Life Insurance and Economic Growth Nexus: Evidence from Tunisia

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Abstract: This paper examines the existence of a causal relationship between the life insurance sector and economic growth in Tunisia between 1990 and 2019. The study applies the Johansen cointegration test and the Granger causality test based on the vector autoregressive model (VAR) to demonstrate the possible causal link. Our empirical results provide evidence that life insurance industry has a significant positive effect on the growth of Tunisian economy in the short-run. A unidirectional causality was found to run from aggregate life insurance penetration to economic growth to support the "supply-leading" hypothesis. The findings suggest that the life insurance sector of Tunisia could eventually reinforce the country's economic growth through financial intermediation.

Keywords: life insurance, economic growth, supply-leading hypothesis, Tunisia.

1. INTRODUCTION

The role of financial system on economic growth remains a major topic in financial economics literature. Researchers have shown that well-functioning financial markets can positively contribute to economic growth (Levine and Zervos, 1999; Ghali, 1999; Ghirmay, 2004; Kouki, 2013 ;...). Most of the empirical studies have generally dealt with the impact of the development of the banking sector and stock markets on economic growth. However, the role of the insurance sector on economic growth has been largely ignored (Haiss and Sümegi, 2008).

Life insurance sector has been growing rapidly in Tunisia with important pooled funds that allowed the sector to participate actively in capital market investments. This reflects a possible growth impact, which has not gained attention from researchers. In fact, over the years, attention has been focused essentially on the relation between financial institutions and economic growth. Little emphasis has been placed on non-financial institutions such as insurance companies (Haiss and Sümegi, 2008).

Several studies support the existence of a relationship between life insurance development and economic growth in some countries, such as Malaysia (Ching *et al*., 2010) and Ghana (Alhassan and Fiador, 2014). This relationship does not seem obvious, either in magnitude or in the direction of causality, for Tunisia.

This study aims to examine empirically the existence of a causal relation between life insurance sector development and economic growth in Tunisia. We employ a time series analysis for annual data ranging from 1990 to 2015.

This paper contributes to the existent literature by focusing on the importance of life insurance on economic growth in Tunisia. Although Tunisian data has been used in previous studies by Olayungbo and Akinlo (2016) and Sawadogo *et al*. (2018) no work has focused exclusively on the Tunisian market. In fact, little is known about the role of life insurance in this country. Moreover, this study contributes to the relatively limited literature on the role of insurance in economic growth. The importance of studying the relationship between the life insurance industry and economic growth is justified by the need to make good use of the relatively large funds drained by this activity. Understanding the interactions between life insurance sector and economic growth is likely to help better shape the economic development strategy. Policymakers may formulate and implement more effective policies on Tunisia's life insurance branch to ensure the prosperity of this country's economic growth.

The remainder of this paper is organized as follows. Section 2 provides a brief overview of life insurance market in the Tunisia. Section 3 examines the literature on life insurance-growth nexus. Section 4 describes the research methodology and data. Section 5 discusses the empirical results. Section 6 concludes and makes policy recommendations.

1.1. Overview of the Life Insurance Market in Tunisia

The Tunisian insurance market is considered as an emerging market. When we compare it with mature African markets, such as South Africa, we can assume that the Tunisian market is rather small (Zerriaa *et al*. 2017). Among the 28 licensed insurers in Tunisia, only 5 specialize in life insurance. The small number of insurers reflects the poor development of the life insurance sector in Tunisia.

Moreover, we note that the amount of life insurance written premiums in 2019 has seen more than ten-fold increase compared to its level in 1990. Thus, the life insurance sector in Tunisia has witnessed substantial growth.

