Scientific Research Publishing

Open Journal of Social Sciences, 2025, 13(12), 499-518
https://www.scirp.org/journal/jss
ISSN Online: 2327-5960
ISSN Print: 2327-5952

Contribution of the Insurance Sector to Economic Growth in the DRC

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How to cite this paper: Mujinga, K. A., Nkashama, M. J. C., Nkuba, B. C., Kabongo, B. M., & Zola, M. S. (2025). Contribution of the Insurance Sector to Economic Growth in the DRC. *Open Journal of Social Sciences, 13,* 499-518.
https://doi.org/10.4236/jss.2025.1312037

Received: November 28, 2025
Accepted: December 27, 2025
Published: December 30, 2025

Abstract

The objective of this study was to assess the contribution of insurance penetration to economic growth in the Democratic Republic of Congo (DRC) during the period 2000-2023 (quarterly) using the Vector Error Correction (VEC) model. The results revealed that, in the short term, insurance premiums have no effect on the economic growth of the DRC. However, in the long term, insurance premiums positively impact economic growth in the DRC, along with the positive contributions of the workforce as a moderating factor in the development of the insurance sector, as indicated by the results of the Granger causality test. The estimation of the Interrupted Time Series Analysis (ITSA) assessed the impact of the liberalization of the insurance sector on economic growth. The results showed no significant effect, supported by the variance decomposition of real GDP forecasts, which indicated that the insurance sector contributes minimally to economic growth in the DRC, with only a 0.27% contribution. These findings raise several concerns; despite the liberalization of the insurance sector and the increase in insurance premiums, the penetration rate and insurance density remain very low. A poorly designed insurance market, even with liberalization, can only partially mitigate risks or lead to behaviors that reduce the effectiveness of risk transfer.

Keywords

Insurance Premiums, Economic Growth, VEC, ITSA, DRC

1. Introduction

Throughout the world, insurance alleviates the fear of covering potential material and immaterial losses from personal funds, thereby promoting investment and, consequently, economic growth and employment. Due to the enormous investment needs, insurance is more than ever a necessity in Africa. This realization compels local authorities and insurance market participants to intensify efforts to regulate and develop this activity. There is no aspect of human life that insurance cannot cover whether social, economic, cultural, scientific, health-related, industrial, ecological, etc., individuals, both collectively and individually, are encouraged to secure coverage through proper insurance policies against unforeseen events.

Insurance may be inconspicuous, yet it is omnipresent in our economies. Our health, mobility, purchases, homes, and even our lives are typically insured. Without insurance, the unpredictability of the future would be overwhelming, making risk-taking and innovation challenging. In other words, insurance generally helps us overcome the psychological and financial barriers that would otherwise deter us from engaging in potentially riskier activities, causing us to forgo higher returns and innovation. Insurance contributes to macroeconomic development by fostering economic growth, stabilizing the economy, redistributing wealth, and encouraging innovation (OIT, 2008).

Movable property, as opposed to immovable property, requires a protective mechanism. Transforming the very notion of protection and solidarity is essential; it entails three fundamental concepts that have supported a developmental insurance model in European society: responsibility, foresight, and non-dependence. Development, both individual and collective, is contingent upon these virtues. Vulnerability and precariousness that threaten individuals necessitate participatory solidarity responsibility and foresight.

Insurance institutions have evolved within this framework, and through their organization into global mutual insurance societies, they enable individuals to avoid dependency on others in the face of risks. Current systems aimed at development are based on aid and assistance (Mulumba, 2011).

The Democratic Republic of Congo (DRC) has the third-largest population in Sub-Saharan Africa and is the second largest in terms of area. It is endowed with abundant human and natural resources, including the world's second-largest tropical forest by area, fertile soils, plentiful rainfall, and various significant mineral resources. Traditionally, mining (copper, cobalt, diamonds, gold, zinc, and other common metals) and oil account for about 75% of its total export revenue and approximately 25% of its GDP. However, despite this abundance of raw materials, the structured sector of its economy has collapsed in recent decades due to poor management and conflict.

Since the structural reforms initiated in the early 2000s and the liberalization of the insurance sector in 2015, the DRC has been striving to modernize its financial system to support more sustainable and diversified economic growth. In this process, the insurance sector plays a significant, albeit often underestimated, role in financing the

real economy, mobilizing long-term savings, and reducing macroeconomic risks. Nevertheless, the actual contribution of insurance to Congolese economic growth remains largely unexplored scientifically (Levine, 1997; Outreville, 1996).

Despite its significant potential, the DRC is characterized by one of the lowest insurance penetration rates on the African continent, limited insurance density, inadequate sector diversification, and an institutional structure still under consolidation. The enactment of the Insurance Code (2015), the establishment of the Insurance Regulatory Authority (ARCA) in 2016, and the opening of the market to new operators have substantially altered the landscape of the sector. These reforms should, theoretically, enhance the economic role of insurance by promoting competition, product innovation, investor confidence, and mobilizing long-term resources (Kayembe, 2018; Lumbala, 2020; ARCA, 2022).

However, the concrete impact of this sector on Congolese economic growth between 2000 and 2023 remains ambiguous. In a context dominated by exogenous shocks (fluctuations in commodity prices, security instability, infrastructural and institutional constraints), it is unclear whether the theoretical mechanisms linking insurance to growth have functioned effectively.

Thus, studying the contribution of the insurance sector to GDP growth in the DRC is relevant on several levels: 1) Economically, to assess whether sector development has stimulated investment and production; 2) Institutionally, to measure the moderating role of the regulatory framework and governance; 3) Politically, to guide future financial system reforms.

