THE COMPLEX INTERACTION OF MACROECONOMIC AND FINANCIAL DETERMINANTS WITH PROPERTY INSURANCE PREMIUMS IN NORTH MACEDONIA: A DYNAMIC SHORT AND LONG-TERM ANALYSIS

Kristijan Kozheski
Teaching and Research Assistant at the Faculty of Economics – Skopje, Ss. Cyril and Methodius University in Skopje
kozeski@eccf.ukim.edu.mk

ABSTRACT

This study investigates the macroeconomic and financial determinants of property insurance premiums in North Macedonia, focusing on the significant role that factors such as gross domestic product (GDP), long-term loans, housing prices, and the number of building permits issued play in determining the demand for property insurance. Global research on property insurance remains limited, particularly regarding the influence of macroeconomic and financial variables. This study aims to fill this gap by analyzing both short-term and long-term impacts on property insurance premiums in North Macedonia using the Autoregressive Distributed Lag (ARDL) methodology and quarterly data from 2012 to 2023. The research finds that the expanding housing market and rising demand for insurance products are key drivers of premium volumes. Moreover, the findings reveal complex interactions between macroeconomic conditions, credit markets, and the real estate sector, underscoring the need for insurers to carefully manage these dynamics to achieve sustainable growth. The study's results offer valuable information for both policymakers and industry stakeholders as they seek to target such aspects on the Macedonian nonlife insurance market.

Keywords: Property Insurance, Macroeconomic Determinants, ARDL Model, Long-Term Loans, Housing Market, North Macedonia.

JEL classification: G22, E44, C32.

1. INTRODUCTION

In North Macedonia, insurance companies have increasingly become integral to the financial sector, contributing significantly to the country's economic stability and growth. The evolution of the insurance industry is intricately linked to the country's overall economic progress, illustrating the intrinsic connections between insurance operations and key macroeconomic and financial variables. In recent years, rising financial risks and escalating market uncertainties have resulted in notable increases in both insurance contract and premiums. Given this context, it is quite plausible to assume that besides microeconomic determinants, macroeconomic factors such as the gross domestic product (GDP), long-term loans, and the housing market trends play a crucial role in determining insurance premiums over time.

Despite extensive research on both life and nonlife insurance, empirical studies on property insurance remain relatively limited, particularly in the context of how macroeconomic factors influence this segment. Much of the existing literature on property insurance has concentrated on microeconomic and firm-specific determinants. This narrow focus on idiosyncratic factors leaves significant gaps in understanding how broader macroeconomic variables such as economic growth, credit markets, and real estate developments affect property insurance premiums. We can address this gap by examining the relationship between key macroeconomic and financial variables and property insurance premiums in North Macedonia. By considering factors such as GDP, long-term loans, housing prices, and the number of building permits issued, this research aims to provide a more comprehensive analysis of the macro-level drivers that shape property insurance demand in North Macedonia. The inclusion of these variables is particularly relevant for the still developing nonlife insurance market, where economic transitions and evolving financial structures can have pronounced impacts on the sector.

The empirical model developed in this paper investigates both the short-term and long-term impacts of several macroeconomic and industry-specific factors on property insurance premiums. The macroeconomic variables under consideration include GDP, long-term loans, the housing price index, and the number of dwellings with building permits issued. In addition, industry-specific indicators such as gross written premiums for property insurance, gross claims paid, and the number of contracts concluded for property insurance are incorporated into the analysis. The study employs the Autoregressive Distributed Lag (ARDL) methodology to capture both short-run and long-run dynamics within the insurance market. Through the Bounds Test for Cointegration, the existence of a long-run equilibrium relationship between the dependent and independent variables is assessed. To capture short-run adjustments while maintaining the long-term equilibrium, an Error Correction Model (ECM) is also estimated.

The expanding housing market and rising demand for insurance products play a crucial role in driving premium volumes. By exploring how key factors such as economic activity, credit conditions, and real estate development shape the demand for property insurance, offering a comprehensive analysis of both short-term and long-term effects. The findings underscore the complex interactions between macroeconomic variables and the insurance market, revealing that insurers must navigate these dynamics carefully to sustain growth while addressing the challenges posed by economic fluctuations and increased credit exposure.

The structure of the paper is as follows. Following this introductory section, Section 2 presents a comprehensive review of the relevant empirical literature, focusing on studies that explore the relationship between macroeconomic variables and insurance markets, with particular emphasis on property insurance. Section 3 details the data sources and outlines the methodological framework employed in the analysis. Section 4 provides a thorough discussion of the results obtained from the econometric models, interpreting the significance of the relationships between property insurance premiums and the macroeconomic and financial variables analyzed. Sections 5 and 6 present the implications on property insurance in North Macedonia and the concluding remarks, thus summarizing the key findings of the study.

2. LITERATURE REVIEW

The insurance industry, particularly property insurance, has garnered substantial attention in recent years due to its significant role in economic development and financial stability. Despite extensive research into life insurance (Browne & Kim, 1993; Beck & Webb, 2003; Fier & Liebenberg, 2013), the property insurance sector remains underexplored, especially concerning its interaction with macroeconomic factors and financial markets. This review provides a comprehensive overview of the key determinants of insurance premiums, focusing on the property insurance market within the context of financial markets, real estate development, and the broader macroeconomic environment, with an emphasis on European and emerging market economies.

The relationship between insurance markets and financial markets has been well-documented in economic literature, with several studies emphasizing the critical role financial markets play in the growth and performance of insurance companies (Outreville, 2015; Esho et al., 2004). Property insurance, which protects against damage or loss to assets, is intricately linked to the financial sector, as it is often tied to credit markets and real estate values. Outreville (2015) suggests that the development of financial markets, especially credit markets, increases the demand for insurance products, particularly property insurance, by enabling consumers and businesses to purchase assets that require insurance protection. Furthermore, this link between credit markets and property insurance has been further highlighted in the context of developing countries by (Sawadogo & Guerineau, 2016), who emphasize that financial market development stimulates insurance penetration. Their findings are consistent with the observation that as credit availability increases, so does the demand for insurance products to safeguard against risks associated with financed assets. In the case of emerging markets, Outreville (2012) discusses the complexities of this relationship, noting that in economies with less mature financial systems, credit expansion can sometimes outpace the insurance sector's ability to adequately assess and price risk.

Empirical studies examining the determinants of insurance premiums have employed various econometric methodologies, including time series analysis, panel data models, and vector autoregression (VAR). Browne & Kim (1993) used a panel data approach to examine the impact of macroeconomic variables on life insurance demand, while Beck & Webb (2003) extended this methodology to analyze both life and non-life insurance across multiple countries. Time series methodologies, such as the Autoregressive Distributed Lag (ARDL) model, have gained popularity for investigating the short-run and long-run relationships between insurance premiums and their determinants (Pesaran, Shin, & Smith, 2001). In the context of property insurance, the use of the ARDL model is particularly relevant, given its ability to capture both short-term dynamics and long-term equilibrium relationships between variables. Lee & Chiu (2012) employed an ARDL model to study the relationship between macroeconomic variables and insurance premiums, finding that economic growth, inflation, and interest rates significantly influenced insurance markets. In this study, the ARDL approach allows for an in-depth analysis of both short-run and long-run impacts of GDP, long-term loans, housing prices, and other factors on property insurance premiums in North Macedonia.

Necessarily, we ought to highlight the importance of several individual or environmental factors. Property insurance premiums are fundamentally shaped by insurers' risk assessments, which estimate the likelihood of future claims. Critical factors in these evaluations include a property's geographic location, construction type, age, value, and the presence of risk mitigation features like fire alarms or security systems. For insurers, accurately assessing these factors is essential to setting premiums that adequately reflect the risk while remaining competitive. Environmental risks such as Nat Cats associated with specific locations lead to higher claim frequencies and severities, as noted by Botzen and van den Bergh (2012). Clients, on the other hand, may experience increased premiums or reduced coverage options after filing claims, adding financial strain and potential dissatisfaction with their insurance providers. Individual behaviors and property characteristics also play a significant role in influencing claims. For example, Grace *et al*. (2004) used GLMs to reveal a significant positive correlation between property age and claim frequency, prompting insurers to adjust premiums accordingly. This complexity requires insurers to employ sophisticated risk models to price policies accurately, which can lead to higher premiums for clients who may not fully understand how these factors impact their insurance costs. Research has shown that properties in areas facing a higher probability of extreme weather events, such as coastal regions prone to rising sea levels, are experiencing both higher premiums and more frequent claims (Michel-Kerjan, 2010). While we made efforts to integrate the Nat Cat component into our modelling, the scarce data alongside the insignificance of dummy variables in the modelling process did not yield the expected result.