Fig. (**2**) shows the evolution of life insurance density (premiums per capita) and penetration (premiums as a percentage

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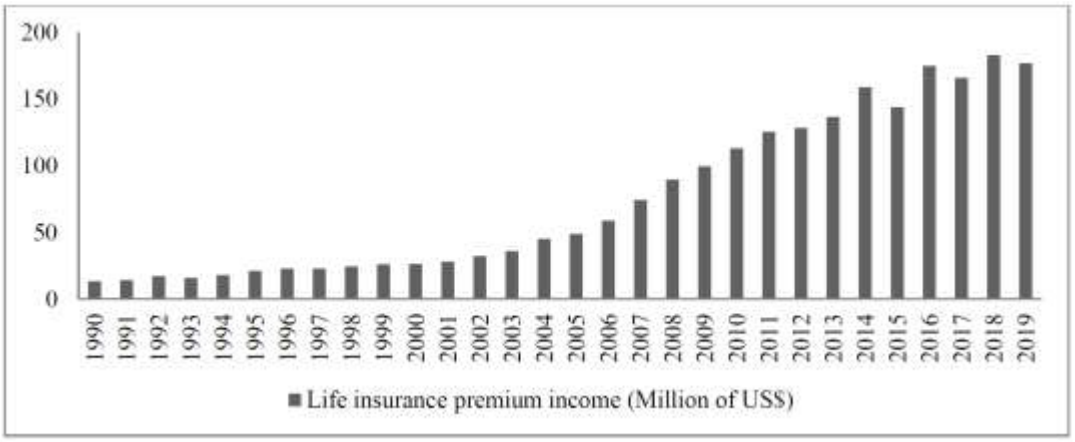

Fig. (1). Evolution of the Tunisian life insurance market written premiums.

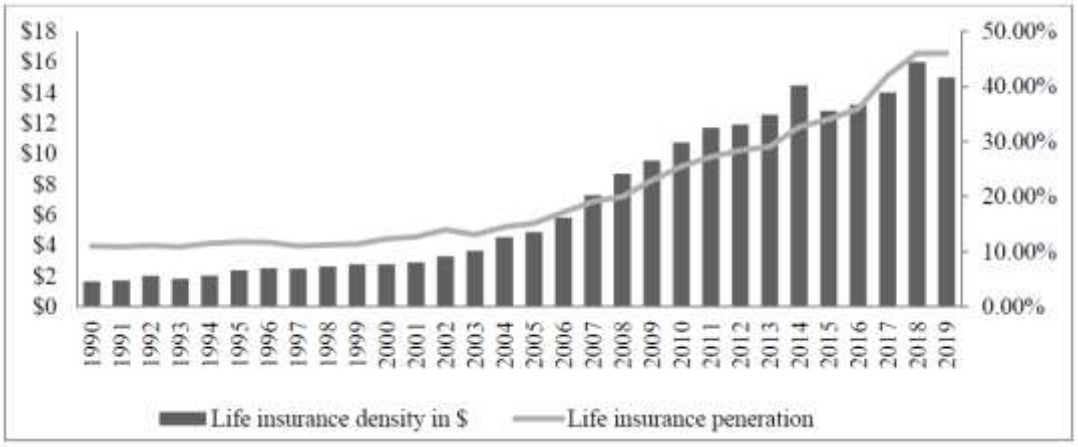

Fig. (2). Evolution of life insurance density (US$) and penetration (%).

of gross domestic product (GDP)) in Tunisia. In 2019, life insurance density and penetration are US$15 and 0.46 percent against a world average of US$379 and 3.35 percent, respectively. These indicators are very low compared with developed countries. In fact, they are smaller than those in France (US$2413 and 5.98 percent), Italy (US$2039 and 6.15 percent) and even Morocco (US$57 and 1.75 percent). They are relatively comparable with those in Turkey (US$20 and 0.22 percent) and Egypt (US$9 and 0.29 percent).

The share of life insurance in the insurance industry in Tunisia represents 21.4 percent of the overall written premiums of the insurance business in 2019. This rate is weak compared to a world average of 46.3 percent and an average of 68.2 percent in the African zone.

