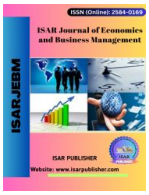
OPEN ACCESS



ISAR Journal of Economics and Business Management

Volume 4, Issue 2, 2026, Page: 1-11

Abbriviate Title- ISAR J Econ Bus Manag

ISSN *(Online)*- 2584-0169

https://isarpublisher.com/journal/isarjebm

Explaining Life Insurance Demand in Macedonia: Economic, Demographic, and Institutional Perspectives

Boban Tomeski*

General Director. Executive Member of the Board of Directors, Croatia Insurance AD Skopje. Life Insurance Division.

***Corresponding Author**

Boban Tomeski

General Director. Executive Member of the Board of Directors, Croatia Insurance AD Skopje. Life Insurance Division.

Article History

Received: 11.11.2025
Accepted: 03.01.2026
Published: 02.02.2026

Abstract: This study examines the key demographic, economic, and institutional factors that shape life insurance density in Macedonia. The aim is to identify the main drivers of insurance demand and assess how structural conditions influence long-term financial protection. The analysis uses annual time-series data for the period 2003–2024. Stationarity is tested using the Augmented Dickey–Fuller procedure. Long-run relationships are estimated with Fully Modified Ordinary Least Squares and Dynamic Ordinary Least Squares to account for cointegration, endogeneity, and serial correlation. Life insurance density increases with income growth, urbanization, financial sector development, and political stability. Ageing also strengthens demand. Higher youth dependency and income inequality reduce insurance uptake. Inflation shows a positive association, reflecting precautionary behavior during periods of uncertainty. Institutional weaknesses, especially corruption, significantly limit market development. Policies that support income growth, strengthen financial inclusion, expand rural access to insurance services, and improve governance can accelerate life insurance market development. Reducing corruption and enhancing institutional trust remain essential for sustaining long-term participation in insurance schemes.

Keywords: Life insurance density, Financial development, Demographic change, Institutional quality, Macedonia, Time-series analysis.

1. Introduction

Life insurance represents a core component of modern financial systems. These products serve two primary functions. They protect household income in the event of premature death. They also support long-term savings and retirement planning. Life insurance contracts take several forms, but most fall into three main categories. Term life insurance pays benefits only if the insured dies during the contract period. Endowment insurance provides payment only if the insured survives the agreed term. Whole or mixed life insurance combines both features, offering payment either at death or at contract maturity (Jovanovski, 2005).

Over recent decades, global life insurance markets have undergone major structural transformation. Many countries have liberalized regulatory frameworks to promote competition and efficiency (Boonyasai et al., 2002; Camino-Mogro et al., 2019; Chandrapal, 2019). These reforms triggered extensive merger and acquisition activity, especially in Europe and the United States (Borges et al., 2008; Cummins et al., 2015; Davutyan & Klumpes, 2008; Klumpes, 2022; Zanghieri, 2009). Cross-border insurance trade has also expanded (Cummins et al., 2017). At the same time, insurers face pressure to modernize operations. Low interest rates, ageing populations, declining public pension coverage, and competition from banks and investment firms have reshaped business models (Eling & Schaper, 2017; Swiss Re Institute, 2019). Digital tools now influence sales, underwriting, claims handling, and customer engagement (Cummins et al., 1999).

Recent research on Southeast Europe and Macedonia confirms the importance of macroeconomic and institutional conditions for insurance performance. Gockov and Kamenjarska (2021) show that insurer profitability depends on market share, inflation, investment activity, and economic growth. Studies covering the Western Balkans report that income growth and rising wages stimulate life insurance demand, while unemployment and high interest rates reduce participation (Stojanović et al., 2021). Institutional quality also matters. Strong regulation, effective legal systems, and public trust increase consumer confidence in insurance contracts (Hoxha & Bakraçi, 2017). Kjosevski (2012) finds that income, inflation, savings behavior, and financial sector development remain the

Cite this article:

Tomeski, B., (2026). Explaining Life Insurance Demand in Macedonia: Economic, Demographic, and Institutional Perspectives. *ISAR Journal of Economics and Business Management*, *4*(2), 1-11.

most reliable predictors of life insurance demand in Central and Southeast Europe, including Macedonia.

These findings raise a key policy question. Which demographic, economic, and institutional forces shape life insurance consumption in Macedonia. Answering this helps identify barriers to market development. It also supports better regulatory and financial strategies. This study therefore examines the theoretical foundations of insurance demand, reviews empirical evidence, evaluates the Macedonian market, and applies econometric methods to identify the main drivers of life insurance consumption.