One of the primary determinants of insurance premium volumes is economic growth, often measured by Gross Domestic Product (GDP). Empirical studies, such as those by Arena (2008) and Lee & Chiu (2012), have found strong positive relationships between GDP growth and insurance premium expansion. Economic growth increases household wealth, corporate profits, and overall asset accumulation, all of which generate demand for various types of insurance, including property insurance. In their cross-country analysis, Beck and Webb (2003) found that GDP growth in developed and developing countries tends to increase both the number of insurance contracts and the volume of gross written premiums, underscoring the significance of macroeconomic expansion in insurance sector development. In Europe, the relationship between economic growth and insurance demand is particularly relevant, as countries experiencing rapid economic expansion often see concurrent growth in the insurance industry. Studies like those by Feyen, Lester, and Rocha (2011) provide evidence of this dynamic, particularly in Eastern European countries, where the insurance market has expanded alongside broader economic recovery and development. Despite these findings, much of the empirical research into the relationship between macroeconomic factors and insurance has focused on life insurance, with relatively less attention paid to property insurance. This leaves a significant gap in understanding how variables such as GDP, inflation, interest rates, and unemployment influence property insurance premiums, particularly in emerging European markets like North Macedonia. The present study addresses this gap by incorporating macroeconomic indicators into an analysis of property insurance premium dynamics in North Macedonia.

3. DATA AND METHODOLOGY

This section outlines the data and methodology used to explore the relationships between the dependent and independent variables. The analysis employs both correlation analysis to assess the initial linear associations between the variables, and the Autoregressive Distributed Lag (ARDL**)** approach to investigate both the short-run and long-run dynamics. The study utilizes quarterly time series data for the period from 2012 to 2023 obtained from the national Insurance Supervision Agency's reports on the quarterly insurance activity. The primary dependent variable are gross written premiums. The independent variables include the gross claims paid, the gross domestic product (GDP), the number of contracts concluded for property insurance, the housing price index, the number of dwellings with building permits issued, and the long-term loans. All factors were transformed into a natural logarithmic form to stabilize variance and facilitate elasticity interpretation. The description of variables is presented in Table 1.

Table 1. Description of variables.

Notation	Variable	Description
Ln_GWP	Gross Written Premium for property insurance	Total gross premiums collected by all insurers for property-related insurance, including fire, flood, and other real estate risks.
Ln_GCP	Gross Claims Paid for property insurance	Total claims paid out by all insurers in the property insurance sector, representing industry liabilities.
Ln_Contracts	Number of Contracts Concluded (Property Insurance)	Total number of property insurance policies issued by all insurers, indicating market scale.
Ln_Loans	Long-term Loans	Total value of long-term loans issued in the economy, reflecting borrowing activity influencing property insurance demand.
Ln_GDP	Gross Domestic Product (GDP)	Total market value of all final goods and services produced; a macroeconomic indicator affecting insurance demand.
Ln_Housing_price	Housing Price Index (2010=100)	Housing price index (base year 2010=100), tracking property value changes affecting insurance demand.
Ln_Permits	Number of Dwellings with Building Permits Issued	Number of new dwellings issued building permits, indicating housing market activity affecting insurance demand.

Source: Author's own work.

To begin the analysis, a Pearson correlation test was conducted to measure the strength and direction of the linear relationships between the variables. The Pearson correlation coefficient r is a measure of the degree of linear association between two continuous variables, calculated using the following formula:

$$r = \frac{\sum(x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum(x_i - \bar{x})^2 \sum(y_i - \bar{y})^2}}$$

where X_i and Y_i represent individual observations of variables X and Y, $\bar{x}$ and $\bar{y}$ are the respective means and n denotes the number of observations in our dataset. Ranging from *-1* to *+1*, the coefficient implies that when $r = 1$ it indicates a perfect positive correlation, $r = -1$ indicates a perfect negative correlation, and $r = 0$ implies no linear relationship. Correlation analysis provided preliminary insights into potential multicollinearity issues among the independent variables, which was considered in the subsequent modeling process.

3.1. Autoregressive Distributed Lag (ARDL) Model

To analyze both the short-run and long-run relationships between the dependent and the independent time-series variables, the **Autoregressive Distributed Lag (ARDL)** approach was employed as the main research model. The ARDL model, developed by Pesaran *et al*. (2001), is well-suited for time series data where variables may be integrated of order $I(0)$ (stationary at level) or $I(1)$ (stationary after first difference), as long as no variables are integrated of order $I(2)$. The flexibility of the ARDL model makes it ideal for examining dynamic relationships in time series data. The general ARDL model can be represented as follows:

$$y_i = \alpha_0 + \sum_{i=1}^{P} \beta_i y_{t-i} + \sum_{j=1}^{g} \sigma_j x_{t-j} + \varepsilon_t$$

where y_i and x_i represent the dependent and independent variables, while p and q denote the optimal lag lengths for the dependent and independent variables, respectively for both. The coefficients of the lagged variables are represented as β_i and δ_i, while ε captures the error term of the model.

The estimation of the ARDL model requires a preliminary step of determining the stationarity of the variables, which was tested using the Augmented Dickey-Fuller (ADF) test. It was applied to ensure that no variable exhibited second order of integration i.e., $I(2)$. Once stationarity was confirmed, the optimal lag lengths for each variable were selected using the Akaike Information Criterion (AIC) and Schwarz Bayesian Information Criterion (BIC).

3.2. Bounds Test for Cointegration

Following the estimation of the ARDL model, the bounds test for joint integration was conducted to assess the existence of a long-run equilibrium relationship between the dependent and independent variables. The bounds test involves the following hypotheses:

- **Null hypothesis (no cointegration)**: $H_0: \delta_1 = \delta_2 \ldots \delta_n = 0$
- **Alternative hypothesis (cointegration exists)**: $H_1: \delta_i \neq 0 \; for \; at \; least \; one \; i$

The bounds test generates two sets of critical values: an upper bound, which assumes that all variables are $I(1)$, and a lower bound, which assumes that all variables are $I(0)$. If the computed F-statistic exceeds the upper bound, the null hypothesis of no cointegration is rejected, indicating the presence of a long-run relationship between the variables.

3.3. Error Correction Model (ECM)

If cointegration was confirmed by the bounds test, an Error Correction Model (ECM) was estimated to capture the short-run dynamics while maintaining the long-run equilibrium relationship. The ECM incorporates an Error Correction Term (ECT) that reflects the speed of adjustment back to the long-run equilibrium after a deviation caused by a shock. The general form of the ECM is expressed as

$$\Delta y_t = \alpha o + \alpha 1 \Delta x_t - \beta \, (y_{t-1} - x_{t-1}) + \varepsilon_t$$

where ΔY_t is the change in the dependent variable *y* from time *t-1 to t (*short-term change in *y),* ΔX_t is the change in the independent variable *x* (short-term change in *x), ($y_{t-1} - \gamma x_{t-1}$)* represents the long-run equilibrium relationship between *y* and *x,* where *γ* is the long-term coefficient of *x. The β* is the error correction coefficient, which measures the speed of adjustment towards equilibrium. If *β* is negative and significant, it suggests that any deviation from the long-term equilibrium is corrected over time. The α_o and α_1 are constants, and ϵt is the error term at time t.

4. MAIN FINDINGS

4.1. How do the variables interact in our system?

The correlation analysis was performed to assess the linear relationships between key variables in the dataset, including gross written premiums, gross claims paid, the number of property insurance contracts, the housing price index, the number of building permits issued, long-term loans, and the GDP. This step is crucial for detecting potential multicollinearity and gaining an initial understanding of the associations between these variables before applying more advanced econometric models, such as the ARDL. The results of the correlation analysis are presented in Figure 1 (correlation heatmap), which illustrate both the strength and direction of these relationships.

