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The Nexus between Insurance and Economic Growth of Tanzania: Autoregressive Distributed Lag Bounds Cointegration Approach

Doreen Laurent[1]
Lecturer, Department of Mathematics and Actuarial Studies, Institute of Finance Management,Dar es Salaam, Tanzania

Pendo T Kivyiro
Lecturer, Department of Mathematics and Actuarial Studies, Institute of Finance Management, Dar es Salaam, Tanzania

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Abstract
The main objective of this study was to examine the relationship between insurance (proxied by insurance penetration) and economic growth in Tanzania. The study employed the annual time series data covering the period from 1995 to 2021 based on 33 registered insurance companies. The autoregressive distributed lag (ARDL) bounds approach to cointegration was employed to test the nexus between insurance and economic growth among the variables of interest based on the conventional error correction model. Granger causality was also employed to test the direction of causality among the variables under study. However, neither demand-following nor supply-leading hypothesis was found to be valid. The evidence of insignificant relationship between insurance and economic growth in Tanzania indicates a low insurance activities and economic development in Tanzania. The possible reason for this explanation perhaps could be that the insurance sector is not fully capture untapped potentials in the market. Thus, the study recommends the fully embracing of insurance activities in order to promote economic growth. Life insurance penetration indicated to be significant in the short-run. the results imply that savings mobilization, which is the main function of life insurance, is significant aspect in insurance development in Tanzania. Hence, as a country, efforts should be made to encourage investment in life insurance.

Key Words: Insurance Penetration, Economic Growth, ARDL bounds test, Granger Causality

[1] **Corresponding Author:** *doreen.laurent@ifm.ac.tz*

Introduction

Insurance business has been pointed out to continue playing an important role in spurring any country's financial and economic growth. This is because insurance pools risk and reduces the adverse effect of large losses and thus spur new investment, innovation, and competition globally, savings, employment creation, tax payment and providing national underwriting capacity. Insurance, particularly life insurance, aids in reimbursing the mortgage loans by acting as a collateral security. It also has long-term benefits that can be in the form of annuities or a lump sum upon retirement (Abbas & Ning, 2016; AIG, 2018; Ul Din *et al.*, 2017; Okwonko & Eche, 2019; Kumar *et al.*, 2020). In its first conference in 1964, The United Nations Conference on Trade and Development (UNCTAD) strongly declared that a sound national insurance and reinsurance market are essential features of economic growth. The importance of insurance for business and development was also acknowledged. The evidence to support the significance of the relationship between the insurance business, economic growth, and development is typically found in the extant empirical literature (Ward & Zurbruegg, 2000; Outreville, 2011; Eze and Okoye, 2013; Outreville, 2013; Akinlo and Apanisile, 2014; Islam et al. 2021; Olarewaju & Msomi, 2021).

It is important to note that numerous fundamental changes in the financial sector are pervasive globally over the past decades. The sector has managed to increase customers base following technological opportunities offered to recruit customers through the direct channels employed by insurance companies (Shapkota, 2018). Similarly, the demand for insurance products continues to grow worldwide, following increasing awareness campaigns about the importance of insurance and rising incomes in many parts of the world. These, in turn, provide a vehicle for investors and other financial investment services, and ensure the stability and sustainability of long-term finance (Asongu & Odhiambo, 2020). The African insurance market offers several growth opportunities due to the huge untapped market within the region (African Insurance Market 2022; Swiss Re Sigma 4/2022). Thus, the role of insurance in economic development cannot be overemphasized.

Nonetheless, despite the efforts made by the sector and the government to create awareness, the insurance penetration has remained low in Tanzania. It should be noted that, one of the most important international indicators that determine the level of development of the insurance sector is the share of insurance premiums in GDP for the reporting year. Over the past decade, the share of insurance premiums in the country's GDP has been less than 1%. For example, in year 2012 was 0.7%, in 2017 was 0.5% and in 2021 was 0.6%. Likewise, insurance penetration in Tanzania has remained low as compared to some of East African countries such as Kenya (2.2%), Rwanda (1.2%) Uganda (0.7%) in year 2021.

The reasons for the present status of insurance penetration in Tanzania are attributed by various factors, including the cost of doing business, unsuitable insurance products, lack of public awareness of insurance businesses and services, the outbreak of COVID-19, low financial literacy and saving culture of the people, and lack of income to mention few. The low insurance penetration is an indication of less growth of the sector, consequently low contribution in the economic growth (TIRA 2022; African Insurance Market, 2022; Finscope, 2023).