Although economic theory highlights several channels through which insurance can promote growth (mobilization of savings, risk reduction, improvement of the business climate), the structural weaknesses in the Congolese market raise two fundamental questions: 1) Do insurance premiums genuinely contribute to Congolese economic growth between 2000 and 2023? 2) What is the impact of the liberalization of the insurance sector on economic growth in the DRC?

In light of the above questions, the following hypotheses are put forward:

H1: Insurance premiums have a positive effect on economic growth in the DRC;

H2: The liberalization of the insurance sector does not significantly affect economic growth in the DRC.

2. Literature Review

2.1. Theoretical Framework

Modern theoretical literature identifies several channels through which the insurance sector can influence economic growth:

1) Risk Management and Transfer: Through insurance, households and businesses reduce uncertainty, thereby encouraging productive investment (physical capital investment), innovation, and capital accumulation (Arrow, 1978; Skipper, 1997). Insurance mitigates uncertainty for households and businesses by covering idiosyncratic risks (claims, disasters, asset loss).

2) Mobilization of Savings and Investment Financing: Premiums collected by

insurers can be transformed into long-term investments (financial instruments, government bonds, infrastructure financing). Life insurance often serves as a stronger "savings channel" than non-life insurance by collecting long-term premiums and investing these funds in financial markets and infrastructure (Haiss & Sümegi, 2008).

3) Improvement of Capital Allocation and Business Climate: A deep insurance market enhances lender and investor confidence, reducing agency costs and facilitating access to credit (Beck & Webb, 2003). This improvement increases access to credit and allows for better capital allocation to projects with real returns.

4) Complementary Role to Banks: Insurance is part of overarching financial development; its effect can be autonomous or complementary to that of the banking sector by stabilizing financial flows and diversifying funding sources (Levine, 1997). Insurers cover risks that banks may avoid (credit insurance, agricultural insurance), thereby stabilizing financial flows and diversifying funding sources.

5) Institutional Role: According to Outreville (1996) and Arena (2008), institutional structure determines the insurance sector's capacity to support growth. In countries with weak institutions (fraud, inadequate contract protection, lack of trust), the effect of insurance tends to be limited. The quality of institutions (governance, rule of law, regulatory framework) conditions the insurance sector's ability to support growth.

2.2. Empirical Evidence from Developing Countries

From an empirical standpoint, international literature shows that the development of insurance, measured by total premium/GDP, penetration, and density, is often associated with positive effects on growth, particularly through two main channels: 1) mobilization of savings (life insurance) and conversion of these resources into productive investments; 2) reduction of uncertainty for economic agents, fostering risk-taking and innovation (Beck & Webb, 2003; Arena, 2008). However, the magnitude and robustness of this effect vary across countries, insurance segments (life vs. non-life), and institutional quality (Pradhan et al., 2017; Enisan & Taiwo, 2024).

Similarly, Outreville (1996), Haiss and Sümegi (2008), Ward and Zurbruegg (2000), and Beck and Webb (2003) often show a positive relationship between insurance development and growth, but results vary based on methods (cross-section vs. dynamic panel), periods, and specifications (life vs. non-life).

Pradhan et al. (2015) and Han et al. (2010) conclude that the relationship between economic growth and insurance depends on the level of development and institutional factors. Causality can run in both directions between economic growth and insurance demand.

However, Shindo and Stewart (2021) demonstrate in their study that insurer investments can support capital accumulation and growth if solvency and governance are strong.

Horvey et al. (2024) reveal threshold effects in their study, indicating that beyond a certain level of insurance market development, the impact on economic

growth becomes significant, emphasizing the importance of institutional frameworks and market depth. Insurance thus promotes investment and growth when the market and regulation are mature.

2.3. The Insurance Sector in the DRC

In the DRC, recent national studies (Mutombo, 2021; Mukeba & Mbuyi, 2019) suggest a positive long-term relationship between insurance premiums and GDP, while field studies on health micro-insurance demonstrate human capital gains that potentially have an indirect effect on growth (Shako et al., 2018). Nevertheless, the historical weakness of insurance indicators (penetration often below 1%) and institutional constraints (governance, data collection, limited competition) could mitigate or delay the expected macroeconomic impact (Kanku & Kabuya, 2016; Kayembe, 2018).

Akinlo and Apanisile (2014) analyze the effect of the 2015 insurance sector liberalization law on market dynamism in the DRC. The results attest that liberalization increases issued premiums, attracts new players, and improves penetration. While these effects on economic growth are still limited,

Mutombo (2021), using an ARDL model on data from 2002-2020, demonstrates that insurance premiums significantly influence GDP levels, although short-term effects remain weak. This conclusion aligns with Mukeba and Mbuyi (2019), whose study (1995-2017) reveals a positive elasticity of the insurance sector on growth, particularly through non-life insurance. Nyembo Tampakanya (2017), in a finance-growth approach, also finds a moderate but significant positive effect. These studies converge on the notion that the insurance sector is beginning to influence Congolese growth, but its effect is constrained by the market's very small size (penetration <1% for several years).

The reform of the sector, enshrined in Law 15/005, marks a significant shift in the literature. Lumbala (2020) shows, through a before/after analysis of 2000-2019, that liberalization stimulates the entry of new players, increases issued premiums, and gradually reduces SONAS's historical monopoly. Kayembe (2018) emphasizes the sector's profound inefficiency prior to reform: low product diversification, absence of innovation, and almost total dependence on a single public operator. These results suggest that the post-2015 period is structurally different from the previous period, justifying the inclusion of a dummy variable in any econometric model covering 2002-2024. Empirical research also confirms that the rise of private companies (since 2018-2022) amplifies the insurance effects on growth determinants (investment, employment, contractual savings).