Correlation coefficients reveal key relationships among gross written premiums (GWP), gross claims paid (GCP), the number of property insurance contracts, and GDP. GWP has strong positive correlations with GCP (0.88) and the number of property insurance contracts (0.91), indicating that higher premiums are associated with increased claims payouts and more contracts—aligning with expectations that greater risk exposure leads to higher payouts. Premiums show a moderate positive correlation with Macedonian GDP (0.41), suggesting that economic growth expands the insurance industry by boosting demand for insurance products. Similarly, GCP strongly correlates with GWP (0.88) and the number of contracts (0.86), confirming that as premium inflows rise, so do claims payouts, and more contracts result in more claims. The moderate correlation between GCP and GDP (0.48) implies that economic growth leads to higher claims, likely due to more insured assets during economic expansion. The number of property insurance contracts strongly correlates with GWP (0.91) and GCP (0.86), reinforcing that more contracts lead to higher premiums and claims because of a larger insurance pool. Its positive correlation with GDP (0.67) suggests that the volume of contracts grows alongside economic growth. Additionally, housing prices have a negative correlation with GWP (-0.12), indicating that fluctuations in housing prices may not significantly affect premiums. This might reflect structural differences between the housing market and the property insurance industry, where housing price movements don't directly drive insurance demand. The housing price index shows weak positive correlations with GCP (0.14) and the number of contracts (0.10), suggesting that housing price changes have limited short-term impact on claims and contracts. Building permit approvals display moderate correlations with GWP (0.32), the number of contracts (0.37), and GDP (0.37), indicating that building permits may support the insurance market by reflecting housing activity trends and potential future demand for property insurance. Lastly, long-term loans show a strong correlation with housing prices (0.87), suggesting that mortgages are closely tied to housing prices, supporting the idea that the housing market is driven by credit availability. Loans also positively correlate with GDP (0.79), reflecting that higher economic activity often leads to increased loan demand, which can influence insurance demand, especially in property and mortgage insurance markets.

The high correlations between some variables, particularly gross written premiums, gross claims paid, and the number of contracts concluded, suggest strong linear relationships, which could impact the dynamics observed in more complex models like ARDL. In contrast, the weaker or negative correlations involving housing index price suggest that housing prices may not play a major role in influencing insurance premiums or claims, although they have a more pronounced effect on loans. The presence of multicollinearity must be carefully considered in further econometric analysis, particularly when interpreting the results of the ARDL model.

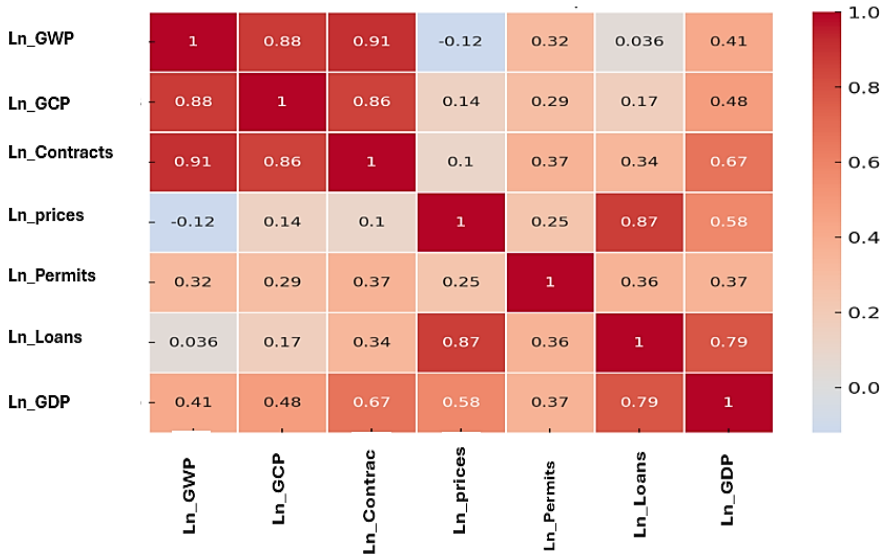

Figure 1. Correlation heatmap results.

Several empirical studies support the observed relationships between macroeconomic and financial variables within the insurance industry (Esho, Kirievsky, Ward, & Zurbruegg, 2004; Guo, Fung, & Huang, 2009; Ching, Kogid, & Furuoka, 2010; Chernobai, Jorion, & Yu, 2011; Feyen, Lester, & Rocha, 2011). For instance, Jiang *et al*. (2012) highlight that the expansion of insurance contracts, particularly in life and property insurance, leads to an increase in claims, which subsequently drives up the demand for building permits. This relationship arises because a higher volume of contracts increases the likelihood of claim events, especially in the nonlife insurance segments. Moreover, the positive correlation between gross written premiums and the number of dwellings with building permits issued is often linked to the financial stability and capacity of insurance firms. As Chen and Wong (2004) demonstrate, firms with larger premium income are typically more financially stable and better equipped to meet their obligations, which, in turn, is associated with a greater number of building permits being issued. This underscores the interconnectedness of financial performance and activity within the real estate and insurance sectors.

The scatterplot reveals a moderate positive correlation between gross written premiums and the number of dwellings with building permits issued, suggesting a connection between premium levels and housing market activity. In the first scatterplot, the relationship between gross written premiums and the number of dwellings with building permits issued is illustrated. Figure 2 suggests that higher gross written premiums may be associated with an increase in the number of building permits issued in the economy. Building permits can be viewed as an indicator of housing market activity, which indirectly reflects trends in property insurance demand. Cummins & Rubio-Misas (2006) highlight that the efficiency of the insurance market and regulatory practices plays a significant role in the sector's performance. In environments with rising premiums, insurers tend to be better capitalized, enabling them to approve and liquidate more claims and thereby contributing to a robust insurance market. However, the scatterplot also reveals that other factors likely influence the number of building permits issued beyond the volume of premiums collected, due to the high dispersion. These factors may include regulatory policies, housing market conditions, or even broader macroeconomic trends.

The second scatterplot on Figure 2 illustrates the relationship between the number of property insurance contracts and the number of dwellings with building permits issued. The positive relationship between property insurance contracts and building permits highlights the logical connection in the insurance market, where an increase in contracts (insurance policies issued) typically leads to more claims being filed, and consequently, an increase in housing market activity. This is consistent with research by Arena (2008), who found that the expansion of insurance contracts is linked to a logical increase in the volume of claims, especially in markets experiencing economic growth or an expansion of the middle class, leading to greater demand for insurance products. These findings align with

established theories in the literature, which emphasize the interconnections between premium collection, contract issuance, and the ability to meet demand in the housing market.

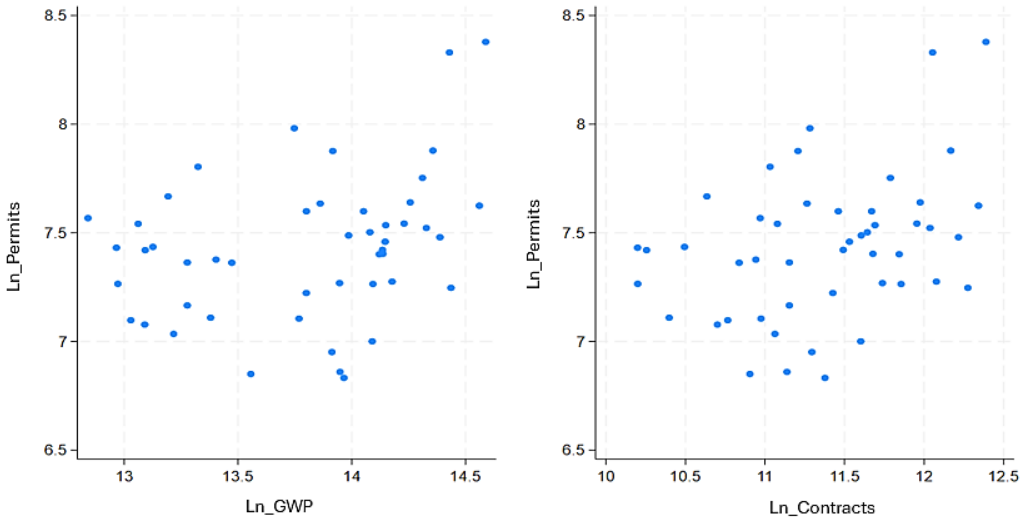

Figure 2. Scatter plots of gross written premiums, number of dwellings with building permits issued, and number of property insurance contracts concluded.

The relationships between long-term loans, gross written premiums (GWP), and the number of property insurance contracts highlight the credit market's influence on the insurance sector. Figure 3 illustrates these relationships by depicting scatterplots between long-term loans and two variables: GWP and the number of property insurance contracts. These plots offer significant insights into how access to credit shapes insurance outcomes. The first scatterplot examines the relationship between long-term loans and GWP. This suggests that while long-term loans may indirectly enhance the capacity of businesses and individuals to purchase insurance, they do not exert a strong direct influence on premium levels. Similarly, the scatterplot between long-term loans and the number of property insurance contracts reflects a weak positive relationship. The lack of a pronounced pattern implies that access to credit does not significantly drive the number of property insurance contracts issued. This could be because other factors, such as economic conditions or property market dynamics, play more substantial roles in influencing insurance uptake. As per Outreville (2012), the development of the financial sector, particularly credit markets, contributes to the expansion of insurance markets, but the strength of this relationship depends on broader economic factors such as income levels and financial literacy. In our case, the weak correlation may indicate that while credit availability helps individuals and businesses secure insurance, other factors such as income growth, risk perception, and regulatory policies may play a more dominant role in driving premium levels. As Cummins and Rubio-Misas (2006) note, certain types of insurance, such as life and health insurance, may be more intricately linked to credit availability compared to other forms, like property insurance. Consequently, the overall weak correlation might obscure stronger relationships within specific insurance segments that are more responsive to credit market dynamics.