The pivotal role of the insurance sector in Tanzania's economy cannot be overemphasized (Kasoga and Tegambwage, 2023). As of present, Tanzania is undertaking the construction of mega projects that require a healthy and developed insurance sector to pursue economic development. Currently, Gross Premium Written (GPW) of the insurance industry is TZS 911.5 billion for the year ended December 31, 2021, representing a nominal increase of 11% compared to TZS 824 billion written in 2020. A total gross written premium of TZS 746.4 billion, representing an increase of 8.4% compared to GPW of TZS 688.6 billion in 2020, was recorded by the general insurance business in 2021. The volume of life insurance businesses increased by 21.6% to TZS 165.0 billion in 2021 from TZS 135.7 billion in 2020. However, despite all the efforts, the overall insurance penetration rate in the country remained at 0.58%, and currently, only 6 million Tanzanians, out of a population of around 60 million, are using insurance services (TIRA, 2022). The Tanzanian insurance industry targets reaching 50% of adult population access and using insurance products by 2030 and increase the insurance penetration rate to 5% by the same period (TIRA, 2021).

According to TIRA (2022), the total number of insurance companies registered to conduct insurance business (including two reinsurers) is thirty-three (33), out of which twenty-five (25) companies transact general insurance business, four (4) transact life insurance business, two (2) transact composite (both general and life insurance business), and two (2) are reinsurance companies. And of all 33 companies, only three (3), including one (1) reinsurance, are 100 percent public players.

Despite the fact that many studies have been conducted on investigating the link between insurance penetration and economic growth and on its related topics worldwide, but in Tanzania little is known on the possible relationship between insurance penetration and economic growth let alone the causal link between the two. In response to this knowledge gap, the study employed the ARDL bounds test to test the existence of the long-run relationship among variables of interest based on the conventional error correction model (see, for example, Abas and Ning, 2016), and to examine a short-run and long-term link between insurance penetration and economic growth in Tanzania.

It is expected that the findings from this study will be beneficial to policymakers, the insurance industry and its stakeholders, actuaries, and other financial institutions. In addition, since the insurance sector has played an important role in a country's economy following the COVID-19 pandemic, this study is particularly relevant. The remainder of this paper is organized as follows: Section 2 reviews the related literature. Section 3 describes the data and econometric approach. Section 4 discusses the empirical results. Section 5 concludes the paper with future recommendations.

Literature Review

Theoretical Framework

Insurance can be defined as a risk management tool designed to mitigate financial losses incurred due to unforeseen events or circumstances (Hoyt & Liebenberg, 2011). This entails individuals or entities paying a premium to an insurer in exchange for coverage against specified risks, with the insurer assuming the financial liability associated with potential losses (Anderson & Brown, 2005). Insurance mechanisms serve to distribute and pool risks across a

broad spectrum of policyholders, thereby providing financial protection and stability in the face of adverse events, ranging from natural disasters to health emergencies and property damage.

Economic growth, defined as the sustained increase in a nation's productive capacity over time, has been extensively studied in economics (Jones, 2019). It encompasses the expansion of an economy's output of goods and services, commonly measured by indicators such as Gross Domestic Product (GDP) or Gross National Product (GNP) (Smith, 2010). Rooted in classical economic thought, the conceptualization of economic growth has evolved to incorporate various factors, including technological progress, capital accumulation, human capital development, and institutional dynamics. In the context of insurance, economic growth signifies the sustained expansion of a nation's productive capacity accompanied by increased uptake of insurance products and services throughout the economy. It encompasses not only the quantitative increase in Gross Domestic Product (GDP) or Gross National Product (GNP) but also the qualitative enhancement of financial resilience and risk management capabilities facilitated by greater insurance coverage. Economic growth in this context reflects a broader societal capacity to manage and mitigate risks, thereby fostering greater stability, resilience, and prosperity. It signifies an environment where individuals and businesses are more adequately protected against unforeseen events, leading to reduced uncertainty, increased confidence, and ultimately, enhanced economic well-being.

The extent to which insurance permeates a society's economic landscape is often quantified through the concept of insurance penetration. Insurance penetration measures the percentage of insurance premiums relative to a country's GDP, offering insights into the level of insurance uptake within a given population (Vimala & Alamelu, 2018). Higher insurance penetration rates typically indicate greater levels of risk mitigation and financial preparedness among individuals and businesses, contributing to overall economic resilience. Consequently, the relationship between insurance penetration and economic growth has garnered considerable scholarly attention. Proponents argue that increased insurance penetration can stimulate economic development by reducing uncertainty, enhancing financial stability, and fostering investment and entrepreneurship (Cummins & Venard, 2008). Conversely, skeptics contend that the impact of insurance on economic growth may be contingent upon various contextual factors, including regulatory frameworks, market structure, and socio-economic conditions (Haiss & Sumegi, 2008).