Several studies indicate that insurance contributes to growth by mobilizing savings and financing investment. Mukeba and Mbuyi (2019) demonstrate that the insurance sector enhances the formation of domestic capital through the mobilization of contractual savings, although this effect is highly dependent on governance quality. Mutombo (2021) also notes that investments made by insurers play a significant role in financial intermediation. These results reinforce the idea that

insurance plays a financial role comparable to that of banks: it collects long-term funds that are subsequently invested in the real economy. They justify the introduction of a "insurance sector investments" or "gross internal savings" variable in your model.

3. Materials and Methods

3.1. Data and Measures

In this article, we use insurance premiums as an indicator to assess the level of development of the insurance sector in the DRC, real GDP as an indicator of economic growth, and the labor force and gross fixed capital formation as control variables.

For better modeling of economic dynamics, we utilized quarterly data disaggregation (Chow & Lin, 1971) as a technique for conducting a robust econometric analysis given the less than 30 annual observations (2000 to 2023). This data disaggregation was carried out using Stata 15 software, as presented by Mukenge and Mbende (2025).

Table 1 presents the operationalization of the variables selected for this study. Following the reviewed empirical works and observations of the Congolese economy, the labor force, investments, and insurance premiums show positive signs concerning real GDP. This underscores the interdependence between economic development and the insurance sector. As the economy develops and real GDP increases, there results a growing demand for insurance products, thereby reinforcing the essential role of the insurance sector in overall economic stability and growth.

Table 1. Definition of variables and expected signs.

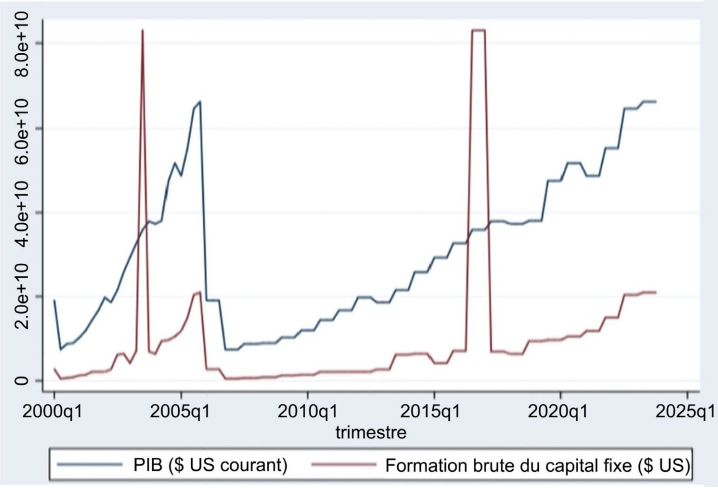
Variables	Codes	Définitions	Measures	Expected signs
Real GDP	RGDP	Indicator of economic growth, measuring the total value of all goods and services produced in a country over a given period.	Billions of current dollars	
Labor force	LABF	Refers to the available workforce; the population of working age.	Thousands	+
Investments	GFCF	Level of investment captured by gross fixed capital formation.	Millions of current dollars	+
Insurance premiums	INSP	Amounts paid by policyholders to an insurance company in exchange for coverage offered by an insurance policy.	Millions of dollar	+

Source: Authors.

Ćurak et al. (2009), Richard and Victor (2013), Akinlo and Apanisile (2014), and Dawd and Benlagha (2023) show in their studies that the development of in-

surance strengthens the link between financing and economic growth. The relationship between insurance and economic growth is therefore positive.

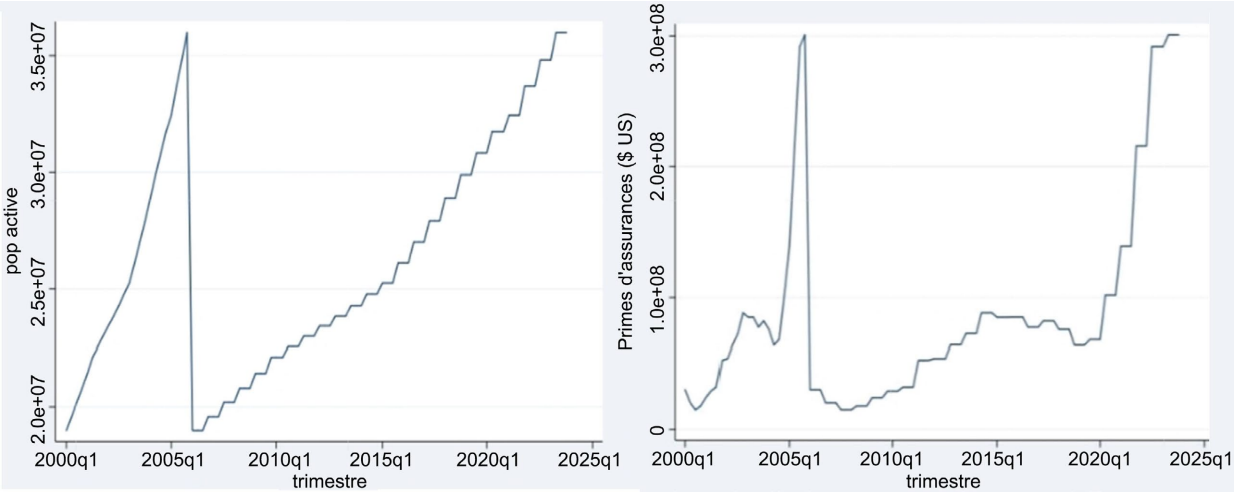
To authenticate the results of the unit root test and proceed with a more thorough examination, Figure 1 and Figure 2 illustrate the graphical evolution of the variables to indicate (by preemption) their level of stationarity. Figure 1 presents the evolution of real GDP and Gross Fixed Capital Formation (GFCF) in the DRC from 2000 to 2023. A certain stability in GFCF can be observed over time, unlike real GDP, which exhibits upward fluctuations throughout the study period, indicating potential non-stationarity.