Furthermore, the stronger relationship between long-term loans and the number of property insurance contracts can be understood in the context of credit-backed consumption. As households and businesses gain increased access to credit, their capacity to undertake economic activities that require insurance coverage (such as property purchases or business expansion) also grows. Arena (2008) highlights those well-developed financial markets, including access to loans, strengthen the insurance sector by raising the demand for coverage, thereby increasing the volume of insurance contracts issued. The second scatterplot presented in Figure 3 shows the relationship between long-term loans and the number of property insurance contracts. The clustering of points along an upward-sloping curve indicates a stronger positive relationship between these two variables. It indicates that an increase in the availability of long-term loans corresponds to a rise in the number of property insurance contracts. Access to credit allows businesses and individuals to assume greater financial obligations, such as acquiring assets that necessitate insurance coverage, including homes, vehicles, and commercial

properties. This aligns with findings from Adams and Buckle (2003), who observed that increased financial market development, particularly through loans and mortgages, leads to greater demand for insurance products as borrowers seek to protect their assets from risks.

The positive relationship between long-term loans and the number of property insurance contracts has important implications for insurance risk assessment. As credit markets expand, insurers face increased risk exposure due to a higher volume of contracts and must evaluate the credit risk of policyholders and the assets backed by credit. Outreville (2012) highlights that rapid credit growth can elevate systemic risks in the financial sector, including insurance, especially if underwriting standards are relaxed to gain market share. Insurers need to assess potential credit risk and defaults as more contracts are issued with increased access to long-term loans. Policyholders who default or experience financial distress may struggle to maintain insurance coverage, leading to higher lapse rates and unpaid premiums. Chen and Wong (2004) noted that during economic downturns or financial stress, insurers face heightened risk as policyholders struggle to meet both loan and insurance obligations. Furthermore, although the correlation between long-term loans and gross written premiums is weak, it still suggests a positive relationship between credit availability and insurance premium volume. While not as strong as the relationship with property insurance contracts, this indicates that insurers may benefit from expanding credit markets by generating higher premium volumes, which can bolster their financial stability. However, this advantage must be balanced against the increased exposure to credit-related risks.

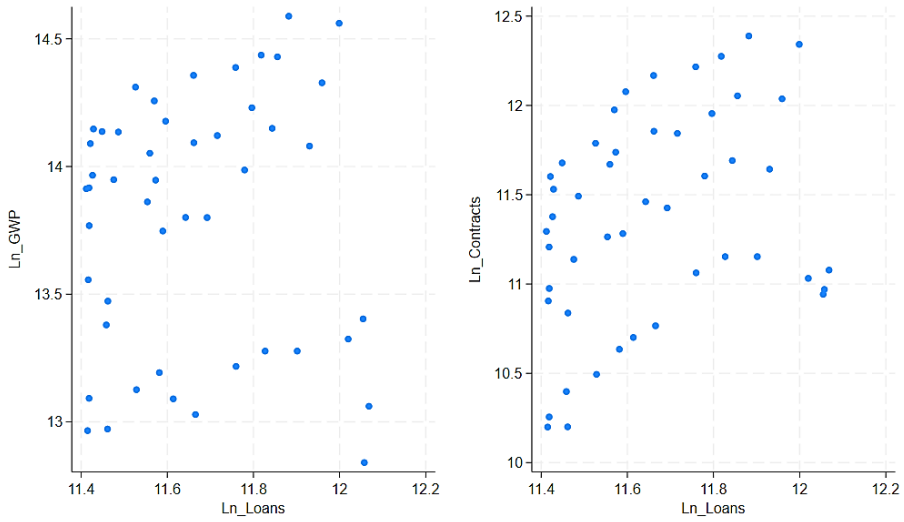

Figure 3. Scatter plots of gross written premiums, long-term loans, and the number of contracts concluded for property insurance.

Figure 4 analyzes the relationships between apartment prices and key insurance variables: gross written premiums (GWP), gross claims paid (GCP), the number of property insurance contracts, and the number of dwellings with issued building permits. Understanding these dynamics is crucial, as fluctuations in property prices can influence insurance demand and claim volumes. Prior studies emphasize the importance of these relationships between financial markets and the insurance industry (Cummins & Rubio-Misas, 2006; Arena, 2008). In the first scatterplot we can observe a negative association between real estate prices and GWP, where premiums tend to decrease as apartment prices increase. This counterintuitive finding may be explained by structural factors. Outreville (2012) suggests that higher property values can lead to fewer transactions and reduced property insurance purchases, as potential buyers are priced out. Additionally, insurers might lower premiums in high-value markets to attract policyholders, or wealthier individuals may use alternative risk management strategies, reducing reliance on traditional insurance.

The second scatterplot shows a negative relationship between apartment prices and GCP. Higher property values, especially in affluent areas, often correlate with lower claim frequencies because owners invest in better protection measures. Kunreuther (2002) notes that high-value properties may

have higher deductibles, and wealthier individuals might opt to self-insure certain risks, leading to lower total claims paid by insurers. The relationship between apartment prices and the number of property insurance contracts indicates a slight positive correlation, though data points are widely dispersed. While rising property values can increase the desire to ensure valuable assets, factors like price sensitivity, market competition, and regulatory influences can weaken this effect as per Dionne & Harrington (1992). Other elements, such as stagnant income growth or stricter mortgage requirements, may limit the ability of potential homeowners to purchase insurance, contributing to the weak correlation observed.

Lastly, the relationship between apartment prices and the number of dwellings with building permits issued shows a weak positive association. Higher property values might stimulate new developments, but the building permit process is influenced by various factors. Cummins and Rubio-Misas (2006) emphasize that insurance industry decisions are shaped by internal underwriting standards and external regulations. As apartment prices rise, insurers may adopt more cautious approaches due to market volatility or economic uncertainty, potentially explaining the weak correlation between high property values and building permit issuance.

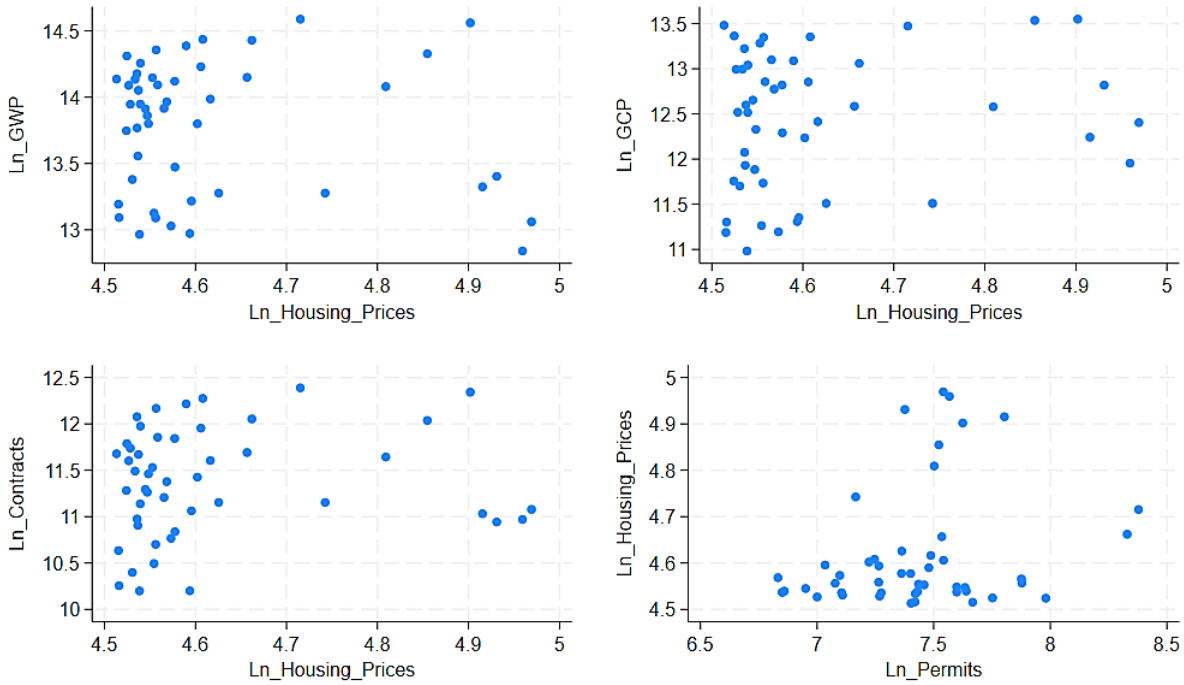

Figure 4. Scatter plots of gross written premium, number of contracts for property insurance, gross claims paid for property insurance, number of dwellings with building permits issued, and house price index.