Theoretically, the relationship between insurance penetration and economic growth can be described by the demand-following and supply-leading theories. Demand-following theory postulates that demand for financial services will increase due to the growth in the real economy, and an expanding economy will lead to demands for financial services. This implies that as income increases, the demand for financial services by households and businesses increases, which in turn leads to the development of the financial sector through the creation of financial asset liabilities. Furthermore, this indicates that economic growth significantly impact financial development (Robinson, 1979; Romer, 1990).

The supply-leading theory on the other hand, postulates that the development of the insurance sector (as an aspect of financial sector) should precede economic development, because the insurance sector provides the financing necessary for economic growth by providing an avenue

for efficient utilization of resources from surplus to deficit spending units. The positive effect of insurance development in the economic growth are influenced by policies and regulations applied in the respective country (Patrick, 1966; Mckinnon, 1973; Shaw, 1973). In supporting the theory, Arena (2008) contend that insurance market activity, both as financial intermediary and as risk transfer provider and indemnification, may promote economic growth through proper risk management and thus encouraging the mobilization and accumulation of new capital into productive investments and savings.

The Influence of Insurance Penetration on Economic Growth

The literature exploring the intricate relationship between insurance penetration and economic growth unfolds a diverse narratives, characterized by varied findings contingent upon the specific contexts under examination. In scrutinizing developed economies such as the United Kingdom and the United States, researchers have unearthed a spectrum of outcomes. Kugler and Ofoghi (2005) contribute to this discourse by unveiling bidirectional long-run causality between insurance market size and GDP in the UK, positing a discernible positive correlation. Contrarily, Ward and Zurbruegg (2000) have brought to light heterogeneous causal relationships between economic growth and insurance demand within OECD countries, signifying a more intricate dynamic that diverges from conventional wisdom.

Conversely, investigations into developing nations have provided divergent conclusions. Alhassan and Fiador's (2014) inquiry in Ghana uncovers a sustained positive relationship between insurance penetration and economic growth over the long term, strengthening the assertion that insurance endeavors exert a positive influence on economic growth. Echoing this sentiment, Zouhaier's (2014) comprehensive analysis across OECD nations and Olayungbo's (2015) study in Nigeria both furnish empirical evidence bolstering the affirmative impact of insurance on economic growth trajectories. Nevertheless, other research findings also encompasses conflicting observations. For instance, Okonkwo and Eche's (2019) examination in Nigeria fails to detect a significant relationship between insurance consumption and economic growth, underscoring the intricate interplay of diverse factors within different economic landscapes.

Despite the heterogeneous findings, advocating for a positive effect hypothesis between insurance penetration and economic growth remains a persuasive proposition. The multifaceted role of insurance extends beyond mere risk mitigation, permeating into realms of investment mobilization and financial intermediation, all of which are pivotal drivers of economic expansion (Pradhan et al., 2017; Neylan & Kiliç, 2020). While the complexities of this relationship may not always lend themselves to simplistic interpretations and can be contingent upon factors such as regulatory environments, market structures, and institutional quality (Kugler & Ofoghi, 2005; Ward & Zurbruegg, 2000; Pradhan et al., 2017), the overarching body of evidence points towards a positive impact of insurance penetration on economic growth trajectories, particularly pronounced within developing economies where insurance markets are still evolving, and effective risk management practices are imperative for sustainable development.We therefore hypothesize that:

H1: Insurance penetration and positive influence on economic growth

Methodology

Data, sample and variable measurement

The study employed annual time series secondary data on aggregate insurance penetration, life- insurance penetration, non-life insurance penetration, GDP growth, trade openness, gross fixed capital formation and inflation over the period of 1995- 2021 in Tanzania based on 33 registered insurance companies. The choice of the data and variables were mainly determined by availability of data as well as economic framework from previous studies with some modification to suit this study. Data on insurance penetration were extracted from TIRA (2021) reports and Swiss Re Sigma database (2022) while other macroeconomic indicators were extracted from the world development indicators (WDI) and National Bureau of Statistics (NBS) database (2021).

Moreover, the level of economic growth (measured by the change in GDP per capita growth rate) was employed as dependent variable while insurance penetration (measured by the ratio of aggrigate insurance premium over GDP) was employed as independent variable. The aggregate insurance penetration further disintegrated into life and non-life insurance penetration. In line with studies that examining the nexus between insurance and economic growth, trade openness (measured by taking the ratio of exports and imports over GDP), gross fixed capital formation (measure by domestic investments) and inflation (measure by consumer price index) were employed as control variables in this study. These control variables are of particular importance and their absence can lead to biased causality and cointegration analysis results (Gujarati, 1995).