1.2. Literature Review

The relationship between insurance sector and economic growth could be classified in terms of causality with respect to four hypotheses (Alhassan and Biekpe, 2016; Pradhan *et al.*, 2016):

The first is the *'Supply-leading' hypothesis*, which suggests that a unidirectional causality from insurance development to economic growth is present. It argues that well developed insurance sector allows an efficient transfer of funds from surplus spending units to deficit spending units, which induces growth. Financial intermediation reduces the cost of acquiring information, which ensures effective resources allocation. The financial intermediary also reduces transaction costs and ensures that funds are allocated to the most profitable projects. Indeed, information to evaluate investment opportunities is costly for individual investors. Financial intermediaries, on the other hand, can evaluate these opportunities reducing the costs of acquiring information. This would enable to convert a greater share of savings into investment and reduce the risk for individual investors and facilitate risk diversification. These functions of financial intermediaries help to allocate more efficiently the resources into investments, leading to growth. The studies supporting this hypothesis are Arena (2008), Haiss and Sümegi (2008) and Pradhan *et al.* (2015).

The second is the *'Demand-following' hypothesis*, which stipulates that the growth in the real economy stimulates the insurance sector and that an expanding economy creates the demand for insurance coverage. In fact, when there is an increase in real income, there follows a need for financial services to absorb surplus funds and accumulate wealth. Insurance, particularly life insurance, can perform these functions. This hypothesis is supported by Beenstock *et al.* (1986) and Ward and Zurbruegg (2000).

The third is the *'Feedback' hypothesis*, which posits that causality runs from both directions simultaneously. The development of the insurance sector and economic growth may

reinforce each other. The studies supporting this hypothesis are Kugler and Ofoghi (2005) and Chang *et al.* (2014).

The fourth is the '*Neutrality' hypothesis*, where no causality between insurance development and economic growth is present. This means they are independent from each other (Guochen and Wei, 2012).

Empirical literature on the causality between life insurance and economic growth has mainly focused on developed economies. Ward and Zurbruegg (2000) examine the relationship between insurance development and economic growth, based on a data of 9 OECD countries. They use Johansen cointegration trace test and error correction models. They find unidirectional causality from insurance consumption to economic growth in Canada and Japan whereas a weaker bi-directional relationship was found for Italy. There was however no evidence of causality for the other countries, namely Australia, Austria, France, Switzerland, UK and USA.

Haiss and Sümegi (2008) study the causality between insurance activity and economic growth in Europe based on a sample of 29 European countries for the period 1992-2005. They find evidence of a positive impact of life insurance on economic growth in the EU-15 countries, Switzerland, Norway and Iceland. They emphasise the effect of insurance sector as a provider of risk transfer and as an institutional investor.

A recent study by Pradhan *et al.* (2017) analyses the inter-linkages between the banking sector and the insurance industry on the economic growth of the G-20 countries during the 1980-2014 period. It uses vector auto-regression model and the Granger causality test. The findings show that, in the long run, developments in the banking sector and insurance industry have had a significant impact on the economic growth of the G-20 countries. In the short term, the inter-relationships between the three factors prove to be more complex in that they differ by countries in different stages of development.

Concerning developing countries, Outreville (1990) uses OLS method on a cross-section data of 55 developing countries to evaluate the relation between property-liability insurance premium written and economic growth. The study shows a positive relation between the logarithm of property-liability premium per capita and GDP per capita.

Ching *et al.* (2010) examine the existence of a causal relation between life insurance funds and economic growth in Malaysia. They apply the Johansen cointegration test and the Granger causality test based on the Vector Error Correction Model. Their results support the existence of a long-run relation between the life insurance indicator (the total assets of Malaysian life insurance sector) and the real GDP, and also a short-run causal relationship running from the real GDP to the life insurance indicator. These results suggest that life insurance sector in Malaysia could potentially be an effective financial intermediation to generate long-term savings to finance capital investments and eventually could strengthen the country's economic growth.

Also in Asia, Verma and Bala (2013) investigate the relationship between life insurance and economic growth in India. They use total life insurance premium and total life insurance investment as proxy for life insurance development and GDP for economic growth. Their study shows that this sector significantly influences economic growth in India.