In Figure 5 we can observe the interplay between broader economic activity, as measured by GDP, and key metrics within the insurance industry, specifically the volume of insurance premiums and the number of property insurance contracts. Understanding these dynamics can shed light on how economic growth influences both the demand for insurance products and the overall performance of the insurance market. The first scatterplot presents the relationship between GDP and gross written premiums. A positive relationship is evident, with the data points generally trending upward, indicating that as GDP increases, gross written premiums tend to rise as well. This relationship is intuitively expected, as economic growth typically leads to increased income, business activity, and asset accumulation, which all contribute to a greater demand for insurance products. Economic growth fuels the expansion of businesses, infrastructure, and personal wealth, all of which require insurance coverage to manage risks. Arena (2008) has shown that a growing economy is often accompanied by the growth of the insurance sector, as rising incomes and increased wealth lead to a greater demand for both life and non-life insurance products. The insurance sector benefits from economic expansion because more individuals and businesses seek to protect their financial assets, which drives up both the number of

insurance contracts and the premiums collected. Additionally, during periods of economic growth, businesses invest in expansion, and individuals may purchase more valuable assets (e.g., real estate, vehicles), which increases the demand for property and liability insurance, ultimately boosting the volume of gross written premiums. This positive association between GDP and insurance premiums suggests that the insurance sector is closely tied to macroeconomic conditions and thrives in a growing economy.

The second scatterplot of Figure 5 examines the positive relationship between GDP and the number of property insurance contracts, which aligns with theoretical expectations that economic expansion boosts insurance demand. As GDP grows, there is an upward trend in the volume of insurance contracts issued, reflecting the link between increased economic activity and the need for risk management through insurance. During periods of GDP growth, businesses and individuals engage in more transactions requiring insurance coverage, such as buying homes, starting businesses, or investing in infrastructure. Beck and Webb (2003) note that economic growth often leads to a surge in demand for insurance products, as individuals seek to protect their wealth, and businesses aim to manage operational risks. This positive correlation suggests that insurers can capitalize on the heightened economic activity by issuing more contracts and expanding their market share. This is particularly relevant for non-life insurance, where demand typically rises alongside economic activities like property transactions and business investments. As economic conditions improve, businesses take on more risks and seek insurance to mitigate them, driving up the number of contracts.

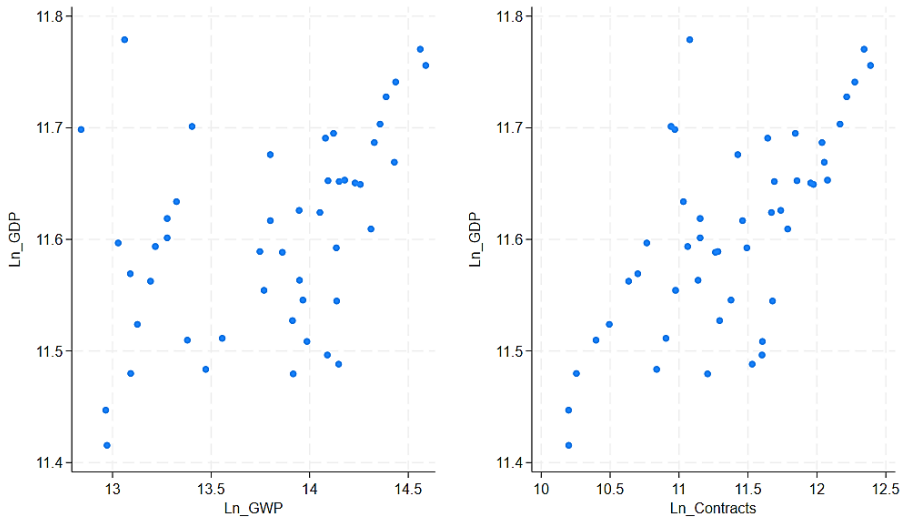

Figure 5. Scatter plots of gross domestic product, gross written premiums and number of contracts concluded for property insurance.

4.2. ARDL model results

To ensure the robustness of the ARDL and ECM estimations, several diagnostic tests were conducted. These included the Breusch-Godfrey test for serial correlation, the Breusch-Pagan test for heteroscedasticity, and the cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ) tests for model stability. The results confirmed that the model was well-specified and that the underlying assumptions of the ARDL approach were satisfied.

To ensure that the variables used in the econometric analysis do not exhibit spurious results, a stationarity test is conducted using both the Augmented Dickey-Fuller (ADF) test and the Phillips-Perron (PP) test. These tests are essential for identifying whether the variables are stationary, meaning that their variances do not change over time. Non-stationary variables can lead to misleading econometric inferences, and hence determining the order of integration of the variables is a crucial step before model estimation. The results from the Augmented Dickey-Fuller (ADF) test indicate that property gross written premiums, property gross claims paid, number of property insurance contracts,

and approvals for building permits are all stationary at the level, meaning they are integrated of order zero, and do not contain unit roots, which makes them stable over time. In contrast, GDP, long-term loans, and the housing price index are non-stationary at the level but become stationary after first differencing. This implies the presence of a unit root in their level form, but stationarity is achieved after differencing. Consequently, logarithm values of variables such as GWP, number for contract concluded for property insurance, and number of dwellings with building permits issued can be included in econometric models in their level form, while logarithm values of GDP, long-term loans, and housing price index require differencing to ensure stationarity. The results from the PP test, which accounts for heteroskedasticity and serial correlation, corroborate the findings from the ADF test. This is critical for obtaining meaningful and valid econometric inferences, especially when employing models like ARDL or ECM, which require stationary variables for accurate estimation.

Table 2. Stationarity test results using the Augmented Dickey-Fuller test and Phillips-Perron test.

Variable	ADF Test	PP Test
Ln_GWP	Level	Level
Ln_GCP	Level	Level
Ln_Contracts	Level	Level
Ln_GDP	1st diff	Level
Ln_Loans	1st diff	1st diff
Ln_Building_Permits	Level	Level
Ln_Housing_price_index	1st diff	1st diff

Source: Author's own calculations

The results from the lag order selection criteria indicate that the optimal lag length based on the Akaike Information Criterion (AIC), Hannan-Quinn Information Criterion (HQIC), and Schwarz Bayesian Information Criterion (SBIC) is 4 lags, as evidenced by the lowest values for these criteria. However, while these criteria provide a useful starting point, the ARDL model allows for flexible lag structures across different variables. Unlike models such as the VAR where all variables have the same lag length, the ARDL model permits each variable to have its own lag length based on the underlying data dynamics. Thus, although AIC suggests 4 lags as the overall optimal number, the ARDL model optimizes the number of lags for each variable separately, balancing both long-run equilibrium relationships and short-run adjustments. The final selection of lags in the ARDL model depends not only on information criteria but also on factors such as the economic significance of the estimated coefficients, diagnostic tests for issues like residual autocorrelation or heteroskedasticity, and the overall model fit in terms of capturing short-run dynamics. The final $ARDL(3,0,0,0,2,1)$ specification captures the key dynamics of the model while avoiding unnecessary complexity, ensuring a simpler and more efficient approach that reduces the risk of overfitting and improves the reliability of the estimated relationships in nonlife insurance.

Table 3. Lag-order selection criteria

Lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	134,872				1,2E-10	-5,8578	-5,76757	-5,6145
1	345,84	421,94	36	0	4,1E-14	-13,8109	-13,1793	-12,1078*
2	383,841	76,001	36	0	4,1E-14	-13,9019	-12,7289	-10,739
3	448,646	129,61	36	0	1,4E-14	-15,2112	-13,4969	-10,5885
4	520,899	144,5*	36	0	4,8E-15*	-16,859*	-14,6034*	-10,7766

*Note: * indicates the optimal lag length. Source: Author's own calculations*

The ARDL model provides important findings regarding the key determinants of gross written premiums in the insurance market. With an R^2 value of 0.9747, the model demonstrates strong explanatory power, indicating that the independent variables account for approximately 97.47% of the variation in gross written premiums. This high level of fit underscores the significant influence of factors such as the number of property insurance contracts, long-term loans, the housing price index, building permits issued, and GDP on the gross written premiums in the insurance sector.

