BULLETIN OF
CZECH ECONOMETRIC SOCIETY
www.bulletin-ces.cz
ISSN 1212-074X | VOLUME 33 | ISSUE 1 | 2026

The Impact of External Factors on the Financial Performance of Insurance Companies in Algeria: A Case Study of the National Insurance Company (SAA) in the Period from 2020 to 2024

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Received: 03/08/2026
Accepted: 22/10/2026
Published: 19/11/2026
https://doi.org/10.5281/zenodo.24360302

Abstract: This study examines the association between selected macroeconomic indicators and financial performance at Société Nationale d'Assurance (SAA), with attention to the Ouargla case over 2020–2024. A retrospective quantitative analysis was conducted using five annual observations and descriptive statistics and Pearson correlations calculated in EViews. Financial performance is represented by an indicator labelled return on assets (ROA), while the explanatory variables are gross domestic product (GDP), inflation, unemployment and the interest rate. The interest-rate indicator exhibits a strong inverse correlation with the recorded financial-performance series ($r = -0.968$, nominal $p = .0068$). GDP is positively correlated with that series ($r = .568$, $p = .3179$), whereas inflation ($r = -.244$, $p = .6927$) and unemployment ($r = .125$, $p = .8416$) exhibit weak and statistically inconclusive correlations. The results reveal contemporaneous associations but cannot substantiate independent causal effects: a four-predictor regression with an intercept has no residual degrees of freedom when based on five observations. In addition, the calculation scale of ROA and certain macroeconomic units require verification against the corresponding accounting and statistical records. The study identifies potentially relevant macro-financial exposures, highlights data and identification constraints, and recommends a longer insurer-level panel and consistently defined performance measures for subsequent investigation.

Keywords: Algerian insurance sector; SAA; financial performance; return on assets; interest rate; inflation; gross domestic product; unemployment.

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ISSN 1212-074X | VOLUME 33 | ISSUE 1 | 2026

JEL classification: G22; G32; E31; E43; C22.

1. Introduction

Insurance companies perform several interrelated economic functions. They pool and redistribute risks, compensate policyholders for covered losses and channel accumulated premiums into financial assets. Their operating results therefore depend not only on underwriting and claims management, but also on the broader economic environment in which households and firms purchase insurance and in which insurers invest technical reserves. A change in macroeconomic conditions may affect premium volumes, claims costs, asset valuations and investment income simultaneously. For this reason, the profitability of an insurer cannot be evaluated solely by examining its internal management practices.

The interaction between external conditions and firm performance is particularly relevant in economies where the insurance market is evolving under changing institutional, technological and monetary conditions. Algeria provides a useful setting. Its insurance industry contains longstanding public insurers alongside other market participants, and its business conditions remain connected to fluctuations in purchasing power, economic activity and financial-market returns. Recent research on the Algerian market highlights both gradual structural change and the growing importance of digital transformation and product diversification (Benahmed & Mwaniki, 2024). Nevertheless, sector-wide trends do not automatically reveal how a particular insurer responds to a given change in inflation, unemployment or interest rates.

This investigation focuses on Société Nationale d'Assurance (SAA), with the Ouargla regional directorate providing the institutional setting for the case. The analysis covers the five years from 2020 through 2024, encompassing the economic disruption associated with the COVID-19 pandemic and subsequent changes in inflation and financial conditions. Financial performance is represented by a recorded return-on-assets (ROA) indicator, while the wider economic environment is assessed through GDP, inflation, interest rates and unemployment. The research adopts a retrospective quantitative design in which observed annual movements are described and the corresponding bivariate relationships are examined.

The central research question is: what patterns of association are observable between macroeconomic conditions and SAA's recorded financial-performance indicator during 2020–2024? Four subsidiary questions address the direction and magnitude of the correlations involving GDP, inflation, unemployment and the interest rate. The analytical distinction between association and causal influence is important. With only five annual records, a correlation can describe co-movement in the observed sample, but cannot establish that a particular macroeconomic variable independently caused a change in profitability. Accordingly, the multivariable specification is assessed for statistical feasibility before any inferential interpretation is attempted.

The study makes three contributions. First, it organizes the five-year macroeconomic indicators and financial-performance statistics into a transparent descriptive and correlational account. Second, it interprets the observed relationships in light of insurer-specific transmission channels identified in

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Algerian and international research, including underwriting costs, premium demand and investment income. Third, it critically assesses the statistical and measurement conditions under which the findings can be interpreted, providing a basis for improved future empirical designs. Methodological transparency is therefore integral to the analysis rather than merely a qualification attached to its conclusions.

2. Conceptual and Empirical Background

2.1. Insurance operations and the meaning of financial performance

Insurance is based on the distribution of uncertain losses across a pool of insured risks. In exchange for premiums, an insurer assumes defined liabilities and meets valid claims subject to the contractual terms. Its business model consequently differs from that of an ordinary non-financial firm: profitability depends on underwriting discipline, the frequency and severity of claims, operating expenses, reserving practices and the management of invested assets. Financial performance must therefore be analysed against both the income statement and the balance sheet.