This study applies ARDL bound cointegration approach motivated largely by the sample size proposed by Pesaran et al. (2001). It is said to work better with a small sample size, which is an advantage when dealing with data from developing countries, which tend to be short and largely missing.

Model Specification

The study has adopted the model by Alhassan and Fiador (2014) to estimate the relationship between insurance penetration and economic growth in Tanzania and the baseline model is indicated in Equation (1).

$$Y_t = \boldsymbol{A}' IP_t + \beta_1 GCAP_t + \beta_2 INF_t + \beta_3 TRD_t + \mu_t \quad (1)$$

Where Y_t capture the economic growth in year t, IP_t is the aggregate insurance penetration in year t, which was further disintegrated into life insurance and non-life insurance penetration. $GCAP_t$ represents gross fixed capital formation in year t, INF_t is inflation in year t and TRD_t stands for trade openness in year. However, the variables in equation (1) are changed in logarithmic form to make it easy to interpret regression coefficients as elasticities. The functional form is as specified in equation (2)

$$\log y_t = \gamma_0 + \gamma_1 \log ip_t + \gamma_2 \log gcap_t + \gamma_3 \log inf_t + \gamma_4 \log trd_t + \mu_t \quad (2)$$

Where $\log y_t$ stands for $\Delta \log(GDP_t)$, $\log ip_t$ is log aggregate insurance penatration, and $\log gcap_t$ symbolize the logarithm of gross fixed capital formation. $\log inf_t$ represents log inflation in year t and $\log trd_t$ is the log trade openness in year t. The components of aggregate insurance penetration (life and non-life insurance penetration) are specified in equations (3) and (4).

$$\log y_t = \gamma_0 + \gamma_1 \log lip_t + \gamma_2 \log gcap_t + \gamma_3 \log inf_t + \gamma_4 \log trd_t + \varepsilon_t \quad (3)$$

$$\log y_t = \gamma_0 + \gamma_1 \log nlip_t + \gamma_2 \log gcap_t + \gamma_3 \log inf_t + \gamma_4 \log trd_t + \epsilon_t \quad (4)$$

Where all variables are as defined earlier and μ_t, ε_t and ϵ_t are the stochastic error terms for equations (2), (3) and (4) respectively.

Test for unit root and bounds cointegration

The study employed the autoregressive distributed lag (ARDL) bounds test proposed by Pesaran *et al.* (1996, 2001) to test for cointegration among the variables of interest. The approach has been pointed out as an appropriate technique for small sample as compared to other methods such as Johansen and Juselius (1990) and Johansen (1991). ARDL of Pesaran's (1996, 1997, 2001) approach is suitable for either I(0) or I(1) or mixed integration. However, the technique is not appropriate for a higher order of integration, e.g., I (2), hence, in order to avoid this backdrop, the study conducted a unit root test by employing the Augmented Dickey-Fuller (ADF) (1979) and Phillips-Perron (PP) (1988) for robustness check.

The ARDL model specification for aggregated insurance penetrion is specified in equation (5). This implies that the first step in the application of the bounds test approach is to re-specify equations (2), (3), and (4) as conditional error correction models.

$$\begin{aligned}\Delta \log y_t = {} & \alpha_0 + \alpha_1 \log y_{t-1} \\ & + \alpha_2 \log ip_{t-1} \\ & + \alpha_3 \log gcap_{t-1} + \alpha_4 \log inf_{t-1} + \alpha_5 \log trd_{t-1} + \sum_{i=1}^{p} \alpha_{6i} \Delta \log y_{t-i} \\ & + \sum_{i=1}^{p} \alpha_{7i} \Delta \log ip_{t-i} \\ & + \sum_{i=1}^{p} \alpha_{8i} \Delta \log gcap_{t-i} + \sum_{i=1}^{p} \alpha_{9i} \Delta \log inf_{t-i} + \sum_{i=1}^{p} \alpha_{10i} \Delta \log trd_{t-i} \\ & + \mu_t \end{aligned} \quad (5)$$

Where Δ is the difference operator, α_0 is the drift component, α_i is the short-run multipliers (coefficients), p is the lag order. Other symbols are as defined earlier. The cointegration (level relationship) among the model variables can be conducted based on the computed F-statistics by imposing restrictions on the estimated long-run coefficients of one period lagged level of the series equal to zero, as indicated below:

$\boldsymbol{H_0}: \alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = \alpha_5 = 0$ (No level relationship) *Against* $\boldsymbol{H_1}: \alpha_1 \neq \alpha_2 \neq \alpha_3 \neq \alpha_4 \neq \alpha_5 \neq 0$

It should be noted that for components of aggregate insurance are modelled in the same manner.