The paper proceeds as follows. Section 2 reviews prior research. Section 3 describes the data and key trends. Section 4 presents the methodology. Section 5 reports the empirical results. Section 6 outlines policy conclusions.

2. Literature Review

A large body of empirical research has investigated the economic and institutional drivers of life insurance demand, often examining both demand- and supply-side influences simultaneously. Early work by Fortune (1973) emphasized the importance of income, wealth, and discount rates in shaping insurance consumption. Headen and Lee (1974) later grouped explanatory factors into three categories: insurer-related efforts such as advertising and product innovation; household saving behavior influenced by income, fertility, and future expectations; and financial capacity indicators including savings and asset ownership. Their results showed that household financial conditions, rather than insurer marketing efforts, play a dominant role in determining life insurance demand.

Cross-country evidence has consistently highlighted the role of income and financial development. Li et al. (2007), using a GMM framework for 30 OECD countries, reported strong income elasticity of life insurance demand, along with positive effects from financial sector development, competition, and price stability. In a developing-country context, Ibiwoye et al. (2010) applied Johansen cointegration methods to Nigerian data and found that real GDP significantly increased life insurance demand, while interest rates exerted a negative influence.

Country-specific studies reveal heterogeneous patterns. Roman (2011) showed that income stimulated insurance demand in Ethiopia in the short run but reduced it in the long run, while inflation and interest rates lowered demand. Kjosevski (2012), analyzing Central and Southeast Europe, identified GDP per capita, inflation, education, health expenditure, and rule of law as key drivers, whereas institutional and demographic variables were less consistent. Amrot (2014) confirmed the positive effects of income, education, and life expectancy in Ethiopia, while again finding inflation to be detrimental.

Micro-level evidence further supports the importance of socio-economic conditions. In Ghana, Eric and Hadrat (2015) found that income, education, and household size increased the probability of purchasing life insurance, while age reduced it. Using Italian household data, Elisa et al. (2015) showed that income and ageing populations stimulated demand, whereas inflation and interest rates discouraged participation. Survey-based studies in Ethiopia also emphasized income, education, and health status as major determinants (Abenezer, 2017).

Studies from Asia reinforce these conclusions. Ganesh (2018) demonstrated that income, education, family size, and financial awareness significantly influenced insurance purchases in India. Tigest (2018) found that income growth, education, and financial deepening increased life insurance demand in Ethiopia, while inflation and premiums reduced it.

Recent research has expanded the focus to institutional and structural factors. Dragota et al. (2023) analyzed 29 OECD countries and showed that GDP per capita, investment freedom, and foreign direct investment supported insurance market growth. Srinivasan and Mitra (2024) confirmed that income, urbanization, and education remain robust predictors of life insurance penetration across advanced economies.

Evidence from emerging markets is more mixed. Outreville (2023) found that income and financial freedom increased life insurance demand in BRICS countries, while unemployment and inflation weakened it. In contrast, Hasan et al. (2025) reported that GDP per capita reduced insurance density in Bangladesh, while inflation and healthcare spending encouraged demand. These findings suggest that structural and institutional conditions can reverse the income–insurance relationship.

Behavioral economics has also gained importance in recent literature. Namirembe et al. (2023) showed that cognitive biases significantly shape insurance decisions in Uganda. Liu (2023) found that loss framing influences life insurance choices among younger individuals. Xu and Zhang (2024) demonstrated that money illusion affects insurance and annuity decisions, particularly among young adults and retirees.

Finally, technological change and demographic ageing are increasingly relevant. Evidence from China indicates that digital insurance platforms and AI-driven product personalization are stimulating demand despite low interest rates (Financial Times, 2025).

Overall, the literature confirms the central role of income, inflation, financial development, and institutional quality, while also highlighting the growing influence of behavioral factors and technological transformation in shaping life insurance demand.

3. Data Sources and Variables

The following sections outline variables associated with the demand function as described by Lewis (1989), alongside supply-side factors that may serve as proxies for the policy loading factor. While the Lewis framework primarily emphasizes the mortality risk aspect of life insurance, we extend the analysis to include the savings and annuity components. Furthermore, considering the portfolio aspect of life insurance as part of private savings adds an additional layer to the discussion.