The positive and significant coefficients for the lagged values of gross written premiums from property insurance (L1, L2, and L3) in the case of North Macedonia underscore the persistence of premium levels over time. The results show that increases in gross written premiums in previous periods lead to higher current premium levels, suggesting a degree of inertia in the country's insurance market, where premiums are heavily influenced by past values. The coefficients of 0.166, 0.251, and 0.202 for the first, second, and third lags, respectively, indicate that premium-setting is a gradual process in North Macedonia, with insurers relying on historical pricing trends to determine current premiums. This persistence aligns with the findings of Adams et al. (2006), who emphasized that long-term relationships between insurers and policyholders, along with ongoing risk assessments, contribute to stable premium flows over time. In practical terms, for the North Macedonian property insurance market this suggests that insurers build on prior premiums when making pricing decisions, reflecting the tariff system and the assessment of the potential risks.

The coefficient for the number of property insurance contracts is both highly significant and substantial (0.935), confirming a strong positive relationship between contract volume and gross written premiums in North Macedonia. The nearly one-to-one correspondence between these variables suggests that a 1% increase in the number of contracts results in a 0.935% rise in gross written premiums. This finding is consistent with the existing literature, such as Beck and Webb (2003), which underscores the critical importance of expanding the customer base to drive premium growth. The substantial impact of contract volume on premium levels indicates that insurers with larger portfolios benefit from economies of scale and increased premium collection, which are essential for ensuring financial sustainability and supporting the growth of the insurance sector.

In contrast, one of the more unexpected findings in the model is the negative and significant coefficient for long-term loans (-1.361). This result indicates that an increase in long-term loans leads to a decrease in gross written premiums. Specifically, a 1% increase in long-term loans is associated with a 1.361% reduction in gross written premiums. This counterintuitive outcome may suggest that higher borrowing levels among businesses and individuals reduce their capacity to allocate funds toward insurance premiums. Alternatively, this negative relationship may reflect increased credit risk within the economy, where rising debt levels lead to higher defaults and financial distress, ultimately diminishing the demand for insurance products. Outreville (2012) identified similar risks in expanded credit markets, noting that greater indebtedness can result in higher default rates, which subsequently affect insurers' risk appetite and premium-setting strategies. In this context, the negative relationship between long-term loans and premiums may reflect insurers' more cautious underwriting practices in markets with elevated credit exposure.

The positive and significant coefficient for the housing price index of 1.084, exhibits a strong relationship between rising property values and higher gross written premiums in North Macedonia, where the housing market has experienced above-average growth in prices during the previous period. The results shows that a 1% increase in housing prices results in a 1.084% rise in gross written premiums, underscoring the significant impact of real estate market trends on the demand for property insurance. This outcome aligns with Kunreuther (2001), who found that as property values rise, there is a corresponding increase in demand for insurance coverage, as individuals and businesses seek to protect their more valuable assets. In North Macedonia's high-growth real estate market, the need for comprehensive insurance coverage becomes increasingly important, leading to higher volumes of issued policies and collected premiums. This result reflects the broader dynamics at play, where insurers must adjust premiums to account for the increasing value of insured properties, ensuring adequate protection against potential risks. As the housing market continues to expand, insurers in North Macedonia are likely to see further growth in premium volumes, driven by the necessity to cover more valuable real estate assets. In this context, there has been a growth of number of building permits issued in the previous period. The results for the variable building permits reveal a degree of heterogeneity in its impact on gross written premiums. While the current effect of building permits is statistically insignificant, the second lag exhibits a significant negative effect, suggesting that building permit issuance has a delayed, adverse impact on premiums. One possible explanation for this is that newly constructed properties may initially require lower levels of insurance coverage due to their new condition and reduced risk of immediate repair or maintenance issues. Moreover, it is important to recognize that the issuance of a building permit does not immediately translate into completed, insurable properties. In many cases, it can take up to two years for construction to be finalized, during which time

the properties remain uninsured. This lag in the construction process can delay the entry of new properties into the insurance market, contributing to the negative effect observed in the second lag. As Cummins and Rubio-Misas (2006) suggest, building activity and insurance demand may not always move in tandem, particularly in real estate markets where lengthy approval processes and construction timelines result in significant delays before properties become insurable. This market adjustment period, where newly built properties gradually enter the insurance market, further explains the delayed and negative impact of building permits on gross written premiums. Once these properties are fully integrated into the real estate market, demand for insurance is likely to increase, but the initial lag highlights the time-sensitive nature of property insurance demand in relation to construction activity.

Results for the GDP demonstrate a significant relationship with property insurance premiums, showing that past economic growth can lead to a reduction in current gross written premiums, highlighting the influence of market adjustments and competition following periods of expansion. The relationship in the current period is positive and statistically significant at 10% level ($p = 0.07$). However, the first lag of GDP shows a significant negative effect (-1.512), indicating that economic growth in previous periods can lead to a reduction in current premiums. This result may reflect market adjustments or competitive pressures that emerge following periods of economic expansion. Initially, economic growth increases the demand for insurance, as businesses and individuals engage in more transactions and acquire assets, which drives up premiums. Over time, however, heightened competition among insurers may lead to premium reductions, as companies attempt to maintain or expand their market share in a growing economy. This finding is in line with the work of Arena (2008), who noted that while insurance markets benefit from economic growth, they are also influenced by competitive dynamics that can limit premium growth over time.

Table 4. Results from the $ARDL(3,0,0,0,2,1)$ model.

Variable	**Coefficient**	**Std. error**	***t*-stat**	***p*-value**	**95% conf. int. lower**	**95% conf. int. upper**
Ln_GWP L1	0.1660***	0.0474	3.5000	0.0010	0.0694	0.2626
Ln_GWP L2	0.2512***	0.0427	5.8800	0.0000	0.1641	0.3382
Ln_GWP L3	0.2024***	0.0426	4.7500	0.0000	0.1156	0.2891
Ln_Contracts	0.9345***	0.0441	21.2000	0.0000	0.8447	1.0243
Ln_Loans	-1.3609***	0.2993	-4.5500	0.0000	-1.9706	-0.7512
Ln_Housing_Price	1.0842***	0.2932	3.7000	0.0010	0.4869	1.6815
Ln_Permits	0.0764	0.0500	1.5300	0.1360	-0.0254	0.1782
Ln_Permits L1	-0.0813	0.0538	-1.5100	0.1410	-0.1910	0.0284
Ln_Permits L2	-0.1644***	0.0489	-3.3600	0.0020	-0.2641	-0.0648
Ln_GDP	0.8541*	0.4562	1.8700	0.0700	-0.0752	1.7834
Ln_GDP L1	-1.5122***	0.4120	-3.6700	0.0010	-2.3514	-0.6731
Constant	14.3371***	4.5062	3.1800	0.0030	5.1583	23.5160
F(11,32)	112.03					
Prob > F	0.0000					
R-squared	09747					
Adj. R-squared	0.9660					
Log Likeihood	49.5293					
Root MSE	0.0921					
No. of obs.	44					

*Note: *, **, and *** refer to 10%, 5%, and 1% statistical significance. Source: Author's own calculations*

The Bounds test for cointegration was conducted to evaluate whether a long-run equilibrium relationship exists between gross written premiums and the independent variables, including the number of property insurance contracts, long-term loans, the housing price index, building permits, and GDP. The results reveal a highly significant F-statistic of 219.22, far exceeding the critical values typically associated with the Bounds Test, thereby strongly rejecting the null hypothesis that no long-run

relationship exists among these variables. This finding indicates the presence of cointegration, suggesting that despite short-term fluctuations, the independent variables and gross written premiums exhibit a stable, long-run equilibrium relationship. In other words, changes in the number of contracts, loans, housing prices, building permits, and GDP have lasting effects on insurance premiums, reinforcing the interconnectedness of these variables over time.

The results in Table 5 highlight that the number of property insurance contracts plays a significant role in determining gross written premiums in the long run. This is consistent with the theory that expanding the customer base through increased contract volumes leads to higher premium collections, as insurers benefit from economies of scale, a conclusion supported by Beck and Webb (2003). Similarly, the significant cointegration of long-term loans indicates that loans exert a lasting impact on premiums. Although the short-run relationship between loans and premiums was negative, the long-run effect remains significant, reflecting the broader systemic influence of credit markets on insurance practices, as discussed by Outreville (2012). Furthermore, the cointegration between the housing price index and gross written premiums confirms that rising property values consistently drive higher demand for insurance, as more valuable assets require greater coverage, which is a specific dynamic emphasized by the work of Kunreuther (2001). The significance of building permits also suggests that real estate market activity, measured by the issuance of dwelling permits, has a long-term effect on premium levels, aligning with Cummins and Rubio-Misas (2006). Lastly, the cointegration between GDP and gross written premiums underscores the strong influence of macroeconomic conditions on insurance demand, with Arena (2008) emphasizing how economic growth fosters the expansion of both life and non-life insurance markets. Overall, the results of the Bounds Test confirm the existence of a robust long-run equilibrium relationship between gross written premiums and the key independent variables, underscoring the validity of the ARDL model in capturing both short-run adjustments and long-term dynamics within the insurance sector.