The calculated *F*-statistics are compared with simulated critical values generated by Narayan (2005), which are more appropriate for small samples like ours. If the calculated *F*-statistics is below the lower bound I(0) then the null hypothesis of no cointegration is not rejected, if the F-statistics is higher than the upper critical bound then the null hypothesis is rejected indicating that economic growth and insurance penetration are co-integrated. The test is inconclusive if the value falls between the lower and upper critical bounds. If the variables of interest are co-integrated, then both long-run and short-run error correction are estimated based on the ARDL (m, n, p, q, r) specification indicated in equations (6) and (7):

$$\log y_t = \alpha_0 + \sum_{i=1}^{m} \alpha_{1i} \log y_{t-i} + \sum_{i=1}^{n} \alpha_{2i} \log ip_{t-i} + \sum_{i=1}^{p} \alpha_{3i} \log gcap_{t-i} + \sum_{i=1}^{q} \alpha_{4i} \log inf_{t-i} + \sum_{i=1}^{r} \alpha_{5i} \log trd_{t-i} + \mu_t \quad (6)$$

$$\Delta \log y_t = \alpha_0 + \sum_{i=1}^{m} \alpha_{1i} \Delta \log y_{t-i} + \sum_{i=1}^{n} \alpha_{2i} \Delta \log ip_{t-i} + \sum_{i=1}^{p} \alpha_{3i} \Delta \log gcap_{t-i} + \sum_{i=1}^{q} \alpha_{4i} \Delta \log inf_{t-i} + \sum_{i=1}^{r} \alpha_{5i} \Delta \log trd_{t-i} + \gamma_t ECT_{t-1} + \mu_t \quad (7)$$

Where μ_t is the stochastic error term, γ_t stands for the coefficient of an error correction term ECT_{t-1} which measures the speed of adjustment into long-run equilibrium from short-term disequilibrium. Engle and Granger (1987) revealed that, if cointegration exists, the situation indicates that causality exist at least in one direction and is conducted based on vector error correction model (VECM) framework. To ensure robustness checks, we also employed a fully modified ordinary least square (FMOLS) proposed by Phillips and Hansen (1990) to identify causal links between the variables under the study.

Results

Descriptive statistics

Table 1 reports descriptive statistics results. It can be observed that over the period of the study, the average aggregate insurance penetration was found to be 0.559% demonstrating that insurance sector contributes less than 1% of GDP and the statistics was highly dominated by non-life insurance penetration. . The minimum value stood at 0.4%, which can be observed in the year 2000, and the maximum value was found to be 0.7% in 2015.

Table 1: Descriptive Statistics

	y_t	*IP*	*NLIP*	*LIP*	*Inf*	*GCAP*	*TRD*
Mean	2.749	0.559	0.422	0.322	8.791	29.354	17.190
Median	3.028	0.600	0.500	0.500	6.166	31.503	12.643
Std. Dev.	1.348	0.089	0.137	0.215	5.883	8.450	22.616
Kurtosis	0.575	-0.547	5.555	-1.738	3.098	-1.048	12.796
Skewness	-0.838	-0.124	-2.380	-0.485	1.767	-0.114	2.726
Minimum	-0.950	0.400	0.000	0.000	3.290	14.721	-31.157
Maximum	4.549	0.700	0.500	0.500	27.428	43.218	112.156

Results for unit root

Table 2 reports results for both ADF and PP unit root tests. As stated earlier, ARDL bounds test technique can be applied without worrying about the order of integration of the variables under the study. That is, the approach can be employed even if some of the variables are I(0) or I(1). However, the technique will not be appropriate for I(2) variables. Hence, we conducted a unit root test to ascertain that all the variables are not integrated of order 2 (I(2)). We can observe that three variables out of seven are integrated of order one (I(1) in both ADF and PP techniques. The variables are life insurance penetration, gross fixed capital formation and trade openness. The rest of the variables were found to be stationary in level form. In the case of PP unit root test; life insurance penetration, non-life insurance penetration growth rate of GDP per capita were found to have a unit root. However, at I(1) all the variables were found to be stationary at 1% level.