The examination of the insurance-growth nexus has received scant attention for African economies. Alhassan and Biekpe (2016) examine the causal relationship between insurance market development and economic growth in 8 selected African countries between 1990 and 2010. The study employs bound test approach within the autoregressive distributed lag framework. It proves the existence of causality in all the eight countries. More specifically, the results provide evidence in support of the 'supply-leading' hypothesis for six out of the eight countries, which are Algeria, Madagascar, Kenya, Mauritius, Nigeria and South Africa. For the two other countries, mixed relationships are found. In Gabon, the author finds evidence in support of the 'demand-following' hypothesis for the relationship between aggregate insurance penetration and economic growth while bidirectional causality is proved between non-life insurance and economic growth. In Morocco, evidence in favour of the 'supply-leading' hypothesis is established between life insurance penetration and economic growth while 'feed-back' hypothesis is proved for the relationship between aggregate insurance penetration and non-life insurance penetration and economic growth.

In the same vein, Olayungbo and Akinlo (2016) analyse the dynamic interactions between insurance and economic growth in 8 African countries over the period 1970-2013. They use A Bayesian Time Varying Parameter Vector Auto regression (TVP-VAR) model with stochastic volatility to examine the short-run and the long-run relationship among life insurance penetration and economic growth. They find positive relationship for Egypt, while short-run negative and long-run positive effects are found for Kenya, Mauritius, and South Africa. On the contrary, negative effects are found for Algeria, Nigeria, Tunisia, and Zimbabwe.

Asongu and Odhiambo (2019) investigate the role of insurance in economic growth on a panel of forty-eight countries in Africa for the period 2004-2014. The empirical evidence is based on Generalized Method of Moments. Life insurance increases economic growth while the effect of non-life insurance is not significant. Increasing both life insurance and non-life insurance has negative effects on economic growth.

Several studies use single-country data framework. Alhassan and Fiador (2014) investigate long-run causal relationship between insurance penetration and economic growth for Ghana over the period of 1990-2010. The study employs the autoregressive distributed lag (ARDL) bounds approach to cointegration by Pesaran *et al.* (1996, 2001). The authors find a long-run positive relationship between insurance penetration and economic growth. A unidirectional causality is found from life and non-life insurance penetration to economic growth, supporting the 'supply-leading' hypothesis.

Moreover, Sibindi and Godi (2014) examine the causal relationship between the insurance sector and economic growth in South Africa for the period 1990-2012. The authors employ insurance density as the proxy for insurance market development and real per capita growth domestic

Table 1. Summary statistics.

Variables	Mean	Median	Std.dev.	Min	Max	Observations
Economic growth	2.7721	2.8525	2.1401	-3.0081	5.6498	30
Life insurance penetration	0.1731	0.1352	0.0758	0.1088	0.34	30

product as the proxy for economic growth. They test for cointegration amongst the variables by applying the Johansen approach and then test for Granger causality based on the vector error correction model (VECM). Their findings confirm the existence of cointegration and show that the direction of causality runs from the economy to the long-term insurance, as well as from the economy to the total insurance sector. This is consistent with the 'demand-following' hypothesis.

Finally, Olayungbo (2015) analyses the asymmetric nonlinear relationship between insurance and economic growth in Nigeria over the period 1976-2010. The study concludes that asymmetric effect is present in Nigeria's insurance market. Moreover, unidirectional causality is found to run from positive GDP growth to negative insurance premium growth. The robustness results, using variance decomposition and impulse response with control variables, show that low insurance promotes high growth in Nigeria. The impulse responses also prove the presence of an asymmetric relationship between low insurance and high growth in this country.