Source: Authors.

Figure 1. Evolution of Real GDP and GFCF

Figure 2 provides a preemption of the non-stationarity of the labor force and insurance premiums. Both variables fluctuate over time with a positive trend during the study period.



Source: Authors.

Figure 2. Evolution of the labor force and insurance premiums.

To ensure the statistical robustness of the time series data, the Stata version 15 analysis tool was employed to first examine the order of integration and the presence of unit roots among the variables. The results of the stationarity tests will determine the direction and analysis method that will be subsequently executed. These results are presented below in Table 2.

Table 2. Stationarity Test of ADF.

Variable	In level		In first difference		Order of integration
	ADF	VCM (5%)	ADF	VCM (5%)	
RGDP	−1.803	−3.456	−3.294	−1.950	I (1)
LABF	−2.249	−3.456	−9.736	−1.950	I (1)
GFCF	−2.807	−3.456	−11.366	−1.950	I (1)
INSP	−2.255	−3.456	−8.975	−1.950	I (1)

Source: Authors.

The results of the stationarity tests, as indicated in Table 2, confirm that the variables are integrated of order 1. In their level form, all variables were non-stationary of the DS type. After the first differentiation, they became stationary. Therefore, there is a presumption of a long-term relationship between the variables.

3.2. Estimation Method

To study and analyze the relationship between the insurance sector and economic development in the DRC during the period 2000-2023, we adopt an empirical approach based on applying a Vector Error Correction model (VEC).

3.2.1. Specification of the VEC Model

According to Table 2, all variables are integrated of order one (1), which suggests the use of the Johansen cointegration test to verify the existence of a long-term relationship among the variables. The justification for using the VEC model is established when the variables are integrated of order one (1).

A Vector Error Correction (VEC) model is a restricted vector autoregressive (VAR) model designed for non-stationary series known to be cointegrated. The VEC incorporates cointegration relationships into its specification, thereby constraining the long-term behavior of the endogenous variables to converge towards their cointegration relationships while allowing for short-term adjustment dynamics. We adopt the procedure of Odhiambo (2008) and test for Granger causality based on the error correction model, which can be expressed as follows:

$$\begin{aligned}\Delta LRGDP = {} & \alpha_0 + \sum_{i=1}^{n} \alpha_{1i} LRGDP_{t-1} + \sum_{i=1}^{n} \alpha_{2i} \Delta LRGDP_{t-1} + \sum_{i=1}^{n} \alpha_{3i} \Delta LGFCF_{t-1} \\ & + \sum_{i=1}^{n} \alpha_{4i} \Delta LLABF_{t-1} + \sum_{i=1}^{n} \alpha_{5i} \Delta LINSP_{t-1} + \alpha_6 ECT_{t-1} + \mu_t \end{aligned} \quad (1)$$

$$\Delta LGFCF = \beta_0 + \sum_{i=1}^{n} \beta_{1i} LGFCF_{t-1} + \sum_{i=1}^{n} \alpha_{2i} \Delta LRGDP_{t-1} + \sum_{i=1}^{n} \alpha_{3i} \Delta LGFCF_{t-1} + \sum_{i=1}^{n} \alpha_{4i} \Delta LLABF_{t-1} + \sum_{i=1}^{n} \alpha_{5i} \Delta LINSP_{t-1} + \beta_6 ECT_{t-1} + \varepsilon_t \quad (2)$$

$$\Delta LLABF = \theta_0 + \sum_{i=1}^{n} \theta_{1i} LLABF_{t-1} + \sum_{i=1}^{n} \alpha_{2i} \Delta LRGDP_{t-1} + \sum_{i=1}^{n} \alpha_{3i} \Delta LGFCF_{t-1} + \sum_{i=1}^{n} \alpha_{4i} \Delta LLABF_{t-1} + \sum_{i=1}^{n} \alpha_{5i} \Delta LINSP_{t-1} + \theta_6 ECT_{t-1} + \gamma_t \quad (3)$$

$$\Delta LINSP = \delta_0 + \sum_{i=1}^{n} \delta_{1i} LINSP_{t-1} + \sum_{i=1}^{n} \alpha_{2i} \Delta LRGDP_{t-1} + \sum_{i=1}^{n} \alpha_{3i} \Delta LGFCF_{t-1} + \sum_{i=1}^{n} \alpha_{4i} \Delta LLABF_{t-1} + \sum_{i=1}^{n} \alpha_{5i} \Delta LINSP_{t-1} + \delta_6 ECT_{t-1} + \vartheta_t \quad (4)$$

With respect to:

ΔX_i : the growth rate of the variable considered.

$LX_{i,t-1}$: the variable taken in logarithm with a one-period lag.

$\Delta LX_{i,t-1}$: the logarithmic growth rate with a one-period lag of the variable.

ECT_{t-1} : lagged error correction term.

$\mu_t, \varepsilon_t, \gamma_t, \vartheta_t$: uncorrelated white noise residuals.

$\alpha, \beta, \theta, \delta$: constant terms.

3.2.2. Model Specification: ITSA

In this study, we will employ the ITSA (Interrupted Time Series Analysis) model. This model allows the assessment of the impact of an intervention or event on a time series by comparing trends before and after the intervention to see if it had a significant effect on the variable of interest.

Intervention models were originally developed by Box and Tiao (1975). In an ITSA analysis, the outcome variable is observed over multiple periods, both spaced before and after the introduction of an intervention expected to disrupt its initial level and/or trend. We consider a single treatment period, the impact of the liberalization of the insurance sector in 2015.