Return on assets is a widely used profitability indicator because it relates financial results to the asset base employed to generate them. In a conventional formulation, ROA equals net income divided by average total assets, sometimes multiplied by 100 when expressed as a percentage. Insurer studies also employ pre-tax operating earnings or alternative definitions, so the numerator and denominator should be disclosed precisely. ROA is attractive for comparing entities with different leverage, but it is not a complete measure of insurance performance. The combined ratio, claims ratio, expense ratio, investment yield and solvency measures capture additional aspects of underwriting efficiency and resilience (Siopi & Poufinas, 2023).

The financial-performance series examined in this study is labelled ROA and ranges from 87.96992 to 260.00000, with a five-year mean of 164.0072. The available calculation record does not establish the numerator, denominator or reporting scale with sufficient precision to regard these figures as verified percentages. Consequently, the recorded values are retained as an "ROA-labelled" indicator rather than being rescaled without evidence. This limitation does not change Pearson correlations under a positive linear rescaling, but it restricts interpretation of profitability levels and the economic magnitude of the associations. Confirmation against SAA's annual financial statements remains necessary to establish a valid, comparable ROA series.

The organizational level of measurement also requires careful consideration. Although the investigation is situated in the Ouargla regional directorate, the available accounting documentation does not establish unambiguously whether the recorded performance figures apply to the national company or a specifically defined regional unit. The empirical case is therefore identified as SAA in the Ouargla setting, with the financial reporting perimeter remaining a measurement limitation. A consolidated corporate profitability ratio must not be interpreted as a regional-branch outcome without a reconciliation of the relevant accounting statements.

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2.2. Gross domestic product and insurance demand

GDP captures the scale of production and economic activity within a country. Stronger activity can expand insurable assets, transport operations, business investment and household income, thereby increasing demand for insurance. Commercial clients may acquire more property, vehicles and equipment, while individuals may have a greater ability to purchase voluntary coverage. Higher sales volumes can support administrative efficiency when premium growth exceeds the incremental costs of acquisition and claims.

The pathway from GDP to profitability is nevertheless conditional. A rise in nominal GDP may partly reflect price increases rather than stronger real activity. Economic expansion may also enlarge insured exposures and the value of claims. Premium pricing, loss experience and product mix determine whether additional business improves returns on assets. The GDP series used in the present analysis increases from 19.00 in 2020 to 36.10 in 2024, but its unit and deflator are not identified in the available variable documentation. The series can therefore be described as increasing, but it cannot be treated as a validated measure of real economic growth.

Comparative studies frequently find a positive GDP–profitability relationship, although findings differ by market and methodology. In an Algerian analysis of eight insurance firms over 2005–2018, Zaoui et al. (2022) reported a positive relationship between GDP and profitability. Saleh and Derbali (2020) also identified a favourable GDP association in a panel of UK insurers. These studies are informative points of comparison; their larger data structures, however, cannot be regarded as independent confirmation of the present five-year correlation.

2.3. Inflation and underwriting profitability

Inflation denotes sustained increases in the general price level and a reduction in the purchasing power of money. For a non-life insurer, price pressures may raise vehicle-repair costs, medical expenses, replacement values and legal or administrative costs associated with claims. If premiums or policy terms cannot be revised promptly, claims inflation can compress underwriting margins. Inflation may also weaken the affordability of optional insurance products, altering policy renewal rates and the composition of the insured portfolio.

Inflation may affect the investment side differently. Some financial assets produce nominal returns that move with market rates, whereas fixed-income holdings can suffer valuation changes when inflation expectations and discount rates rise. Insurer-specific outcomes depend on the duration of assets and liabilities, the treatment of reserves, investment strategy and the pace at which higher prices reach premium tariffs. For these reasons, neither a uniformly negative nor a uniformly positive inflation coefficient can be assumed across contexts.

The international literature illustrates this heterogeneity. Siopi and Poufinas (2023) identified a negative association between inflation and profitability for a sample of EU insurance groups. By contrast, the UK study of Saleh and Derbali (2020) reported a positive association involving the consumer price index, while Zaoui et al. (2022) did not find a statistically significant inflation effect in their Algerian sample. These differences reinforce the need to specify the pricing environment,

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portfolio composition and measurement interval before translating a sample correlation into a general conclusion.

2.4. Interest rates, investment income and valuation risk

Interest rates occupy a distinctive position in insurer profitability because they can affect assets and liabilities in opposing directions. Higher interest rates may improve the yield available on new deposits and fixed-income purchases. At the same time, rising yields reduce the market value of existing fixed-rate bonds and may increase financing costs or affect policyholder behaviour. For longer-duration insurance obligations, changes in the discount rate can also alter the measured present value of liabilities. The net effect depends on asset–liability matching, accounting rules, the maturity of investments, liquidity needs and the mix of insurance products.