2. METHODOLOGY

2.1. Model Specification

This paper investigates empirically the existence of a significant causal relation between life insurance development and economic growth in Tunisia. Economic growth indicator is the percentage change in per capita Gross Domestic Product (GDP) as in Lee *et al.* (2013) and Pradhan *et al.* (2016). Life insurance development indicator is the life insurance penetration rate (which represents total life insurance premium volume as a percentage of GDP) following Hou *et al.* (2012) and Pradhan *et al.* (2016). Thus, we use the following model to examine the relationship between life insurance and economic growth in Tunisia:

$$\Delta GDP_t = \eta_0 + \eta_1 PEN_t + \varepsilon_t \quad (1)$$

Where: ln is the natural logarithm, the subscript t refers to the years, ΔGDP is the percentage change in per capita gross domestic product, PEN is life insurance penetration, and ε_t is the error term.

2.2. Data

This paper employs a time series analysis for an annual data spanning the period from 1990 to 2019. Life insurance penetration rates are collected from various issues of *Sigma*, a publication of Swiss Reinsurance Company (Swiss Re), and from the annual reports of the Tunisian federation of insurance companies (FTUSA). GDP per capita growth rates are obtained from the World Bank database.

Hence, by using the specification in (1), we examine the existence of a causal relationship between life insurance penetration rate and economic growth in Tunisia. The estimation procedure involves three steps. The first step is to conduct unit root tests for each variable. The second step is to test long-run cointegration relationships between these variables. On the basis of unit root and cointegration results, the third step is to estimate a vector autoregressive (VAR) model in order to infer the Granger causal relationship between the variables.

3. EMPIRICAL RESULTS

Table **1** provides summary statistics for the selected variables. The average per capita economic growth is 2.77% for the period of study. Moreover, aggregate mean life insurance penetration rate represents 0.17% indicating that the life insurance industry's contribution in terms of premium volume is less than 1% of GDP.

3.1. Unit Root Tests

It is required to examine the stationarity properties of the variables to avoid spurious results. Briefly, stationarity means that the mean and the variance and the autocovariance of the series are constant through time (Gujarati, 2003). It is important to conduct stationarity tests to ensure that the variables have the same order of integration.

For this purpose, we employ the Augmented Dickey Fuller (ADF) unit root test (Dickey and Fuller, 1979). This test is based on the following regressions:

$$\Delta y_t = \delta y_{t-1} + \sum_{k=2}^{p} \varphi_k \Delta y_{t-k+1} + \varepsilon_t \quad (2)$$

$$\Delta y_t = \delta y_{t-1} + \sum_{k=2}^{p} \varphi_k \Delta y_{t-k+1} + c + \varepsilon_t \quad (3)$$

$$\Delta y_t = \delta y_{t-1} + \sum_{k=2}^{p} \varphi_k \Delta y_{t-k+1} + bt + c + \varepsilon_t \quad (4)$$

Where p is the maximum autoregressive level, c is constant, t is a linear time trend, δ and φ_k are slope coefficients, ε_t is the error term. The null hypothesis of this test is the existence of unit root (non-stationary; $\delta = 0$), while the alternative hypothesis is the absence of unit root (stationary; $\delta < 0$).

The length, p, for the ADF test is chosen by minimizing the Schwarz information criterion (SIC) (Schwarz, 1978). The SIC is defined as:

$$SIC = -2 \ln L + k \ln N \quad (5)$$

Where: ln *L* is the maximized log-likelihood of the model, k is the number of parameters estimated and N is the sample size.

Table 2. Augmented Dickey Fuller Unit root test.

Variables	Level	First difference			
	ADF test statistics	ADF test statistics	Critical values		
			1%	5%	10%
GDP per capita	-2.665 (1)	-4.569*** (1)	-4.380	-3.600	-3.240
Life insurance penetration	-0.373 (1)	3.513*** (1)	-2.660	-1.950	-1.600

Figures in ( ) indicate number of lags. The optimal number of lags for the ADF test was selected using the SIC criterion.
(***), (**) and (*) signify rejection of the unit root hypothesis at the 1%, 5% and 10% levels, respectively.