This leads to the proposal of the regression model in the following form:

$$Y_t = \beta_0 + \beta_1 T_t + \sum_{j=1}^{m} \left(\beta_{j0} X_{jt} + \beta_{j1} X_{jt} T_t \right) + \varepsilon_t \quad (1)$$

where Y_t, is the vector of all variables (economic growth rate, GFCF, labor force, and insurance premiums); T_t represents their trends). The variables X_{jt} are dummy variables capturing the intervention (pre-intervention period 0, otherwise 1). Equation (1) assumes there were q treatment periods and that there is only a single group to study.

When there is only one group under study (no comparison groups), the standard regression model takes the following ITSA form (Huitema & Mckean, 2000; Linden & Adams, 2011):

$$Y_t = \beta_0 + \beta_1 T_t + \beta_2 X_t + \beta_3 X_t T_t + \varepsilon_t \quad (2)$$

where Y_t is the aggregated outcome variable measured at each equally spaced time point t; T_t is the time elapsed since the beginning of the study; X_t is the dummy variable (indicator) representing the intervention (post-liberalization period 0, otherwise 1); and $X_t T_t$ is an interaction term.

In the case of a single group study, β_0 represents the intercept or starting level of the outcome variable, β_1 represents the slope or trajectory of the outcome variable until the intervention's introduction. β_2 represents the change in the outcome level occurring immediately after the intervention introduction (compared to the counterfactual). β_3 represents the difference between the pre-intervention and post-intervention slopes of the outcome.

We thus seek significant values of ρ in β_2 to indicate an immediate treatment effect, or in β_3 to indicate a treatment effect over time (Linden & Adams, 2011). If these two coefficients are statistically significant, it implies that the liberalization of the insurance sector had a significant impact on economic growth in the DRC.

The error terms follow a first-order autoregressive process AR (1):

$$\varepsilon_t = \rho\varepsilon_{t-1} + \mu_t \tag{3}$$

Where the autocorrelation parameter ρ is the correlation coefficient between adjacent error terms such that $|\rho| < 1$, and the disturbances μ_t are independent $N\left(0, \sigma^2\right)$.

The models will be adjusted using the OLS method while verifying post-estimation diagnostics.

4. Results

4.1. Johansen Cointegration Test and Granger Causality Test

Having established that all variables are non-stationary and integrated of order one, we proceed to test the number of cointegration relationships by applying the Johansen cointegration test.

Cointegrated variables allow the elimination of spurious relationships and highlight common stochastic trends. Additionally, they enable us to formulate an error correction model by determining the long-term relationship among the variables. We first estimate an unconstrained VAR and determine criteria for selecting the lag length.

The optimal lag structure is determined by the lowest value according to the parsimony principle. The optimal lag length (different from zero) selected is 3 based on AIC and HQIC criteria as shown in Table 3 below.

We then apply the Johansen test using the optimal lag length of 3. The results presented in Table 4 indicate the rejection of the null hypothesis (H_0: rank = 0) and the acceptance of the alternative hypothesis (H_a: rank ≠ 0). The trace statistic (37.10) exceeds the critical value (29.68) for 1 lag at the 5% level, suggesting the existence of a cointegration relationship among the variables. We thus conclude to the existence of at least two cointegration relationships (two long-term relationships among the variables).

Table 3. Determination of optimal lag length.

Lag	LL	LR	AIC	HQIC	SBIC
0	158.36		−3.3926	−3.3481	−3.2822*
1	162.02	7.32	−3.1214	−2.8988	−2.5696
2	165.29	6.52	−2.8415	−2.4408	−1.8482
3	253.93	177.28	−4.4380*	−3.8591*	−3.0032
4	265.79	23.73	−4.3471	−3.5902	−2.4709

Source: Authors.

Table 4. Johansen cointegration test.

Number of Relationships	Eingenvalue	Trace Statistic	Critical Value at 5%
0	-	87.10	47.21
1	0.4158	37.10	29.68
2	0.2402	11.55*	15.41
3	0.0963	2.13	3.76
4	0.0227		

Source: Authors.

Once the existence of at least one cointegration relationship between economic growth and the development variables of the insurance sector is established, we proceed with Granger/exogeneity causality tests by block (Wald tests) based on the error correction model. The results are presented in **Table 5**.

Table 5. Granger causality test.

	ΔLRGDP	ΔLGFCF	ΔLLABF	ΔLINSP
ΔLRGDP		(0.5984) 0.897	(22.29) 0.000***	(2.4782) 0.479
ΔLGFCF	(1.195) 0.754		(2.5105) 0.473	(0.8015) 0.849
ΔLLABF	(0.7844) 0.853	(0.1240) 0.989		(6.3264) 0.097*
ΔLINSP	(1.6137) 0.656	(0.3740) 0.946	(4.9429) 0.176	

Legend: (.) chi2, ***significant at 1%, **significant at 5%, *significant at 10%.
Source: Results from analyses using Stata 15.

The results indicate that there is no causal link between the development of the insurance sector (insurance premiums) and economic growth. We cannot reject the null hypothesis of exogeneity for the development variables of the insurance sector in the economic growth function at a 10% significance level, as all *p*-values exceed 10%.

The results imply a causal relationship between economic growth and the increase in the labor force. Thus, economic development enhances the demand for

labor. However, this increase in the labor force stimulates the development of the insurance sector through the rise in insurance premiums.

The labor force can thus be viewed as a moderating factor in the development of the insurance sector. The direction of causality thus flows from economic growth to the development of insurance via the labor force in the long term, without feedback. The development of the insurance sector in the short term is not affected by economic growth, and vice versa.