Table 5. Bounds test for cointegration.

Constraint	F-statistic	Degrees of Freedom	Prob > F
(1) Ln_Contracts = 0	219,22	5, 32	0,000
(2) Ln_Loans = 0	219,22	5, 32	0,000
(3) Ln_Housing_Prices = 0	219,22	5, 32	0,000
(4) Ln_Permits = 0	219,22	5, 32	0,000
(5) Ln_GDP = 0	219,22	5, 32	0,000
F (5, 32) = 219.22			
Prob > F = 0.0000			

Source: Author's own calculations

The results from the estimation of the Error Correction Model provide the short-term dynamics that influence gross written premiums, with particular focus on macroeconomics and financial variables such as GDP, housing prices, long-term loans, and building permits and their economic interaction with the property insurance market in North Macedonia. By examining both the short-term effects and the system's adjustment towards long-run equilibrium, this analysis contributes to an estimation of effect of macroeconomic factors on property insurance premiums. Hence, the Error Correction Term highlights the speed at which the system reverts to equilibrium following short-term deviations, which is crucial for assessing the resilience of the insurance market to economic fluctuations. The results reveal that GDP exerts a highly significant and positive influence on gross written premiums in the short term, supporting the hypothesis of a log-linear relationship between insurance premium volume and GDP. Specifically, a 1% increase in GDP results in a 7.87% rise in gross written premiums, highlighting the strong responsiveness of the insurance market to fluctuations in economic activity. This finding is consistent with the work of Arena (2008), who demonstrated that economic growth stimulates demand for both life and non-life insurance products, driven by increasing wealth, business expansion, and asset accumulation. The strong short-term correlation between GDP and premiums reflects the broader macroeconomic context, where an expanding economy generates more insurable assets and heightened risk exposure, leading to higher demand for insurance coverage. The long term relationship underscores the proportional sensitivity of insurance premiums to changes in GDP, emphasizing the integral role of

economic growth in estimation the trend of the insurance market (Lee & Chiu, 2012). Furthermore, in the case of housing price index, the coefficient is positive but statistically insignificant, indicating that short-term fluctuations in housing prices do not have a meaningful impact on gross written premiums. This suggests that, in the immediate term, changes in property values are not a major driver of insurance demand, and the response of the insurance market to variations in housing prices may be more pronounced over the long run rather than in the short term. This finding is consistent with Kunreuther (2001), who noted that property owners often delay adjusting their insurance coverage in response to changes in asset values, leading to a lagged effect. It is plausible that, in the short run, insurance coverage does not immediately reflect property value changes due to delayed consumer responses or gradual adjustments by insurers.

In the terms of building permits and their role in determining the property life insurance the results reveal a strong and statistically significant relationship between building permits and gross written premiums, highlighting the crucial role of construction activity in driving demand for property insurance. The results indicate that building permits have a positive and statistically significant effect on gross written premiums, with a coefficient of 0.38 ($p = 0.028$). This implies that a 1% increase in the number of building permits issued leads to a 0.38% increase in gross written premiums in the short term. The findings highlight the role of construction activity in driving the demand for property insurance, as newly constructed buildings require immediate coverage to protect against potential risks. This result is consistent with the work of Cummins and Rubio-Misas (2006), who highlighted real estate development as a critical factor influencing insurance demand, particularly in rapidly expanding markets. The positive relationship between building permits and gross written premiums underscores the direct connection between construction activity and the growth of the insurance sector. As new properties are developed, the need for insurance coverage rises, resulting in a corresponding increase in premium volumes. This trend is particularly evident in regions experiencing economic growth and urbanization, where ongoing construction creates a continuous demand for insurance services. The findings not only reinforce the importance of real estate development in shaping the insurance market but also suggest that insurers should closely monitor construction trends as an indicator of future premium growth. Moreover, this relationship implies that insurers stand to benefit from active construction markets, as newly built properties present fresh opportunities for underwriting. The demand for property insurance is closely tied to the expansion of housing and commercial real estate, and as the number of building permits rises, so too does the volume of insurable assets. his dynamic plays a crucial role in sustaining the growth of the insurance industry, particularly in the Skopje region, where real estate development is experiencing a substantial upward trend.

The Error Correction Term (ECT) represents the speed at which the system reverts to its long-run equilibrium following short-term deviations. The negative sign of the ECT is theoretically consistent with the expectations, as it suggests that the system moves back toward equilibrium when short-term deviations occur. In this analysis, the ECT coefficient is -0.24501, indicating that approximately 24.5% of deviations from the long-run equilibrium are corrected in each period. However, the statistical insignificance of the ECT (p-value of 0.32) suggests that the adjustment process is relatively slow and lacks strong predictability. This slow pace of correction could be attributed to potential structural factors or market frictions within the insurance industry that impede a rapid return to equilibrium. Furthermore, the slow adjustment may reflect the inherent inertia present in the financial sector, where changes in premiums, claims processes, and policy terms are often delayed in response to macroeconomic shifts. As Beck and Webb (2003) highlight, especially the insurance sector tends to exhibit this inertia due to a combination of institutional rigidity, market frictions, as well as long-standing contractual obligations. In many cases, insurers may be reluctant to revise policy terms or premiums too rapidly out of fear of destabilizing their customer base or creating uncertainty in their established business models.

The ECM analysis provide important results into the short-term dynamics of the property insurance market. The significant positive effect of GDP and building permits on gross written premiums highlights the essential role of economic growth and real estate activity in driving property gross written premium. Although variables such as housing prices and long-term loans do not show notable short-term effects, their importance in maintaining long-run equilibrium is evident. The slow adjustment speed suggested by the ECT (see Table 6) indicates that insurers should account for both short-term fluctuations and long-term stability when creating their strategies. These results highlight

the importance of closely monitoring macroeconomic trends and real estate developments to balance immediate responsiveness with sustained market stability.

Table 6. Estimates from the Error Correction Model (ECM).

Variable	Coefficient	Std. error	*t*-stat	*p*-value	95% conf. int. lower	95% conf. int. upper
D_Ln_GDP	7.8689***	1.0873	7.24	0.000	5.6729	10.0648
D_Ln_Loans	1.9618	4.2597	0.46	0.648	-6.6408	10.5644
D_Ln_Housing_Prices	0.7401	2.9504	0.25	0.803	-5.2183	6.6986
D_Ln_Permits	0.3796**	0.1663	2.28	0.028	0.0437	0.7155
ECT	-0.2450	0.2434	-1.01	0.32	-0.7366	0.2466
Constant	3.2904	3.3487	0.98	0.332	-3.4726	10.0533
No. of obs.	47					
F(5. 41)	16.68					
Model SS	14.3978					
Residual SS	7.0784					
Total SS	21.476					
R-squared	0.6704					
Adj. R-squared	0.6302					
Root MSE	0.4155					

*Note: *, **, and *** refer to 10%, 5%, and 1% statistical significance. Source: Author's own calculations*

5. IMPLICATIONS ON PROPERTY INSURANCE IN NORTH MACEDONIA

We can observe property insurance as a vital tool for maintaining economic stability and individual financial resilience. By enabling quicker recovery from losses due to unfavorable events such as natural catastrophes, theft, or accidents, the property insurance class helps in the reduction of the long-term impact of such events. Despite this importance, the Republic of North Macedonia still faces a significant protection gap in property insurance. Even though challenging to scientifically estimate due to the lack of official and detailed micro data, the protection gap in property insurance remains one of the key challenges to be targeted in the following period. Even McKinsey (2023) note that the growing protection gap in developed and developing markets indicates that insurance struggle to design products for the evolving and emerging risks. We also observed that both financial and macroeconomic factors play a crucial role in the determination on the volume of gross written premiums, beside other segments such as claims and the number of policies concluded.