Table 3. Johansen Cointegration Test (Trace Eigenvalue Statistic).

Number of Cointegrating Equations	Eigenvalue	Trace Statistic	5% Critical Value	1% Critical Value
r = 0	-	15.41	20.04	31.7084
r = 1	0.57519	3.76	6.65	10.3054

The results of the Augmented Dickey Fuller unit root tests for the variables (which are the variation of GDP per capita and the life insurance penetration rate) are presented in Table **2**. They show that the null hypothesis of non stationarity cannot be rejected at the 10% level for the variables at levels. However, when first differences are taken, the null hypothesis of non stationarity is rejected for the two variables. It can therefore be concluded that both variables' series are not stationary at levels, while both series are stationary and can be integrated at first difference. Accordingly, the variables were expressed to be I(1).

3.2. Cointegration Tests

In a second step, this study employs the Johansen cointegration test (Johansen, 1988) to check the existence of a long-run relationship between life insurance development and economic growth. Only variables with the same order of integration could be tested for their cointegration. This test is conducted based on the Trace eigenvalue statistic. The likelihood ratio statistic for the trace test is:

$$TR = -T\sum_{i=r+1}^{N} \ln\left(1-\hat{\lambda}_i\right) (6)$$

Where: $\hat{\lambda}_{r+1}, \ldots, \hat{\lambda}_N$ are the smallest eigenvalues of estimated N-r. T is the number of observations and N is the number of explanatory variables. The null hypothesis for this test is that there are at most r cointegrating relations. The null hypothesis cannot be rejected when the trace statistic is less than the tabulated critical value.

The results of the Johansen cointegration test are presented in Table **3**. Trace statistics indicate that there is no cointegration relationship between GDP per capita growth rate and life insurance penetration. This suggests the absence of long-run equilibrium relationship among the two variables. This result is consistent with the findings of Alhassan and Biekpe (2016) for Algeria, Gabon and Madagascar.

Consequently, the bivariate system *ΔGDP* and *ΔPenetration* (where 'Δ' is the first difference operator and hence define the growth of the respective variables) can be modeled as an unrestricted vector autoregression (VAR).

3.3. Causality Test

In the final step, we employ the vector autoregression (VAR) framework. The optimal lag order of the VAR is chosen as 1 based on the Schwarz Bayesian Information Criteria (SBIC), Information Criteria (HQIC) and adjusted log-likelihood ratio (LR) test criteria as shown in Table 4. Finally, Granger causality Test to the bivariate VAR is examined to check the direction of short-run causality between life insurance development and economic growth. Since in our case data series, denoted X and Y, are I(1) but not cointegrated, this test is based on the following equations:

$$\Delta X_t = \alpha + \sum_{i=1}^{m} \beta_i \Delta X_{t-i} + \sum_{j=1}^{n} \gamma_j \Delta Y_{t-j} + u_t (7)$$

$$\Delta Y_t = \alpha + \sum_{i=1}^{q} b_i \Delta Y_{t-i} + \sum_{j=1}^{r} c_j \Delta X_{t-j} + v_t (8)$$

The optimal lag length m, n, q and r are determined on the basis of Hannan-Quinn (HQIC) and/or Schwarz Bayesian (SBIC) and/or log-likelihood ratio test (LR) Criterion.

For Equations (7) and (8), ΔY Granger causes ΔX if,

H_0: $\gamma_1 = \gamma_2 = \ldots = \gamma_n = 0$ is rejected against

H_a: at least one $\gamma_j \neq 0$, j=1…n,

and ΔX Granger causes ΔY if,

H_0: $c_1 = c_2 = \ldots = c_n = 0$ is rejected against

H_a: at least one $c_j \neq 0$, j=1…r

The results in Table **5** show that there exists a one-way short-term relationship running from life insurance penetration rate to GDP per capita growth rate.

Table 4. VAR Lag order Selection Criteria.