In our study, we used a time series dataset for Macedonia covering the period 2003–2024. The data were obtained from the Agency for Supervision of and the World Bank. The dataset is unbalanced, which, according to Rinaldi and Sanchis-Arellano (2006), allows for the inclusion of more observations and reduces dependence on a particular subperiod, thereby improving the robustness of the results. The selection of variables was guided both by the availability of data and by the determinants most frequently employed in the literature on life insurance demand, ensuring consistency with established empirical approaches

According to the studies (Beck, 2002) demand for life insurance can be measured in several ways: "life insurance penetration" (ratio of insurance premiums volume to GDP), "life insurance density" (insurance premiums per capita in constant dollars), ratio of "life insurance in force to GDP" and "life insurance in private savings" (relating insurance premiums to private savings instead of income). Life insurance density is more applicable for cross-country analysis as here adjusting for income level of the economy is not needed. Lin and Grace (2006) also suggest taking the "net amount at risk" – difference between the policy reserve and the face amount (the sum that company pays to the beneficiary when the insured dies), as a proxy for the demand for life insurance. The dependent variable in my model life insurance penetration. Penetration is commonly used as a key indicator of life insurance development because it captures the relative importance of life insurance in an economy, measuring total life premiums as a share of GDP (Beck & Webb, 2003). It reflects both the accessibility of insurance products and households' willingness or ability to allocate resources toward long-term risk coverage (Li, Moshirian, Nguyen, & Wee, 2007). Higher penetration indicates that life insurance plays a more significant role in financial intermediation, long-term savings, and risk management, which are critical components of economic and social development (Alhassan & Biekpe, 2016; Feyen, Lester, & Rocha, 2011).

Based on theoretical and empirical studies, we identify the following factors.

Demographic Determinants

A higher young dependency ratio—the proportion of young dependents relative to the working-age population—is expected to increase the demand for mortality coverage while reducing demand for savings through life insurance and annuities. When a larger share of the population consists of dependents, the total present value of consumption for the beneficiaries rises, which increases the need for life insurance that provides payments in the event of the premature death of the primary income earner (reflected as a higher TC in equation 1). At the same time, a high young dependency ratio implies that many individuals are too young to save for retirement, resulting in lower demand for life insurance as a savings vehicle. Empirical studies by Beenstock et al. (1986), Browne and Kim (1993), and Truett and Truett (1990) indicate a positive correlation between the young dependency ratio and life insurance penetration. However, given the opposing effects on mortality and savings components, the overall relationship is ambiguous.

Similarly, a higher old dependency ratio—the proportion of elderly dependents relative to the working-age population—is expected to increase the demand for the savings and annuity components of life insurance while reducing demand for mortality coverage. In countries with a larger retired population, life insurance products that provide retirement savings and protect against outliving one's income become more important, whereas protection against the death of the primary wage earner becomes less critical. Therefore, the net effect of the old dependency ratio on life insurance demand is also ambiguous.

Longer life expectancy is likely associated with lower mortality coverage costs and a reduced perceived need for death protection but a higher demand for savings and annuity components of life insurance (reflected by a lower ppp in equation 1). Consequently, life expectancy may have an ambiguous impact on overall life insurance demand. Previous studies have generally found a positive correlation between life expectancy and life insurance penetration (Beenstock et al., 1986; Outreville, 1996).

A higher concentration of population facilitates both the distribution of life insurance products and the dissemination of information about them to potential consumers, as it lowers costs for companies. Consequently, countries with a larger share of urban population are generally expected to exhibit higher demand for life insurance. Although family ties and solidarity tend to be stronger in rural areas, most life insurance contracts are concluded in urban centers. This is largely due to the higher concentration of consumers, which simplifies the work of sales representatives and reduces their operating expenses (Schlag, 2003). Lower operational costs and prices positively influence the supply side of the life insurance market. However, empirical studies have revealed that the effect of urbanization on life insurance demand is ambiguous.

Economic Determinants

Life insurance consumption responds positively to increases in disposable income (Beck and Webb, 2003). Specifically, these authors explain that if life insurance is viewed as coverage in the event of the policyholder's death, then with higher disposable income, the insured individual and their income-dependent family members are able to spend more, which increases the demand for life insurance. This demand arises from the need to protect income potential and expected consumption of dependents in case of the insured's death. Furthermore, when life insurance is considered as a savings instrument, individuals with higher earnings have greater capacity to purchase life insurance policies as a means of saving and securing additional income during retirement. In this study, real gross domestic product (GDP) will be used as a proxy for disposable income. Most empirical studies employ GDP per capita as a variable representing disposable income (Beenstock et al., 1986; Truett and Truett, 1990; Browne and Kim, 1993; Outreville, 1996; Beck and Webb, 2003). Real GDP has also been used as a variable in the empirical literature, for example in Ibiwoye et al. (2010). In this paper we used logarithm of GDPPC in (current US$)

Theory suggests that inflation has a negative effect on life insurance consumption. The negative relationship between inflation and life insurance consumption arises from the fact that savings in the form of life insurance provide monetary benefits in the long run. When inflation is present in the economy, the value of life insurance decreases, since higher inflation reduces the returns that policyholders receive from their investments in life insurance companies (Cargill and Troxel, 1979). The measure of inflation used in this study is based on the annual percentage increase in the Consumer Price Index (CPI).