Table 2: ADF and PP unit root Tests

Variable	T-Statistics					
	Level Series		**First Difference Series**			
	ADF	**PP**	**ADF**	**PP**	**Order (ADF)**	**Order (PP)**
y_t	-8.624***	-9.648***	-5.386***	-29.574***	I(0)	I(0)
log ip	-3.855***	-3.846**	-3.776***	-8.325***	I(0)	I(0)
log lip	-2.227	-1.943	-4.229***	-4.582***	I(1)	I(1)
log nlip	-3.469**	-2.875	-3.630***	-8.619***	I(0)	I(1)
log gcap	-1.578	-2.749	-5.961***	-6.268***	I(1)	I(1)
loginf	-4.003**	-4.913**	-4.442***	-13.736***	I(0)	I(0)
log trd	-2.581	-4.055**	-3.809***	-7.407***	I(1)	I(0)

Note: y_t=Δlog(GDP_t), $loginf = \Delta\log(CPI_t)$, log trd = log(trade/GDP), log ip = log(aggregate insurance penetration/GDP), log lip = log(life insurance penetration/GDP), log $nlip$ = log(non life insurance penetration/GDP), log cap = log(gross fixed capital formation/GDP), The asterisk *** and ** indicate the rejection of null hypothesis of unit root at 1% and 5% level respectively

Results for Cointegration Test

Table 3 reports results for ARDL bound cointegration test. The results reject the null hypothesis of no cointegration, since the calculated *F*-statistics falls above the upper bound ((I(1)). This imply that there is a long-run cointegration relationship between variables under the study. According to Engle and Granger (1987), causality exist if cointegration among the variables is pervasive at least in one direction..

Table 3: Results for Cointegration Tests (Bounds Test)

		90%		95%	
Equation	**F-statistics**	**I(0)**	**I(1)**	**I(0)**	**I(1)**
$F_{y_t}(y_t$ */log gip, log gcap, loginf, log trd)*	35.478***	2.45	3.52	2.86	4.01
$F_{y_t}(y_t$ */log lip, log gcap, loginf, log trd)*	27.618***	2.45	3.52	2.86	4.01
$F_{y_t}(y_t$ */log nlip, log gcap, loginf,log trd)*	40.899***	2.45	3.52	2.86	4.01

Note: *The asterisk ***indicates the rejection of the null hypothesis of no cointegration at 1% level*

Results for long-run estimates

Table 4 reports results for long-run estimates for both ARDL and FMOLS techniques. The coefficient of insurance penetration of 0.748 indicates that as aggregate insurance penetration increases by 1% economic growth increases by 0.748%. However, the variable is not statistically significant. The results are consistent with results from FMOL approach where the coefficient of insurance penetration stood to be 0.306% but also insignificant. While both life and non-life insurance penetration are also insignificant, the coefficient of non-life insurance is negative which indicates a negative relationship between the variable and economic growth. The estimated coefficient of -0.992 designates that as non-life insurance penetration increases by 1% economic growth decreases by 0.992%.

Table 4: Results for Long-run Estimates

Variables	**Dependent Variable: GDP per capita growth rate**					
	Autoregressive Distributed lag (ARDL)			**Full Modified Ordinary least squares (FMOLS)**		
	Model 1	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**
log ip	0.748			0.306		
log lip		0.264			1.157	
log nlip			-0.992			2.737
log gcap	-1.264***	-1.119	-0.301	-1.019	-3.729*	-2.173
Log inf	0.837**	0.376	0.289	-0.334	-0.057	-0.134
log trd	0.263	0.050	0.546	-0.934**	-1.477***	-1.349**

Note: *ARDL (2,3,1,3,1) was selected for model (1), ARDL (1,1,1,0,1) for model (2) and ARDL (1,1,1,0,1) for model (3) based on Akaike Information Criterion (AIC). The signs ***, **, * indicate significance at 1%, 5% and 10% level of significance respectively.*

Gross fixed capital formation was reported to have a significant negative association with economic growth. The results are according to model 1 in ARDL and model 2 in FMOLS. Inflation was found to have a significant positive impact on economic growth in model 1 in the the ARDL approach. Trade openness was found to have a negative impact on economic growth in all the three models of FMOLS approach.