The relatively low level of financial literacy among the population hinders the understanding of the overall benefits. Moreover, the Macedonian nonlife insurance market is primarily dominated by the compulsory classes (such as the Motor Third Party Liability or MTPL) which leaves voluntary classes like the property insurance lacking behind. Last year, the property insurance in North Macedonia accounted for 16.27% of the total nonlife insurance portfolio as per data from the ISA (2023), reducing its share from 17.81% in 2022. On the other hand, ISA (2023) notes that in 2023 the property insurance claims accounted for 13.06% of all claims with 25.06% paid under the agricultural insurance. Being an economy where the agricultural sector is of key importance, the low levels of agricultural insurance (which attributes to just 17% of all property insurance in North Macedonia) is worrisome. Even though efforts towards a compulsory agricultural insurance were made, the low supply of this product by the companies remains a challenge. In a case of a larger gap, this exposes the potential vulnerability of the national economy – mainly physical assets such as real estate. One of the main remedies is improving the financial literacy of the population, which is detrimental to insurance penetration. Next, in cases of high premiums some of the clients may choose to deter from purchasing property insurance. Designing flexible products which are affordable, especially for the low-income households may be one of the potential solutions.

From a financial performance perspective, the average loss ratio for the property insurance sector in North Macedonia between 2013 and 2023 stands at 0.27806. This notably low ratio reveals that premiums collected significantly exceed the claims paid, suggesting potential overpricing relative to the risks covered. A loss ratio well below the international benchmark of 60-70% raises critical questions about the efficiency of current risk pricing and may also reflect underutilization of claims. Additionally, the consistently low loss ratio may partly result from the lack of major natural disasters or catastrophic events during the period, a dynamic that could change dramatically with ongoing environmental shifts, heightening the need for insurers to adapt their risk models accordingly. Furthermore, the analysis of the expense ratio for property insurance, which ranged between 0.68 and 0.80 from 2020 to 2023, indicates a growing trend in operational costs relative to premiums earned. When combined with the loss ratio, this suggests that while the sector remains profitable, rising administrative and operational expenses present a potential challenge. The combined ratio, encompassing both loss and expense ratios, remains below 100%, signaling continued profitability for the sector. However, with operational expenses on the rise, insurers must remain vigilant, as any significant increase in claims—particularly given the increased risks from environmental and market shifts—could threaten profitability and strain financial resources.

The protection gap in property insurance has serious implications for North Macedonia's economic development and resilience to shocks. The country is susceptible to natural hazards such as earthquakes, floods, and landslides, and such cases would become even more emphasized with the ongoing global environmental shifts. We evidently observe that even wildfires become more common each year. Without adequate insurance coverage, the financial burden of recovering from such events falls heavily on individuals and the government, reacting as a “lender of last resort”. This can lead to prolonged economic disruptions, increased poverty levels, and strain on public finances due to the need for post-disaster aid and reconstruction efforts. Even though the NatCats are rare events, this is especially noted for the agricultural property insurance in the Macedonian case. Introducing mandatory property insurance for specific sectors or types of properties can ensure a baseline level of coverage. While compulsory insurance must be implemented cautiously to avoid undue financial pressure on citizens, it can be effective when combined with subsidies or phased implementation. For instance, several countries require property insurance for buildings located in high-risk areas or for properties above a certain value. However, raising the standards when constructing real estate is one of the potential solutions in mitigating the underlying risks. Born and Klein (2015) note that strict regulation of property insurance is generally targeting a more affordable insurance, while some studies such as the one of the Federal Insurance Office (2013) argue that this artificially depresses prices – forcing insurers out. Thus, the authors note that the supply of “inexpensive” insurance coverage may lead to severe problems.

So, what can be done to effectively support property insurance in the Macedonian nonlife insurance market? To enhance the level of property insurance, it is imperative to implement strategic incentives and measures that address both demand and supply-side challenges. One effective approach is unfortunately government intervention. Introducing subsidies for property insurance premiums, especially for essential sectors like agriculture and for low-income households, can be an effective measure. By alleviating the cost burden, these financial incentives can make insurance more accessible and appealing to a broader segment of the population. The government might also consider creating a public reinsurance fund to support insurance companies in covering extreme and especially rare risks, thereby encouraging insurers to offer more comprehensive property insurance products without the fear of potentially disproportionate losses. On the supply side, fostering public-private partnerships can stimulate the development of innovative and affordable insurance solutions. Designing microinsurance products tailored to the needs of small-scale property owners and farmers, who are often the most vulnerable yet least insured has proven to be an effective strategy in global terms. Implementing educational programs and awareness campaigns is also crucial. By enhancing financial literacy and highlighting the benefits of property insurance, they can shift public perception and increase property insurance demand.

6. CONCLUSION RESULTS

This research focuses on how macroeconomic and financial variables shape property insurance premiums in North Macedonia, revealing key drivers that influence premium levels and claims. Hence, the study observes both the short-term and long-term relationships in the domestic market. The correlation analysis reveals strong positive associations between gross written premiums, gross claims paid, the number of property insurance contracts, and the GDP, which is theoretically expected. The findings demonstrate a clear link between economic growth and the insurance sector showing that increased economic activity leads to higher demand for property insurance, greater premium volumes, but also more claims.

The baseline ARDL model highlights the long-term influence of macroeconomic and financial factors on property insurance premiums in North Macedonia. Key drivers such as GDP, long-term loans, the housing price index, and building permits have been found to have a sustained impact on premium levels. The persistence of gross written premiums underscores the lasting effect of past premium levels on current pricing, indicating inertia within the insurance market. Expanding the number of property insurance contracts continues to be a critical factor for driving premium growth, underscoring the need for insurers to focus on customer base expansion to ensure long-term industry development. Furthermore, the ARDL model reveals a negative relationship between long-term loans and gross written premiums. indicating that higher levels of borrowing may reduce the funds available for insurance coverage. This suggests that as businesses and individuals take on more debt, their capacity to allocate resources toward insurance premiums diminishes, potentially due to increased financial strain. However, even despite this negative impact on premium levels the positive correlation between long-term loans and the number of property insurance contracts highlights the continued role of credit availability in driving demand for insurance. Borrowers still seek to protect the assets financed by loans, noting the importance of credit markets as a catalyst for expanding the insurance coverage, even as rising indebtedness presents challenges for premium collection. These dynamic highlights the need for insurers to carefully assess credit-related risks while leveraging the growth opportunities that credit markets provide. Rising housing prices have a strong positive effect on gross written premiums, indicating that higher property values lead to increased demand for insurance coverage. This trend is particularly significant in North Macedonia, where housing prices have experienced above-average growth in recent years. As the Macedonian real estate market expands, insurers can expect higher premium volumes due to the need to insure more valuable assets. But, we found that there is a time lag between construction activity and when new properties require insurance coverage, highlighting the importance for insurers to anticipate the long-term effects of real estate developments on insurance demand. Therefore, strategic planning is essential to align premium-setting practices with the ongoing growth in the housing sector.

The error correction model shows that while GDP and building permits have a significant positive short-term effect on gross written premiums, the adjustment toward long-term equilibrium is gradual in North Macedonia. This gradual adjustment reflects the insurance market's structural characteristics, where economic growth and construction activity stimulate insurance demand over time. As new dwellings are completed and enter the real estate market, the demand for property insurance rises, also driving premium growth. However, the slow pace of adjustment suggests that insurers cannot rely solely on short-term economic upswings or construction booms to sustain premium levels. Instead, they must adopt a long-term strategy, carefully aligning their premium-setting practices with ongoing economic development and real estate trends. This underscores the empirical importance of monitoring macroeconomic indicators like GDP growth and housing market activity, as they provide early signals of future changes in insurance demand. Furthermore, the gradual nature of the adjustment process indicates that insurers must be prepared to adapt to changing market conditions over time rather than responding too aggressively to short-term fluctuations.

The moderate correlation between long-term loans and property insurance contracts in North Macedonia highlights the dual role of credit markets in shaping the insurance sector. On one hand. expanding credit markets offer opportunities for growth. as greater access to loans enables individuals and businesses to acquire assets that require insurance coverage. leading to an increase in the number of property insurance contracts. This is particularly relevant in North Macedonia. where the financial sector has expanded in recent years. providing more credit to the housing and property markets.

However. this expansion also raises significant challenges. As credit markets grow. insurers face increased exposure to credit-related risks. such as defaults or financial distress among borrowers. The empirical model suggests that while loans are positively correlated with contract growth. insurers must exercise caution. To mitigate these risks. insurance companies in North Macedonia must implement rigorous risk assessment and underwriting practices to ensure they are adequately pricing and managing the additional risk associated with insuring assets backed by credit. This will be crucial for maintaining financial stability in a market that is becoming increasingly interconnected with the broader credit environment.

In conclusion, the findings indicate substantial opportunity for growth in the property insurance sector in North Macedonia, driven by the continuously expanding housing market and increasing demand for insurance products. However, insurers must carefully manage the complex interactions between macroeconomic factors, credit market dynamics, and real estate developments. Successfully capitalizing on these opportunities will require insurers to implement effective risk management strategies ensuring that they balance growth with the mitigation of potential risks arising from economic volatility and increased credit exposure.

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