4.2. Estimation of the VEC and ITSA Models

4.2.1. VEC Model Results

After estimation, the results shown in Table 6 indicate that in the long term, real GDP and investments (GFCF) are functions of the labor force and insurance premiums. This leads to the following equations:

$$\mathrm{LRGDP}_t - \beta_2 \mathrm{LLABF}_t - \beta_3 \mathrm{LINSP}_t + \mu_t = 0 \quad (1)$$

$$\mathrm{LGFCF}_t - \beta_2 \mathrm{LLABF}_t - \beta_3 \mathrm{LINSP}_t + \mu_t = 0 \quad (2)$$

To make the equation clearer, we can consolidate the constant terms. The cointegration equation becomes:

$$\mathrm{LRGDP}_t = \beta_2 \mathrm{LLABF}_t + \beta_3 \mathrm{INSP} + \mu_t \quad (3)$$

$$\mathrm{LGFCF}_t = \beta_2 \mathrm{LLABF}_t + \beta_3 \mathrm{LINSP}_t + \mu_t \quad (4)$$

From these two cointegration relationships (3) and (4) above, we can conclude that in the DRC, economic growth is positively affected by insurance premiums and the labor force in the long term. When the labor force increases by 1%, economic growth rises by 2.91%. However, when insurance premiums increase by 1%, economic growth rises by 0.20%. It is also observed that with a 1% increase in the labor force and insurance premiums, the level of investments (GFCF) increases by 3.62% and 0.62% respectively in the long term. We conclude that insurance premiums are less sensitive to affecting economic growth than the labor force. Similarly, insurance premiums are less sensitive to affecting investments (GFCF) compared to the labor force.

Table 6. Cointegration equation results.

Normalized Variable $\mathrm{LRGDP}_t = 1$		Relation CE1		Normalized Variable $\mathrm{LGFCF}_t = 1$		Relation CE2	
Variables	Coefficients	Z	*p*-value	Variables	Coefficients	Z	Coefficients
LGFCF_t	0.000			LRGDP_t	0.000		
LLABF_t	2.9195	−10.25	0.000***	LLABF_t	3.6267	−2.77	0.006***
LINSP_t	0.2036	−3.05	0.002***	LINSP_t	0.6243	−2.03	0.042**
μ_t	29.5183	7.75	0.000***	μ_t	50.8157	0.004	0.004***

Legend: ***significant at 1%, **significant at 5%, *significant at 10%.
Source: Authors using Stata 15.

The results of the VECM estimation, as presented in Table 7 of Equation (1)

for real GDP, indicate that the sign of the adjustment coefficient (reversion force) is negative (−0.4622) and significant (p-value = 0.009 < 5%), which corresponds to one of the characteristics of VEC models. There is therefore an error correction mechanism in the long term: the imbalances between the economic growth rate (the variation in real GDP), the growth rate of the labor force (variation in the active population), variations in insurance premiums, and variations in investment (GFCF) compensate in such a way that the series exhibit similar long-term evolutions.

Furthermore, from the estimations carried out using the VEC model, we observe that in the short term, economic growth is not influenced by any of the variables retained in the model. Thus, there is no impact from the insurance sector on economic growth in the DRC in the short term. Given that the reversion force (ECT) has a negative and significant coefficient, this reflects long-term effects from certain variables, as indicated in Table 6.

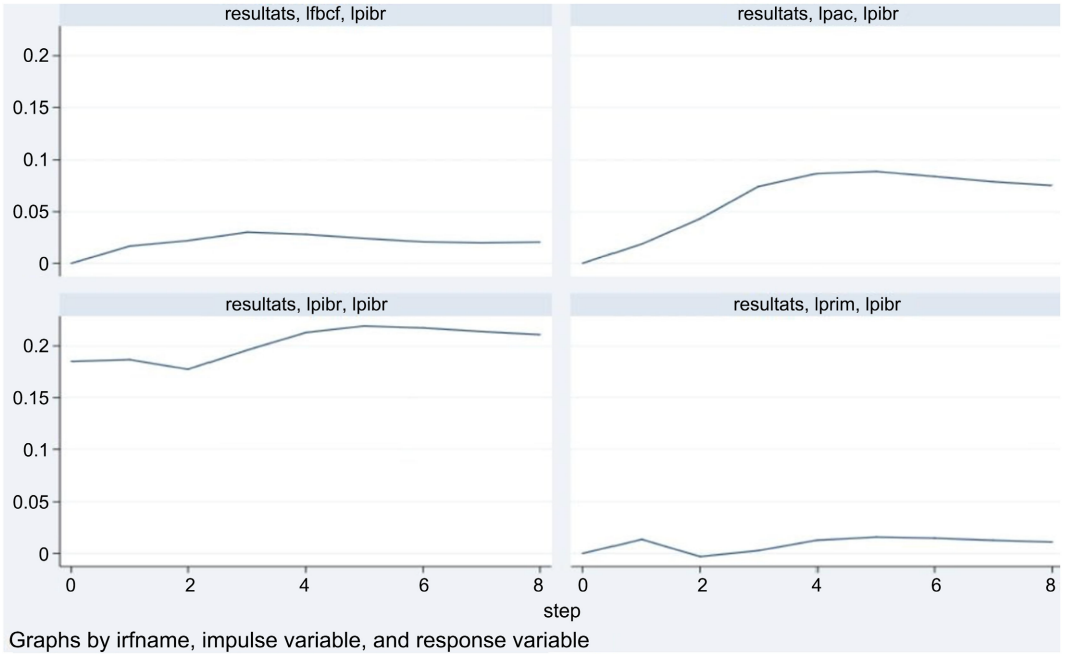
Table 7. Short-term relationship results.