Short-Run Estimates

Table 5 present results for short-run. It can be observed that coefficient of error correction term (γ) in all three models is negative and statistically significant at 1% level, providing more justification for existence of long-run equilibrium relationship between the variables of interest. The coefficient of -1.509 signify that, about 150.9% disequilibrium in the short-run will be

corrected into long run equilibrium within a year in the model with aggregate insurance penetration. The coefficient of -0.937 indicates that 93.7% of short-run disequilibrium will be corrected in the long-run equilibrium within a year in the model with life insurance penetration. The coefficient of -0.924 indicates that 92.4% of short-run disequilibrium will be corrected in the long-run equilibrium within a year in the model with non-life insurance penetration. Life insurance penetration is found to be positively related with economic growth at 1% level. Gross fixed capital formation exhibits significant positive relationship with economic growth in the case of Models 1 and 3. The adjusted R-squared values of 0.981, 0.819, and 0.857 for all three models indicate that the higher variations in economic growth have been explained by the estimated models employed in the current study.

Table 5: Short-run error correction models

Variables	**Dependent variable: GDP per capita growth rate**					
	Model 1		**Model 2**		**Model 3**	
	Coefficient	**Prob.**	**Coefficient**	**Prob.**	**Coefficient**	**Prob.**
Δlog *ip*	0.229	0.4181	-	-	-	-
Δlog *lip*	-	-	3.582***	0.0001	-	-
Δlog *nlip*	-	-	-	-	0.133	0.7675
Δlog g*cap*	5.825***	0.0000	1.145	0.1625	2.911***	0.0017
Δ*log inf*	0.311**	0.0197	-	-	-	-
Δlog *trd*	-2.869***	0.0000	-2.698***	0.0000	-2.464***	0.0000
ECT_{t-1}	-1.509***	0.0000	-0.937***	0.0000	-0.924***	0.0000
R-Squared	0.985		0.854		0.885	
Adjusted R-Squared	0.981		0.819		0.857	

***Note**: The asterisk *** and ** indicates significance at 1% and 5% level of significance respectively.*

Granger causality test

Table 6 reports results for Granger causality test. The main objective as stated earlier was to ascertain if demand-following and supply-leading hypotheses exist between insurance penetration and economic growth. The results reported in Table 6 are somehow counter-intuitive, neither demand-following nor supply leading is valid in Tanzania. For example, results indicate a one-way granger causality spanning from inflation to economic growth which imply that inflation precedes and induces economic growth in the short-run. The null hypothesis which claims that trade openness does not granger-cause gross fixed capital formation is rejected at 5% level. The other unidirectional causality can be observed between aggregate insurance penetration and inflation where the causality runs from aggregate insurance penetration to inflation. Furthermore, there exist a unidirectional causality running from gross fixed capital formation to inflation and bi-directional causality between trade openness and inflation.

Table 6. Granger Causality Results

Null hypothesis	Chi^2	Prob.	Decision on H_0
log ip does not granger cause y_t	0.259	0.6108	Do not reject
log gcap does not granger cause y_t	0.088	0.7666	Do not reject
log inf does not granger cause y_t	15.045***	0.0001	Reject
log trd does not granger cause y_t	0.098	0.7537	Do not reject
y_t does not granger cause *log ip*	0.455	0.5001	Do not reject
log gcap does not granger cause *log ip*	0.351	0.5538	Do not reject
log inf does not granger cause *log ip*	2.297	0.1296	Do not reject
log trd does not granger cause *ln ip*	0.040	0.8410	Do not reject
$y_t$does not granger cause *log gcap*	0.139	0.7084	Do not reject
log ip does not granger cause *log gcap*	0.140	0.7080	Do not reject
loginf does not granger cause *log gcap*	0.307	0.5797	Do not reject
log trd does not granger cause *log gcap*	5.618**	0.0178	Reject
y_t does not granger cause *inf*	0.003	0.9529	Do not reject
log ip does not granger cause *inf*	4.806**	0.0284	Reject
log gcap does not granger cause *inf*	2.656*	0.1032	Reject
log trd does not granger cause *inf*	11.332***	0.0008	Reject
$y_t$does not granger cause *log trd*	2.643*	0.1040	Reject
log ip does not granger cause *log trd*	0.475	0.4909	Do not reject
log gcap does not granger cause *log trd*	0.119	0.7291	Do not reject
loginf does not granger cause *log trd*	7.807***	0.0052	Reject

***Note**: The asterisk ***, ** and * indicates the rejection of null hypothesis of no granger causality at 1%, 5%, and 10% level of significance.*

Discussion of Findings

The current study provides an insight on the nexus between insurance business and economic growth in Tanzania. Specifically, the study seeks to establish the causal links between insurance penetration from both life and non-life insurance and the level of economic growth. In the long-run the results indicate that both life and non-life insurance penetration have insignificant impact on economic growth. This is consistent with neutrality insurance-growth hypothesis. These results may be attributed by the low insurance penetration found in Tanzania, which in turn, affect economic growth negatively. The findings are corroborated by another empirical study in Nigeria (Omoke, 2012) which confirm insignificant relationship between insurance and economic growth.