As a result, a negative empirical relationship is plausible but is not universal. Saleh and Derbali (2020) reported a negative interest-rate association in their UK sample. Conversely, Siopi and Poufinas (2023) found that long-term interest rates were positively associated with profitability in the EU groups they examined. These apparently conflicting results need not indicate a theoretical contradiction: the papers examine different markets, interest-rate definitions and business models. Indeed, the measurement of the rate itself matters; a short-term lending rate, monetary-policy rate and long-term government bond yield represent different mechanisms.

The interest-rate series used in this analysis takes values of 13.30, 6.80, 12.10, 6.90 and 4.50 over the five years. The accompanying metadata do not identify the indicator code or establish whether these observations represent a nominal, real, lending or monetary-policy rate. The variable is therefore treated as the recorded interest-rate indicator, without attributing it to a more specific monetary instrument. Its co-movement with the ROA-labelled series can be estimated, but the economic transmission mechanism remains uncertain until the exact statistical definition is verified.

2.5. Unemployment and household insurance expenditure

Unemployment may influence insurers through household income, consumer confidence and demand for discretionary cover. When unemployment rises, some households postpone purchases of life, health or additional property protection, while financially constrained businesses may reduce insured assets or seek lower-cost policies. The effects are likely to differ across product categories and need not follow a single annual pattern.

Compulsory coverage can weaken the immediate connection between unemployment and premium income. Motor third-party liability insurance, for example, may remain necessary even when consumers reduce optional spending. Moreover, unemployment statistics do not fully capture informal activity, regional purchasing power or the financial circumstances of existing policyholders. These considerations provide plausible explanations for a weak relationship, although the present dataset does not contain the product-level and household-level measures needed to test them directly.

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A notable result in Zaoui et al. (2022) is a positive unemployment association in their larger Algerian insurance sample. It should not be read as proof that unemployment improves insurance profitability, nor does it justify expecting the same sign for every company. More extensive models that control for product mix, business cycle conditions and time trends are required to determine whether unemployment offers incremental explanatory value beyond other macroeconomic variables.

3. Algerian Insurance Market and SAA Case Context

The Algerian insurance market has developed through distinct periods of state involvement, specialization and market opening. According to Benahmed and Mwaniki (2024), reforms and the emergence of new insurance practices have diversified the market, while the pandemic accelerated discussion of digital distribution and modernization. Established public insurers continue to play a substantial role alongside other providers of general, life and specialized insurance. Najafi (2018) likewise shows how political, economic, social and technological factors can shape the operating environment of insurers. The structure of the market matters because a company's exposure to macroeconomic shocks is shaped by the coverage it underwrites, its distribution network and the investment rules governing its resources.

SAA is one of Algeria's longstanding insurance institutions, established in 1963, and operates through a network of local and regional entities. In this study, the Ouargla regional directorate supplies the organizational context for examining the company's exposure to wider economic conditions. It is nevertheless important to distinguish regional service delivery from consolidated corporate accounting. A distribution network may respond to regional demand and purchasing power differently from the company's national investment portfolio and balance-sheet results. The available data do not isolate these two levels of operation.

The Algerian insurance market experienced changing business conditions between 2020 and 2024, including the disruption of 2020 and subsequent recovery in economic activity. Sector-level premiums, however, are not included as a verified annual monetary series in the present analysis because the available turnover records employ inconsistent labels and units. The discussion therefore uses the market environment only as contextual information rather than making unsupported numerical claims about total sector revenue or company-specific profitability.

Contextual interpretation should therefore avoid three common confusions. First, a national macroeconomic indicator is not a local Ouargla variable simply because the case study is geographically based there. Second, growth in total industry premium volume is not equivalent to an increase in SAA profitability. Third, stronger accounting ROA is not necessarily evidence of enhanced risk-adjusted solvency. A convincing empirical analysis would measure regional business generation, national profitability and industry-level conditions separately, even when the three series are examined within one explanatory framework.

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4. Materials and Methods

4.1. Research design and observation window

This research employs a retrospective, exploratory quantitative case-study design to examine SAA in the context of its Ouargla regional directorate. The observation period extends from 2020 to 2024, providing five annual records for the financial-performance indicator and the four macroeconomic variables. The unit of temporal analysis is the calendar year. The principal objective is to describe observed co-movement between economic conditions and financial performance, rather than to estimate the effect of an externally assigned intervention.

The dataset comprises one financial-performance indicator and four contemporaneous macroeconomic indicators. Macroeconomic figures were assembled with reference to national and international statistical information, including World Bank series, while the insurer-related information was associated with financial reporting and commercial-register materials. The available dataset, however, does not include a complete reproducibility record of database indicator codes, exact financial-statement line items or retrieval dates. This limitation is disclosed rather than resolved through assumptions. Annual values, descriptive statistics and correlations are presented below as the five-year analytical dataset and accompanying statistical outputs.