Variables	(1) ΔLRGDP	(2) ΔLGFCF	(3) ΔLLABF	(4) ΔLINSP
ECT_{t-1}	(−0.4622) 0.009***	(0.4569) 0.415	(0.0840) 0.216	(−0.0371) 0.897
$\Delta LRGDP_{t-1}$	(0.2017) 0.302	(0.1982) 0.750	(−0.0166) 0.825	(0.324) 0.919
$\Delta LGCFC_{t-1}$	(−0.0256) 0.584	(0.1091) 0.463	(0.0000) 0.999	(0.0136) 0.857
$\Delta LLABF_{t-1}$	(−0.9119) 0.121	(−0.4209) 0.822	(−0.1311) 0.563	(−1.2450) 0.192
$\Delta LINSP_{t-1}$	(0.0473) 0.756	(−0.1561) 0.747	(0.0754) 0.199	(0.3242) 0.191

Legend: (.) coefficient, ***significant at 1%, **significant at 5%, *significant at 10%.
Source: Authors using Stata 15.

Figure 3 illustrates the impulse response functions of real GDP to shocks from other variables. A shock to GFCF and/or the labor force yields positive effects on real GDP, reflecting the importance of capital investments and labor strength for economic growth. However, economic growth is less sensitive to shocks in insurance premiums in the DRC.

The results of the forecast error variance decomposition of real GDP presented in Table 8 indicate that variations in real GDP in the DRC primarily depend on its own past values throughout the study period. After 8 quarters (2 years), we find that real GDP accounts for 88.73% of its own variations. The contributions from the labor force, GFCF, and insurance premiums follow at 9.94%, 1.05%, and 0.27% respectively. Hence, we can conclude that the insurance sector, despite its liberalization, does not contribute significantly to economic growth in the DRC, with a contribution of less than 1%.



Source: Authors using Stata 15.

Figure 3. Impulse response functions of real GDP.

Table 8. Decomposition of variance of Real GDP.

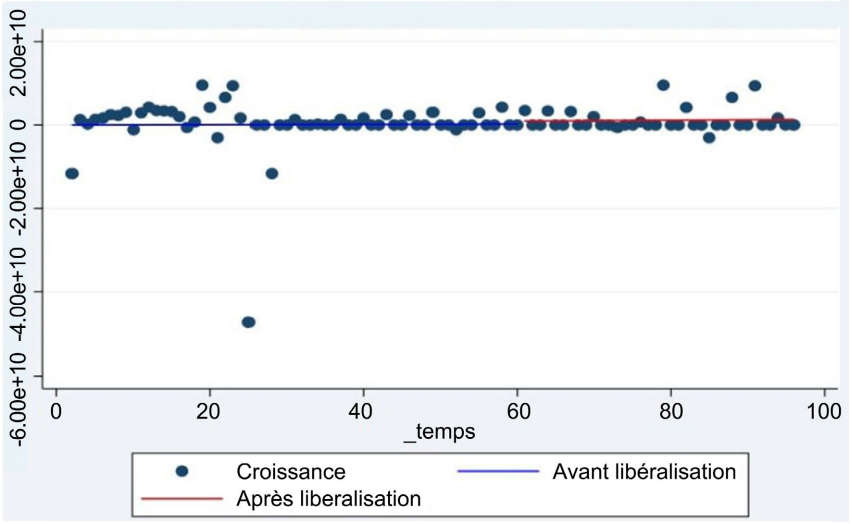
Periods	LRGDP	LGFCF	LLABF	LINSP
1	1.000	0	0	0
2	0.9884	0.0039	0.0049	0.0026
3	0.9694	0.0073	0.0213	0.0018
4	0.9353	0.0111	0.0520	0.0013
5	0.9106	0.0120	0.0755	0.0018
6	0.8965	0.0116	0.0894	0.0023
7	0.8901	0.0110	0.0962	0.0026
8	0.8873	0.0105	0.0994	0.0027

Source: Authors using Stata 15.

4.2.2. Results of the ITSA Model

Figure 4 demonstrates that the liberalization of the insurance sector did not have a significant impact on economic growth in the DRC. This may be explained by the fact that this sector is still under development, with low insurance density and penetration rates. However, the strong potential of the labor force and the expansion of premiums offer optimism regarding the long-term effects of this liberalization.

The results of the ITSA model estimation presented in **Table 9** indicate that the model is generally sound, as the probability of the global significance test of Fisher is zero (0.0005 < 5%). The adjusted coefficient of determination (R^2) stands at 0.6115, meaning that the explanatory variables retained in this study account for 61.15% of the variability of economic growth in the DRC.



Note: Intervention in 2015.
Source: Post-estimation model generated on Stata 15.

Figure 4. Impact of COVID-19 on economic growth.

From these results, it is noteworthy that variations in investments ($\Delta LGFCF_t$) and insurance premiums ($\Delta LINSP_t$) positively impact economic growth in the DRC, while the increase in the labor force has no effect on economic growth. Furthermore, the post-liberalization period (X_t) did not have any effect on economic growth in the DRC.

In conclusion, the liberalization of the insurance sector does not have a significant impact on economic growth in the DRC. However, there are observed positive effects from the levels of investment and insurance premiums. When these increase by 1%, economic growth subsequently rises by 0.10% for investments and 0.43% for insurance premiums.

Table 9. ITSA model estimation results.

Number of Observations	**=95**	**R^2**	**=0.6363**
F (6, 88)	=25.66	R^2 Ajusté	=0.6115
Prob > F	0.0005		
$\Delta LRGDP_t$	**Coefficient**	**t**	***p*-value**
$\Delta LGFCF_t$	0.1024	4.58	0.000***
$\Delta LLABF_t$	0.0640	0.18	0.860
$\Delta LINSP_t$	0.4331	5.00	0.000***
T_t	0.0004	0.41	0.680
X_t	0.0367	0.66	0.513
$X_t T_t$	−0.0024	−1.04	0.300
Constant	−0.0172	−0.49	0.625

Legend: ***significant at 1%, **significant at 5%; *significant at 10%.
Source: Authors using Stata 15.