The development of the financial system enables individuals to convert their available cash into financial instruments, such as deposits and securities, in order to secure future income (Li et al., 2007). The theory does not provide a clear answer regarding the impact of financial sector development on life insurance consumption. Specifically, life insurance companies offer products that are part of the financial market, and if these products are considered from a savings perspective, financial

sector development is expected to increase life insurance consumption.

Moreover, a well-developed financial and banking sector contributes to lower operating costs for life insurance companies, which can lead to lower product prices and higher consumption. For example, a developed banking sector allows insurance companies to conduct transactions at lower costs, enabling them to offer more competitively priced products.

On the other hand, since individuals have limited income, if a significant portion is invested, for example, in deposits, financial sector development may not necessarily increase life insurance consumption. Some empirical studies, such as Li et al. (2007) and Outreville (1996), use the M2 money aggregate relative to gross domestic product as a measure of financial sector development. Beck and Webb (2003), however, focus only on banking sector development as the dominant part of the financial sector, measured by claims of the non-financial sector on deposit banks.

In this study, we will follow Kjosevski (2012) and as a measure of financial sector development we used Domestic credit to private sector by banks (% of GDP)

Similar to the previous variable, theory does not provide a clear answer regarding the impact of wealth on life insurance consumption. According to Beenstock et al. (1986), wealth may have a negative effect on life insurance consumption, as wealthy individuals who own houses, stocks, bonds, gold, and similar assets are less likely to need life insurance, since their future income is relatively secured in the event of their death. In contrast, poorer individuals rely primarily on their income and therefore have a greater need for life insurance, as they must purchase policies to protect their dependents in case of their death. The explanation for a positive impact of wealth on life insurance consumption is similar to that of income discussed above. As a proxy measure for wealth, this study will use the real estate price index, since real estate is part of wealth, and rising property prices increase household wealth. Beenstock et al. (1986) and Beck and Webb (2003) use the Gini index, which reflects the inequality of income distribution among individuals in a country, as a measure of wealth.

Institucional variables (Political Stability, Rule of Law, and Corruption Control)

The institutional and political environment plays a crucial role in shaping the development of the life insurance market. As Ward and Zurbruegg (2002) emphasize, political and legal stability are essential factors that should be incorporated into empirical models of insurance demand. Since life insurance involves long-term contractual relationships between consumers and insurers, the stability of the legal and political system enhances the willingness of both parties to engage in such commitments. In this respect, indicators such as Political Stability (capturing the political dimension), Rule of Law, and Control of Corruption (reflecting the legal and institutional dimension), as provided by the World Bank, are particularly relevant.

A well-functioning institutional framework supports the growth of the life insurance sector in several ways. First, if fraudulent practices in claims reporting are widespread, insurance becomes prohibitively costly for large segments of the population. Second, when breaches of insurance contracts cannot be effectively appealed through the legal system, the perceived value of these contracts to consumers declines, discouraging long-term financial commitments. Third, weak protection of property rights and ineffective enforcement of contracts constrain insurers' ability to invest efficiently and increase the cost of providing insurance. Finally, political instability shortens the economic horizon of both potential policyholders and insurers, thereby hindering the development of a sustainable life insurance market.

To capture these institutional and political dimensions, three indicators are commonly employed. Rule of Law reflects the extent to which citizens are able to rely on the legal system to mediate disputes and enforce contracts. Political Stability captures the likelihood of government destabilization through events such as revolutions and coups. Control of Corruption measures the degree to which public power is exercised for private gain, which directly affects the credibility and functioning of institutions. Together, these indicators provide a comprehensive measure of the institutional environment relevant for the life insurance sector.