4.2. Variables and operational definitions

The dependent variable, ROA, is used as the available indicator of financial performance. Under conventional accounting practice, return on assets relates profit to an asset base; however, the scale of the recorded series remains to be verified. Unemployment (CHOM) and inflation (INF) are annual national macroeconomic rates; interest rate (INT) is retained in its recorded numerical scale. GDP is treated as the observed national output indicator. As shown by the World Bank's (n.d.) metadata, GDP may be expressed in current or constant prices and in different currency units. Because the exact definition of the series used here is not documented, its magnitude must not be converted into a definitive monetary or real-growth interpretation.

The hypothesized relationships are conceptually directional but are evaluated empirically as two-sided associations. H1 anticipates a positive association between GDP and profitability as an expression of stronger economic activity. H2 anticipates a negative association between inflation and profitability through increased claims and operating costs. H3 treats the unemployment association as potentially negative through reduced purchasing power, but recognizes competing channels. H4 does not impose a universal sign for interest rates because the net result of yield and valuation effects is theoretically ambiguous. These hypotheses reflect economic expectations rather than assumptions of causality.

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Table 1. Variable definitions and measurement status

Variable	Abbrev.	Role in analysis	Measurement status
ROA-labelled performance	ROA	Outcome	Definition and scale not fully specified; original values retained
Gross domestic product	GDP	Macroeconomic correlate	Unit and nominal/real classification not specified
Inflation	INF	Macroeconomic correlate	Reported annual rate; exact indicator code unavailable
Interest rate	INT	Macroeconomic correlate	Type of rate and source code not stated
Unemployment	CHOM	Macroeconomic correlate	Reported annual rate; exact indicator code unavailable

Note. The uncertainties summarized in the table reflect gaps in the accompanying variable metadata; no undocumented measurement definitions are assumed.

4.3. Analytical strategy and feasibility of regression

To organize the research hypotheses, the following conceptual multiple-regression model is considered: $Y_t = \beta_0 + \beta_1 CHOM_t + \beta_2 INF_t + \beta_3 INT_t + \beta_4 GDP_t + \varepsilon_t$, where t denotes year. It contains four predictors and an intercept, requiring five parameter estimates. With five annual observations, the residual degrees of freedom equal $n - (4 + 1) = 0$. Even if the design matrix has full rank and permits an algebraically exact fit, independent residual variance cannot be estimated and conventional coefficient standard errors, t statistics, confidence intervals and an overall F test are unavailable. The analysis therefore does not claim that this model establishes statistically significant independent macroeconomic effects.

The feasible empirical strategy is correspondingly descriptive and bivariate. Annual macroeconomic observations, summary statistics and Pearson correlation coefficients are presented alongside the two-sided p values calculated in EViews. The coefficients describe marginal contemporaneous associations for the five observed years. Nominal p values are reported transparently but not interpreted as evidence of causal influence. Their usual statistical interpretation assumes independence and appropriate distributional conditions that cannot be reliably established with such a short annual series. Multiple comparisons, shared trends and potential temporal dependence introduce further uncertainty.

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Jarque–Bera statistics were also calculated for the five annual observations of each series. Although the corresponding probabilities exceed .05, a failure to reject normality with five data points provides little assurance about the population distribution because the test has extremely limited power. These probabilities are consequently presented descriptively and do not validate the proposed multivariable regression. No synthetic observations, unreported coefficient estimates or expanded time series are introduced.

4.4. Transparency and data integrity

The analysis distinguishes the numerical observations and statistical outputs from interpretations of economic mechanisms. Data values in the tables are drawn from the five-year analytical records and the corresponding EViews descriptive and correlation calculations. The discussion situates these findings in the established literature without treating conceptual explanations as mechanisms demonstrated by the dataset. The reported associations and the scope of the financial and statistical documentation are described explicitly to support evaluation and reproducibility.

Full replication would require the exact ROA numerator and denominator; the accounting perimeter of the company or regional unit; GDP units and price basis; the definition and statistical code of the interest-rate measure; and source-linked annual observations. Any sector-turnover figures must likewise be reconciled before being incorporated into formal estimation. In the absence of this documentation, the contribution of the current analysis is an exploratory assessment of a fixed five-year dataset rather than a demonstration of independent econometric determinants.

5. Results

5.1. Evolution of the macroeconomic indicators, 2020–2024

Table 2. Annual macroeconomic observations, 2020–2024

Year	Interest rate	Unemployment	Inflation	GDP*
2020	13.30	11.70	4.00	19.00
2021	6.80	13.70	7.20	25.15
2022	12.10	12.40	9.30	32.03
2023	6.90	11.60	9.30	33.68
2024	4.50	11.70	4.00	36.10

*Note. Annual values used in the analysis. *GDP is shown in the recorded but unspecified scale; the exact interest-rate definition remains unverified. These entries should not be confused with independently reconstructed World Bank series.*

The annual profiles reveal different forms of variation. The interest-rate series fluctuates sharply: it declines from 13.30 in 2020 to 6.80 in 2021, rises to 12.10 in 2022 and falls again to 4.50 by 2024. This non-monotonic path is important because the exceptionally strong inverse correlation

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with the ROA-labelled measure cannot be explained merely by a simple, steadily falling rate. The five years nevertheless do not allow an assessment of whether shifts in interest rates precede, follow or occur simultaneously with changes in accounting performance.