Table 10 shows that the ITSA model is well-specified; there is no heteroscedasticity as the probability exceeds the 5% significance threshold. This indicates the consistency of error variance across our variables. The Breusch-Godfrey test results show the absence of autocorrelation in errors, which indicates that the residuals are uncorrelated. There is also no multicollinearity, as the VIF value is 3.97, which is below 10. These results validate the model.

Table 10. ITSA model diagnostics.

Hypotheses	Tests	Test Probability	Conclusio
Model Specification	Ramsey	0.692	Respected
Heteroscedasticity	Breusch-Pagan	0.3933	Respected
Absence of Autocorrelation	Breusch-Godfrey	1.5876	Respected
Non-Multicollinearity	VIF	3.97	Respected

Source: Authors using Stata 15.

5. Discussions and Implications

The findings from this study provide clear answers to the two questions posed in the introduction. Firstly, concerning the contribution of the insurance sector to economic growth in the DRC, the use of the VEC model estimation was necessary. Analysis revealed that the variables retained in the study have a long-term relationship according to the cointegration test results. However, only one causal relationship was found through the Granger causality test, indicating that variations in real GDP cause variations in the labor force. From the VEC model, in the short term, variations in insurance premiums do not affect economic growth in the DRC. Furthermore, variations in GFCF or the labor force do not explain economic growth in the DRC. These results diverge from those of Outreville (1996), Haiss and Sümegi (2008), Ward and Zurbruegg (2000), and Beck and Webb (2003), who found that insurance premiums positively affect real GDP. These differences may stem from the types of data used and the specific insurance products considered. Most of these authors utilized panel data and/or life insurance products, which is not the case here.

Regarding the long-term relationship, the results affirm that the labor force and insurance premiums contribute positively to real GDP in the DRC. However, this contribution from insurance premiums remains weak, with a 0.20% increase in the growth rate for a 1% rise in premiums. In contrast, economic growth increases more with the rise in the labor force, showing a 2.9% increase for a 1% increase in the labor force. The analysis of the decomposition of real GDP variance reinforces these findings, demonstrating that insurance premiums contribute only 0.27% to variations in real GDP, whereas GFCF and the labor force contribute 1.05% and 9.94%, respectively. These results align with those found by Mutombo (2021) and Mukeba and Mbuyi (2019), who also identified a long-term positive relationship between insurance premiums and GDP in the DRC. Additionally, these results

corroborate the study by Iyodo et al. (2018), which found that, in the long term, the labor force captured by the active population positively enhances economic growth.

Secondly, the estimation of the ITSA model allowed for verification of the impact of the liberalization of the insurance sector on economic growth in the DRC. By considering GFCF and the labor force as control variables, it was found that only investments and insurance premiums positively affect economic growth in the DRC. This outcome coincides with the findings of Outreville (1996), Haiss and Sümegi (2008), Ward and Zurbruegg (2000), and Beck and Webb (2003).

However, liberalization does not exhibit significant effects. The impact of liberalization on economic growth is therefore not yet felt. This result contrasts with those found by Lumbala (2020) and Kayembe (2018), who found that liberalization positively impacted economic growth by stimulating new market entries. This discrepancy may arise from several factors: 1) the temporality of this study, which applied quarterly disaggregation; 2) the ITSA model used is much more robust than a simple dummy variable integration used by the previously mentioned authors.

Through these results, several implications can be drawn to enable the DRC to benefit from the liberalization of the insurance sector and enhance its insurance market aimed at economic growth. These include:

- Enhancing productive investments: Encourage insurance penetration (temporary subsidies, tax incentives) to stimulate investments in a risk-laden economy.
- Need for a regulatory framework: To maintain the financial soundness of insurers (avoid systemic risks), improve insurers' ability to mobilize savings for productive investments, which also depends on prudential rules, taxation, and incentives to channel funds toward infrastructure and businesses.
- Investment financing: Encourage robust capital markets to enable insurers to invest locally.
- Develop insurance products tailored to SMEs to reduce financing constraints. Regulate coordination between banks and insurance companies to avoid regulatory arbitrage and strengthen productive financing.
- Joint macroprudential oversight of banks and insurance by encouraging partnerships (securitization) while managing systemic risks.
- Strengthening institutions (market supervision, contract protection) and financial education programs.

6. Conclusion

This study focuses on the insurance sector in relation to economic development in the Democratic Republic of Congo over the period from 2000 to 2023. The primary objective was to assess the contribution of the insurance sector to economic growth in the DRC.

In summary, the empirical analysis conducted highlights the weak structural

integration of the insurance sector within the economic dynamics of the DRC. Although the labor force, captured by the active population, gradually appears as a factor explaining GDP, the sector-specific variable, such as insurance premiums, still exerts a limited influence on economic activity. These results reflect the weak embedding of insurance within the national economic fabric, often characterized by informality and a low risk coverage culture. For this sector to become a true catalyst for development, profound reforms are necessary: enhancing financial inclusion, raising public awareness, providing tax incentives, and strengthening regulation. Strengthening the link between insurance and economic growth remains a strategic challenge for the future of the DRC.

It is noteworthy that if premium collection is very low (low penetration), insurers do not accumulate sufficient resources to significantly finance investment, leading to insufficient economic growth. A notable observation in the DRC is that the majority of workers and investors operate informally (with no access to standard insurance products), meaning that the risk transferred by the insurance sector does not reach key economic agents (informal SMEs, smallholders). Moreover, even if premiums exist, their reinvestment may be directed toward low-productivity activities, and if insurers do not invest in the productive domestic economy, there will be no effect on economic growth.

Finally, the results obtained contain some limitations, particularly concerning certain unaccounted factors; it is possible that other socioeconomic and political factors also influence the development of the insurance sector and the economy in the DRC, which were not included in our study, such as (insurance consumer behaviors, risk management by insurers, financial education, political stability, and institutional factors).

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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