Table 1. Definition of variables

Symbol	Variable	Measurement	Source
DEN	Life insurance density	Ratio of total life insurance premiums by the country's total population	Agency of supervision of insurance in Macedonia
CDR	Young dependency ratio	Population aged 0–14 relative to working-age population (15–64), %	World Bank (World Development Indicators – WDI)
ODR	Old-age dependency ratio	Population aged 65+ relative to working-age population (15–64), %	World Bank (WDI)
LEXP	Life expectancy	Average number of years a newborn is expected to live	World Bank (WDI)
URB	Urbanization	Share of urban population in total population (%)	World Bank (WDI)
GDPPC	GDP per capita	GDP per capita (current US$)	World Bank (WDI)
GINI	Income inequality (Gini	Gini index (0 = perfect equality; 100 = perfect	World Bank (WDI); World Income Inequality

Symbol	Variable	Measurement	Source
	index)	inequality)	Database (WIID)
INF	Inflation	Consumer price index (annual %, year-on-year)	World Bank (WDI)
DCPS	Domestic credit to private sector	Credit to private sector by banks as % of GDP	World Bank (WDI, Global Financial Development Database)
LAW	Rule of law	Governance indicator (−2.5 = weak; +2.5 = strong)	World Governance Indicators (World Bank)
PS	Political stability	Governance indicator (−2.5 = weak; +2.5 = strong)	World Governance Indicators (World Bank)
COR	Control of corruption	Governance indicator (−2.5 = weak; +2.5 = strong)	World Governance Indicators (World Bank)

We also present descriptive statistics for all countries and discuss the main trends in the evolution of the selected variables over time. The summary statistics presented in Table 2 reveal some noteworthy variations among the countries in our sample.

Table 2. Descriptive statistics

	DEN	CDR	ODR	LEXP	URB	GDPPC	INF	GINI	DCPS	LAW	PS	COR
Mean	9.36	27.48	20.06	74.93	57.84	5730.11	2.80	37.93	44.37	-0.26	-0.31	-0.29
Median	7.55	26.67	18.80	75.00	57.53	5598.49	1.51	38.10	47.89	-0.28	-0.30	-0.33
Maximum	25.28	32.02	27.66	76.65	59.87	9310.03	14.20	46.10	53.68	-0.06	0.26	-0.03
Minimum	0.85	25.68	15.45	73.25	57.09	2818.58	-0.74	33.00	20.87	-0.54	-1.16	-0.55
Std. Dev.	7.71	1.96	4.10	0.99	0.84	1688.39	3.71	3.84	9.64	0.12	0.37	0.16
Observations	21	21	21	21	21	21	21	15	21	20	20	20

Source: Own calculations

Life insurance density (DEN) shows a mean value of 9.36, with a wide range from 0.85 to 25.28. This large dispersion, combined with a high standard deviation of 7.71, indicates strong fluctuations over time. The low minimum confirms weak market development in earlier years, while the higher maximum reflects recent expansion. Despite this progress, life insurance penetration in Macedonia remains limited relative to income growth.

Demographic indicators display clear and stable patterns. The young dependency ratio (CDR) averages 27.48, while the old-age dependency ratio (ODR) stands at 20.06. This reflects a demographic structure still dominated by younger dependents, although population ageing is increasingly evident. The standard deviation for ODR (4.10) is higher than for CDR (1.96), indicating more pronounced changes in the elderly population over time.

Life expectancy (LEXP) remains stable, with a mean of 74.93 years and a low standard deviation of 0.99. This confirms steady improvements in health outcomes, with limited variation across the period. Urbanization (URB) is also highly stable, averaging 57.84 percent, with values ranging narrowly between 57.09 and 59.87. This suggests a mature and slowly evolving urban structure.

Economic indicators show stronger variability. GDP per capita (GDPPC) averages 5,730 US dollars, but ranges from 2,818 to 9,310 dollars. The large standard deviation of 1,688 reflects significant income growth over time and structural transformation of the economy. Inflation (INF) displays substantial volatility, with a mean of 2.80 percent and a wide range from –0.74 percent to 14.20 percent. The relatively high standard deviation of 3.71 indicates periods of pronounced price instability, which can weaken long-term financial planning.

Income inequality, measured by the Gini index, averages 37.93, with moderate dispersion (SD 3.84). This suggests persistent inequality levels, with some fluctuations across the period. Domestic credit to the private sector (DCPS) averages 44.37 percent of GDP, but the high standard deviation of 9.64 indicates uneven financial deepening. Banking sector development has progressed, yet access to credit remains inconsistent.

Institutional quality indicators show persistently weak performance. The rule of law (LAW), political stability (PS), and control of corruption (COR) all have negative mean values of –0.26, –0.31, and –0.29, respectively. Their low standard deviations suggest that institutional conditions have remained consistently weak, with only minor changes over time. Such institutional constraints reduce trust in long-term financial contracts and limit insurance market development.