Unemployment changes over a comparatively narrow interval, from 11.60 to 13.70, with its maximum in 2021. Inflation rises from 4.00 in 2020 to 9.30 in 2022 and remains at that recorded level in 2023 before returning to 4.00 in 2024. These patterns could influence insurance activity through affordability and claim severity, but the temporal sequence alone does not demonstrate a relationship with SAA profitability. The recorded GDP series grows monotonically from 19.00 to 36.10. Because its units and price basis are unidentified, the safe descriptive claim is that the numerical series increases, not that real national output increased by the same percentage.

These distinct trajectories also explain why a short sample is insufficient for structural conclusions. A single high- or low-performing year may have considerable leverage in a five-point correlation. The 2020 observation potentially reflects extraordinary pandemic-related conditions, while 2022–2023 may capture inflationary changes common to several economic series. Without a longer history, one cannot separate transient macroeconomic shocks from changes in SAA's product mix, reporting conventions, reserve accounting or operational decisions.

5.2. Descriptive statistics of the five variables

Table 3. Descriptive statistics (five annual observations)

Statistic	ROA*	CHOM	INF	INT	GDP
Mean	164.0072	12.2200	6.7600	8.7200	29.1920
Median	168.1159	11.7000	7.2000	6.9000	32.0300
Minimum	87.9699	11.6000	4.0000	4.5000	19.0000
Maximum	260.0000	13.7000	9.3000	13.3000	36.1000
SD	71.0675	0.8871	2.6614	3.7818	7.0023
Skewness	0.2061	1.0922	−0.1363	0.2399	−0.5551
Jarque–Bera	0.4154	1.0326	0.6596	0.5855	0.5596
JB p	0.8125	0.5967	0.7191	0.7462	0.7559
n	5	5	5	5	5

*Note. EViews descriptive statistics for the five observed years. *The ROA-labelled series is reported in its recorded scale, not as verified percentage values. Jarque–Bera statistics are descriptive and do not establish normality.*

The mean of the ROA-labelled series is 164.0072, with a standard deviation of 71.0675 and an observed range from 87.9699 to 260.0000. These values indicate substantial movement in the recorded outcome across years, but the absence of a confirmed ROA formula prevents comparison with conventional insurer profitability benchmarks. Interpreting 164.0072 as 164 per cent ROA would be especially problematic, and this article does not do so.

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The mean unemployment rate is 12.22, with a relatively small standard deviation of 0.8871. The inflation series has a mean of 6.76 and a standard deviation of 2.6614, while the interest-rate series has a mean of 8.72 and a standard deviation of 3.7818. GDP has a mean of 29.1920 in the recorded but unidentified units. The distributional characteristics describe five observed values rather than stable population parameters. Such a limited sample is insufficient to estimate the tails or distributional properties of the variables with confidence.

For the same reason, the descriptive evidence cannot establish that SAA's performance was consistently satisfactory or improving. A high outcome in one year may result from unusual underwriting results, asset transactions or accounting entries. Reliable financial assessment would require year-by-year scrutiny of net income, average total assets, technical provisions and investment results, in addition to the headline ROA indicator.

5.3. Pairwise associations with the financial-performance indicator

Table 4. Correlations with the ROA-labelled indicator

Macroeconomic indicator	Pearson r	Reported p	Exploratory interpretation
Interest rate (INT)	−0.968058	.0068	Strong inverse association
GDP	0.567925	.3179	Moderate positive association
Inflation (INF)	−0.243787	.6927	Weak inverse association
Unemployment (CHOM)	0.124696	.8416	Very weak positive association

Note. Pearson correlations calculated in EViews (n = 5 for each pair). The nominal, two-sided p values are associated with bivariate tests and must not be interpreted as multivariable regression probabilities.

The largest absolute correlation is between the recorded interest-rate series and the ROA-labelled indicator (r = −0.968058). This is a striking inverse pattern within the five observations: the years with lower values of INT tend to coincide with higher values of the performance series. The associated reported p value is .0068. Under the conventional small-sample Pearson test, that value is below .05, but such an inference rests on assumptions that cannot be adequately evaluated in the present design. It should therefore be described as a nominally significant correlation, not proof of a robust interest-rate effect.

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GDP displays a moderate positive correlation with the outcome (r = 0.567925), consistent in sign with the conceptual expectation that stronger economic activity may support insurance demand and earnings. Yet the corresponding reported p value (.3179) provides no basis for rejecting a null correlation at the .05 level. The descriptive direction should be distinguished from a demonstrated relationship in the wider population. The positive sign alone does not support acceptance of a hypothesis of statistically significant impact.