Lag	LR	FPE	AIC	HQIC	SBIC
0	-	0.021674	1.844	1.86736	1.94318
1	94.07*	0.000435	-2.06826	-1.99817*	-1.77071*
2	8.5841	0.000429*	-2.09481*	-1.97799	-1.59889
3	3.863	0.000533	-1.90677	-1.74321	-1.21247
4	3.865	0.00068	-1.71881	-1.50853	-0.826142

*Indicates lag order selected by the criterion. LR: Sequential modified Likelihood Ratio test statistics (each test at 5 percent level); FPE: Final Prediction Error; AIC: Akaike Information Criterion; HQIC: Hannan-Quinn Information Criterion and SBIC: Schwarz Information Criterion.

Table 5. Vector autoregressive model (VAR).

	ΔGDP	ΔPenetration
ΔGDP_{t-1}	0.0864 (0.44)	0.0004 (0.47)
$\Delta Penetration_{t-1}$	13.4046** (2.27)	1.09971*** (40.37)
Constant	5.1422*** (3.83)	-0.0086 (-1.39)
R^2	0.1750	0.9866
Log Likelihood	32.20772	
Schwarz Criteria	-1.804088	
Observations	25	

Figures in parentheses indicate t-statistics. *, ** and *** indicate significance at 10%, 5% and 1% levels respectively.

The results of the Granger causality test, presented in Table **6**, confirm that the penetration rate of life insurance causes economic growth in the short run, while there is no causal relationship running from economic growth to life insurance penetration. This indicates the existence of causality running from life insurance development with the absence of any feedback effect.

Table 6. Granger's causality tests.

Null Hypothesis	Granger Wald Statistic (χ^2)	Degrees of Freedom	P-value
Non causality ΔPEN⇒ΔGDP	5.1624	1	0.023
Non causality ΔGDP⇒ΔPEN	0.22284	1	0.637

Our result implies the validity of the supply-leading hypothesis. This corroborates the findings of Arena (2008) for a panel of 56 countries, Haiss and Sümegi (2008) for 29 European countries, Lee *et al.* (2013) for 6 developed countries, Alhassan and Biekpe (2016) for Algeria and Madagascar as well as Alhassan and Fiador (2014) for Ghana.

4. CONCLUSION AND POLICY IMPLICATIONS

This paper examines the causal relationship between life insurance market development, measured by penetration rate, and economic growth measured by per capita GDP variation in Tunisia over the period 1990 –2019.

The findings provide country-specific evidence to support short-run relationship between the development of Tunisian life insurance market and economic growth. We find a unidirectional causality to run from aggregate life insurance penetration to economic growth to support the "supply-leading" hypothesis. Insurance companies could transform the pooled funds from collected premiums into financial investment. This would strengthen the country's economy by mobilizing domestic savings.

Based on the results of the causality analysis, it is recommended that this country pursue policies and measures to promote the local life insurance market as it will help foster economic growth. Life insurers in Tunisia may play an important role in stimulating economic growth. Indeed, life insurance provides significant capital that can be invested in different sections of the economy, which promotes growth.

Despite the remarkable growth of life insurance in Tunisia, over the last two decades, this branch suffers from difficulties and has not yet reached the place it deserves in this country's economy. This may explain the fact that its influence on the economic growth is only on the short-term. In order to develop life insurance, and induce economic development as a result, we note that there is a need for policy-makers to promote insurance culture among Tunisians and raise awareness among the public about the benefits of life insurance. This can be achieved by intensifying communication and campaigns for these contracts. Insurers are also expected to diversify life insurance products according to the needs of potential consumers. In addition, through the establishment of a well-regulated and competitive insurance market, this sector will become an appropriate channel for savings mobilization and capital accumulation for other sectors and capital market agents.

The weak development of life insurance seems to deprive Tunisia of an important source of long-term savings necessary for their growth. Thus, the role of life insurance sector should be seriously considered in the policy-making process.

Towards attaining sustainable economic growth goals, policy makers should take into account all conceivably critical influences involving the contribution of life insurance sector.

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