Likewise the results are consistent with the studies by Oitsile *et al*. (2018) who found a negative relationship between insurance penetration and economic growth in Botswana, Olayungbo and

Akinlo (2016) the case of Nigeria, Tunisia and Zimbabwe. Perhaps, a possible justification for this result could be the savings-substitution effect in Ghana. That is, if insurance premiums are invested abroad, it can drag down the income-expenditure flow, which can negatively affect economic growth. High inflationary environment, unevenly rising prices inevitably reduce the purchasing power of some consumers, could probably be the reason for the negative demand for insurance product in Zimbabwe under the period of study.

In the short-run, the results indicate that life insurance penetration has a significant positive impact on economic growth. The results imply that savings mobilization, which is the main function of life insurance, is significant aspect in promoting economic growth in Tanzania. Hence, as a country, efforts should be made to encourage investment in life insurance. The obtained results are consistent with the study by Alhassan and Fiador (2018) who examined the causal links between insurance and economic growth in Ghana.

The results from bounds test indicated that there exists a long-run relationship between insurance uptake and economic growth, the computed *F*-statistics for all three models were found to be higher than upper critical bound simulated by Pesaran *et al*. (1996, 2001). The counter-intuitive results were revealed in all three models for the case of long run estimates. Neither the aggregate insurance penetration nor their components (life and non-life insurance uptake) were significant in influencing economic growth in the case of Tanzania for the period under study. Contradicting the long-run results, life insurance penetration was positively related to economic growth. Furthermore, the results indicated that the coefficient for error correction term in all three models was negative and significant providing more evidence of existence of long-run equilibrium relationship between the variables.

Granger causality results indicated that neither demand-following nor supply-leading is valid in Tanzania. All the null hypotheses of either the insurance sector does not Granger cause economic growth or economic growth does not granger cause insurance penetration are not rejected. The results contradict previous findings such as the results by Pradhan *et al*. (2017), Singhal *et al*. (2020), Ul Din *et al*. (2017, 2020) and Gonzalez *et al*. (2022)

Conclusion

The main objective of the study was to examine whether there exist relationships between insurance penetration and economic growth in Tanzania by employing the time series data covering the period between 1995 and 2021. Generally, the econometric results indicated that despite the fact that both life and non-life insurance penetration are expected to propel economic growth of a particular economy, the situation is not pervasive in Tanzania. This implies that functions of insurance sector through mechanism of risk transfer, mobilizing large amount of funds in an appropriate way to support the business activities in the economy and providing financial security to beneficiaries upon occurrence of unforeseen though predicted as crucial roles in economic growth could not empirically proved.

Only life insurance penetration was found to be positive and significant in short-run. This indicates that savings mobilization which is the main function of life insurance penetration has improved nor supply-leading is valid in Tanzania. The major finding of the study indicates insignificant relationship between insurance and economic growth in Tanzania for the period

covered in this study (i.e. the evidence of causality was not found), the results confirm Omoke(2012) findings.

The results of this study have significant policy implications for policy makers, relevant authorities and insurers. First the evidence of insignificant relationship between insurance and economic growth in Tanzania indicates a low insurance activities and economic development in Tanzania. The possible reason for this explanation perhaps could be that the insurance sector is not fully capture untapped potentials in the market. Thus, the study recommends the fully embracing of insurance activities in order to promote economic growth. Second, government should pursue growth policies aimed at developing local insurance markets (untapped and potential market) would ultimately improve insurance market. Third, since life insurance penetration was found to be positive and significant in short-run, the study recommends the deregulation of insurance sector to promote innovation and demand for life insurance products, the sector would become an appropriate avenue for savings mobilization and capital accumulation for to other sectors in the economy. Fourth, the government and insurers should promote education programs aimed at creating and enhancing awareness of benefits of insurance demand to individuals and economy of a country.

This study experiencing few limitations that need to be addressed in future studies. First, the study employed only five variables through rigourou literature review. However, in future more variables should be explored to enhance the framework. Second, this study was limited to one country, the validated econometric results may be replicated in other countries with the same environment, such as Rwanda, Uganda, Kenya, and Sudan, to mention a few and observe the empirical results obtained. Third, since this study employed the autoregressive distributed lag (ARDL) bounds econometric approach to model the nexus between insurance and economic growth, future studies should consider employing other econometric models such as Computable General Equilibrium (CGE) to extend the scope of study as well to enhance the understanding of the phenomena

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