The inflation correlation is weakly negative (r = −0.243787, p = .6927), while unemployment is very weakly positive (r = 0.124696, p = .8416). Both estimates are imprecise and could be strongly affected by individual years. The modest unemployment result should not be interpreted as evidence that unemployment improves insurer profitability; it simply describes a negligible positive co-movement within the small sample. Similarly, the negative inflation coefficient accords with a plausible claims-cost mechanism, but it offers little direct evidence about the size or existence of that mechanism at SAA.

The full correlation matrix also indicates a negative association between INT and GDP (r = −0.629178, nominal p = .2555). This overlap further complicates attempts to isolate their separate contributions to financial performance. More generally, macroeconomic indicators are not independent experimental treatments: they can respond jointly to monetary decisions, external shocks and structural economic developments. Estimating partial associations would require a substantially larger dataset and sufficient information to account for these dependencies.

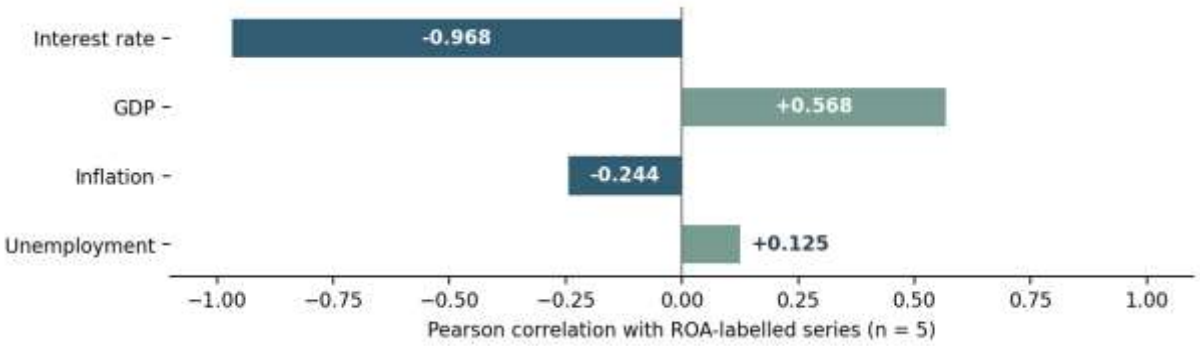

Figure 1. Direction and magnitude of the four pairwise Pearson correlations.

Note. The diagram displays Pearson correlation coefficients for the five-year sample; the bars do not represent causal effects, regression coefficients or confidence intervals.

5.4. Assessment of the hypotheses

The four hypotheses are evaluated in terms of the direction and statistical strength of the available bivariate associations. For GDP, H1 receives directional support but no statistically significant evidence of correlation. For inflation, H2 is consistent in sign with the expected inverse association, although the reported p value is not significant. H3, concerning unemployment, is not supported in its proposed negative direction, and the estimated relationship is close to zero. The interest-rate

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relationship associated with H4 is the most pronounced and yields a nominally significant negative Pearson coefficient. These assessments do not demonstrate independent effects: the four-predictor model lacks the residual degrees of freedom needed for valid inferential estimation.

Hypothesis evaluation must distinguish the sign of a correlation from its statistical strength. A positive or negative coefficient is not, by itself, grounds for accepting a hypothesis about statistically significant influence; nor does correlation establish causality. Of the four nominal bivariate tests, one yields $p < .05$ and three do not. The broader proposition that the external indicators jointly exert independently identifiable effects cannot be tested with the available five observations and four-predictor specification.

Table 5. Evidence-based interpretation of the four propositions

Proposition	Observed sign	Source p	Inference supported by the dataset
H1: GDP–performance	Positive	.3179	Direction observed; statistical hypothesis not supported
H2: Inflation–performance	Negative	.6927	Direction observed; statistical hypothesis not supported
H3: Unemployment–performance	Positive	.8416	Very weak association; no support for expected negative sign
H4: Interest rate–performance	Negative	.0068	Strong nominal bivariate association; causal effect not established

Note. The statements concern bivariate evidence. Neither a full regression nor independent partial effects are inferred.

6. Discussion

6.1. Why the interest-rate relationship is prominent

The unusually strong inverse INT–ROA correlation is the most salient empirical feature of the study. One possible interpretation is that adverse financing and valuation effects dominate potential benefits from reinvesting premiums at higher yields. When interest rates rise, insurers holding fixed-rate securities may experience downward market-value adjustments. Borrowing or working-capital costs may increase, and financial conditions can influence insurance demand indirectly. If SAA's reported profitability is sensitive to such channels, the negative correlation is economically intelligible.

