prob.
$\Delta \alpha_0$	0.482***	5.865	0.000
$\Delta \ln k$	0.155***	4.083	0.000
$\Delta \ln k_{t-1}$	-0.077**	-2.221	0.031
$\Delta \ln crt$	-0.089***	-3.821	0.000
$\Delta \ln h$	-0.307***	-11.919	0.000
$\Delta \ln h_{t-1}$	0.165***	4.819	0.000
$\Delta \ln cpi$	1.404***	8.351	0.000
$\Delta \ln cpi_{t-1}$	-0.478**	-2.122	0.038
$\Delta \ln dint$	0.017***	5.124	0.000
$ECM_{t-1}$	-0.132***	-5.914	0.000
R-squared	0.890		
Adjusted R-squared	0.874		
Durbin Watson stat	1.870		

\*,\*\*,\*\*\* means significant at 10%, 5% and 1%, respectively.

The error correction model has a good fit, with an adjusted  $R^2$  of 87 percent. All control variables exert statistically significant influence on GDP per capita, although some have unexpected signs. The direction of their short-run influence on economic growth is the same as that found in the long-run model. That is, physical capital, price level and deposit interest rate have positive influence on economic growth, while the effect of bank credit to the private sector and human capital is negative. As for aggregate insurance, it does not influence economic growth in the short-run.

## 5. CONCLUSIONS AND POLICY IMPLICATIONS

This paper was motivated by the observation that despite its rapid increase over the last decade, there was not much empirical investigation on the impact of insurance penetration on economic growth in Botswana. The paper employed ARDL bounds test technique within the framework of the endogenous growth models to examine whether insurance influence economic growth in Botswana in the period 1994-2013. The ARDL approach to cointegration analysis has been shown to provide reliable and robust estimates in small sample sizes, such as for the present study. The bounds test found a long run relationship between economic growth and insurance penetration. The existence of cointegration allowed for the application of the error correction model to uncover the short-run dynamics.

The results show that insurance penetration affects economic growth only in the long run. This influence is not only small, but is statistically significant only at the 10 percent level. Moreover, the results show that an increase in insurance penetration is associated with a fall in economic growth. Possible explanations for this negative influence

include moral hazard (insurance providing incentive to the insured to engage in risky behaviour); adverse selection (where increased premiums lead to increased average risk of the insured); savings-substitution (where larger proportion of insurance assets are invested abroad). These are some of the areas that need further investigation. However, the observation that credit to the private sector has slowed down despite the country's accommodative monetary policy could suggest existence of adverse selection fears amongst lenders. In addition most of the insurance companies operating in Botswana are foreign owned and appear to have been investing mainly offshore. This could represent a significant leakage from the income-expenditure flow, which if not reversed could dampen economic growth as insurance penetration increases.

**Funding:** This study received no specific financial support.

**Competing Interests:** The authors declare that they have no competing interests.

**Contributors/Acknowledgement:** All authors contributed equally to the conception and design of the study.

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