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The available observations do not establish which interest-rate mechanism explains the inverse correlation. Asset maturities, investment-income schedules and a decomposition of underwriting versus investment earnings are unavailable. It is also possible that the recorded interest-rate indicator reflects a different monetary concept from the one assumed in a particular theoretical explanation, since real and nominal rates may move differently during inflationary periods. Confounding by shared annual shocks, exceptional accounting entries or changes in business composition remains plausible. These alternatives must be assessed before recommending managerial decisions based on the sign of the coefficient.

The comparison with international research illustrates the same point. Saleh and Derbali (2020) found an unfavourable interest-rate relationship for UK insurers, while Siopi and Poufinas (2023) reported a positive association for EU insurance groups using long-term rates. The two findings can coexist if insurers differ in asset duration, liabilities, accounting standards, product portfolios and national interest-rate regimes. The SAA study offers a local descriptive observation, not a decisive test between the competing mechanisms.

6.2. GDP and the limits of interpreting aggregate growth

The positive GDP–ROA correlation may reflect the intuitive relationship between economic activity and insurance business. Improved production, commercial transactions and household purchasing power can create new insurable assets and increase demand for coverage. In that respect, the sign is compatible with the positive GDP findings reported by Zaoui et al. (2022) in Algeria and Saleh and Derbali (2020) in the UK. It is also compatible with the argument that insurers benefit indirectly from stronger private-sector activity when premiums and investment opportunities expand.

Nevertheless, the available evidence does not quantify the channel. The GDP series may be nominal, and any increase attributable to inflation cannot automatically be treated as improved real purchasing power. Furthermore, the SAA profitability measure does not provide separate observations for premium growth, underwriting expenses or asset income. A positive correlation could therefore reflect a shared time trend or unrelated company-level changes. The effect of GDP on insurance demand might also differ between firms insuring large commercial risks and those serving predominantly households.

An improved future model would distinguish nominal GDP levels from real GDP growth, preferably using real growth and sector-relevant measures such as non-hydrocarbon activity, real disposable income or investment demand. Regional variations in employment and business activity could also be matched to branch-level premium data. Such an approach would address the scale mismatch between a nationwide macroeconomic predictor and a case study institutionally situated in Ouargla.

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6.3. Inflation, unemployment and potentially offsetting mechanisms

The weak negative inflation correlation cannot be taken as evidence that inflation is economically irrelevant. Inflation may raise claim settlements and repair costs with a lag, while premiums may adjust only at renewal. If the insurer benefits from nominal premium increases or investment returns at the same time, the contemporaneous net correlation can be small even when individual operational channels are substantial. An insurer may also manage inflation exposure through policy terms, indexation arrangements, claims controls and changes in product mix.

Unemployment is likewise an imperfect macroeconomic proxy for the composition and purchasing power of an insurer's customers. Employment losses can constrain discretionary insurance purchases, while the portfolio may also include compulsory contracts, institutional clients and households less directly affected by national unemployment fluctuations. The observed association is slightly positive but close to zero. Compulsory insurance may contribute to stability in policy demand, but this explanation remains untested because the available records do not distinguish premium shares by product line.

The broader literature demonstrates why results need not be homogeneous. Zaoui et al. (2022) found an association for unemployment but no significant inflation effect in a multi-insurer Algerian sample. Jaishi and Poudel (2025), analysing Nepalese listed insurers with a larger firm-year dataset, reported mostly insignificant associations between major macroeconomic variables and ROA or ROE. Market segmentation, sample size and model specification can therefore produce different patterns even when the underlying economic channels remain conceptually plausible.

6.4. What the short time series can and cannot establish

A defining methodological feature of this case is that four potentially interrelated macroeconomic series are observed for only five years. The full model's zero residual degrees of freedom prevents meaningful regression inference. Any software output that fitted all five observations exactly would be a consequence of model saturation rather than evidence of predictive validity. Good in-sample fit under these circumstances would not translate into a credible economic relationship or a usable forecast.

The pairwise coefficients are vulnerable to instability. Excluding just one year would leave only four data points; major economic events may have effects persisting across years; and an apparent relationship between two variables may partly reflect shared movement with a third. Without more frequent accounting records, a longer annual period or a panel of insurers, these uncertainties cannot be resolved. The analysis therefore refrains from introducing unsupported sensitivity estimates or treating the reported coefficients as stable structural parameters.

These limitations are not a reason to discard the descriptive evidence. The correlations do identify a promising question for further investigation: why did the reported SAA performance indicator and the recorded interest-rate series move in opposite directions over the selected period? The

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distinction is between identifying a researchable pattern and explaining its causes. Presented within that boundary, the evidence can motivate future work and provide a transparent benchmark against which more robust estimates may be assessed.

7. Implications for Insurance Management and Policy

For managers, the practical implication is not that a particular macroeconomic indicator has been proven to control profitability. It is that the insurer's financial reporting should make external sensitivities observable. A systematic monitoring framework could track the relationship between claim inflation, premium repricing, investment yields, interest-rate duration and product-specific profitability. Such a framework would help distinguish changes in underwriting results from changes in financial income and would allow management to evaluate whether asset–liability mismatches create exposure to movements in market rates.

Inflation management should connect pricing reviews with actual claims experience. In branches where replacement and repair costs rise rapidly, the frequency of tariff reassessment may be as important as the reported national consumer price index. Claims-cost indicators broken down by vehicle, property and other insured lines would provide a more direct view of inflation transmission. Where competitive or regulatory constraints slow price adjustments, underwriting and expense controls become especially important.

Investment risk management deserves attention because the observed correlation identifies interest rates as an informative variable for subsequent investigation. A firm can assess the duration and liquidity of its invested assets, perform interest-rate stress scenarios and evaluate the consistency of its asset mix with the timing of insurance liabilities. Yet specific portfolio reallocation cannot be justified from the present correlation alone. Such decisions require current exposure data, solvency constraints and professional assessment of the balance between risk and expected return.

At the policy level, consistent public reporting would materially improve the evidence base for Algerian insurance research. Comparable annual figures for insurer premiums, claims, investment income, net earnings, assets and capital, together with clear national macroeconomic series, would permit longer panels and stronger empirical designs. For a regional analysis, branch-level premiums and claims should be matched with regionally relevant employment and activity measures rather than relying exclusively on national aggregates. A clear record of source definitions and revision dates would also reduce the risk that changes in statistical methodology are mistaken for economic movements.

Digitalization, product diversification and greater public awareness also merit consideration in the Algerian insurance market (Benahmed & Mwaniki, 2024). These strategies could expand access to coverage, improve operating efficiency and support sustainable premium development. Their effects, however, cannot be established by the macroeconomic correlations presented in this paper and would require distinct indicators and suitable evaluation designs.

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8. Limitations and Directions for Further Research

Several limitations determine the strength of the study's conclusions. The first is temporal coverage: five annual observations permit basic description but not credible estimation of a four-predictor regression. Future research should extend the time series substantially or use a panel of multiple insurers observed over a sufficiently long period. Larger samples would allow controls for insurer size, liquidity, leverage, business mix and regulatory changes, and they would permit diagnostics for serial correlation, non-stationarity and model specification.

The second is measurement. The ROA-labelled values and their unit require reconciliation with audited financial statements. The analyst should specify whether the denominator is end-of-year or average total assets, whether the numerator is net profit after tax or operating profit, and whether the resulting series is expressed as a decimal or percentage. The same discipline is needed for GDP (currency, scale, nominal/real prices) and the interest-rate variable (short-term, lending, policy, real or nominal). Because these choices affect economic interpretation, they should be resolved before formal econometric modelling.

Third, the case's institutional boundary requires clarification. The Ouargla regional directorate provides the organizational context, but the accounting records available for analysis do not demonstrate its exact contribution to the ROA series. Future research should distinguish consolidated company profitability from regional branch performance, preventing attribution of nationwide investment results to local economic activity. Fourth, sector-turnover figures with inconsistent reported units should be reconciled with authoritative industry or company reporting before quantitative use.

Fifth, the four macroeconomic variables are not the only potential determinants. Premium composition, the claims ratio, reinsurance arrangements, operational costs, investment portfolio allocation, governance and changes in regulation may all affect profitability. Their exclusion raises the possibility of omitted-variable bias. Even with more observations, an association model would not automatically identify causality; researchers would need a plausible identification strategy, appropriately timed predictors and sensitivity analysis to alternative explanations.

A promising extension would involve an annual panel of Algerian insurers with verified ROA and return on equity, differentiated between life and non-life business, and connected to real GDP growth, clearly defined interest rates and inflation. Event-based analyses of monetary shifts or inflationary episodes might help assess short-run transmission, while qualitative interviews with investment and underwriting managers could illuminate the mechanisms suggested by the numerical patterns. Releasing a transparent codebook and source-linked dataset would further increase the value of such work.

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9. Conclusion

This study examined the relationship between selected macroeconomic conditions and SAA's recorded financial-performance indicator over 2020–2024. The five annual observations show a strong negative Pearson correlation between the interest-rate series and the variable labelled ROA ($r = -0.968$, nominal $p = .0068$). GDP exhibits a moderate positive correlation, whereas inflation and unemployment display weak associations; none of these latter three coefficients is statistically significant in the reported bivariate tests.

The findings describe contemporaneous co-movement rather than independently established macroeconomic impacts. A regression containing four explanatory variables and an intercept cannot support conventional residual-based inference from five annual observations. Ambiguities concerning the ROA calculation and the measurement units of GDP and interest rates also restrict interpretation of economic magnitudes. These constraints should inform the reading of the results rather than be obscured by unwarranted causal claims.

The case nevertheless highlights a valuable line of inquiry for Algerian insurance studies. Financial performance should be examined jointly through underwriting, investment and macroeconomic channels, using consistent accounting definitions and datasets sufficiently extensive to distinguish transient association from systematic exposure. With those improvements, research can move from preliminary description towards reliable evidence capable of informing managerial decisions and public policy.

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