Overall, the descriptive statistics for Macedonia highlight three key patterns:

1. Low and uneven development of the life insurance market.
2. Macroeconomic volatility, especially in inflation and financial deepening.
3. Gradual demographic change, with stable life expectancy and urbanization alongside rising ageing pressures.

Table 3 Correlation matrix

	DEN	CDR	ODR	LEXP	URB	GDPPC	INF	GINI	DCPS	LAW	PS	COR
DEN	1.00											
CDR	-0.65	1.00										
ODR	1.00	-0.75	1.00									
LEXP	0.74	-0.63	0.64	1.00								
URB	0.69	-0.22	0.70	0.47	1.00							
GDPPC	0.64	-0.55	0.75	0.66	0.27	1.00						
INF	-0.27	0.10	-0.26	-0.13	-0.35	0.03	1.00					
GINI	-0.73	0.67	-0.61	-0.75	-0.63	-0.59	0.56	1.00				
DCPS	0.68	0.00	0.68	0.53	-0.04	0.62	0.02	-0.45	1.00			
LAW	0.09	-0.18	0.06	0.16	-0.11	0.21	-0.31	-0.34	0.26	1.00		
PS	0.66	-0.76	0.67	0.74	0.16	0.63	-0.08	-0.41	0.80	0.38	1.00	
COR	-0.14	-0.38	-0.14	0.15	-0.78	0.35	0.25	0.15	0.60	0.37	0.39	1.00

Source: Own calculations

Before analyzing the regression panel model, a correlation matrix was formed between the dependent and independent variables, and an analysis of Pearson's correlation coefficients was carried out. Namely, we estimate the correlation between selected determinants to check possible problems of multicollinearity between them. We have a multicollinearity problem if the correlation between selected determinants is above 0.80 Gujarati and Porter (2009) and simultaneous inclusion of the variable in the model should be avoided. According to the results from Table 3, there are no multicollinearity problems between selected determinants.

4. Methodology

This study relies on time series data, which requires an initial assessment of their statistical properties, particularly their stationarity. A variable is considered stationary when its mean and variance remain stable over time and when the covariance between two periods depends only on the time gap between them rather than on the specific point in time.

To evaluate these properties, the Augmented Dickey–Fuller (ADF) unit root test is applied. The ADF test examines whether a series contains a unit root, which would indicate non-stationarity. If a variable is found to be non-stationary in levels, it must be differenced until stationarity is achieved. The number of differences required defines the order of integration, denoted as I(d).

A 5 percent significance level is adopted as the decision rule for rejecting or accepting the presence of a unit root. The stationarity results reported in Table 3 provide the empirical basis for selecting the appropriate econometric techniques and for specifying the regression models used in the subsequent analysis.

Table 4 Unit Root Results

Determinant	**At Level t-statistic**	**Critical Value (5%)**	**First Difference t-statistic**	**Critical Value (5%)**
DEN	0.072	-3.01236	-3.628	-3.02069
CDR	-0.389	-3.01236	-2.089	-3.02069
ODR	1.504	-3.01236	-2.153	-3.02069
LEXP	0.604	-3.01236	-3.731	-3.02069
URB	0.144	-3.01236	-2.516	-3.02069
LGDPPC	2.556	-3.01236	-2.1	-3.02069
GINI	0.851	-3.01236	-3.292	-3.02069
INF	-1.635	-3.01236	-4.104	-3.02069
DCPS	0.742	-3.01236	-1.783	-3.02069
LAW	-0.799	-3.01236	-5.168	-3.02069
PS	-0.654	-3.01236	-2.035	-3.02069
COR	-1.171	-3.01236	-2.098	-3.02069

Source: Own calculations

The Augmented Dickey–Fuller test results show that all variables are non-stationary in their level form, meaning the null hypothesis of a unit root cannot be rejected. After applying first differences, each series becomes stationary, as indicated by test statistics exceeding the 5 percent critical threshold. This confirms that all variables are integrated of order one, I(1). Such a data structure satisfies the basic condition for using the ARDL framework and for examining long-run cointegration relationships.

In econometric research, the choice of methodology must reflect the properties of the dataset to ensure valid and interpretable results. Since the variables in this study are non-stationary in levels but stationary in first differences, it becomes necessary to investigate whether a stable long-run relationship exists among them. When variables share common stochastic trends, cointegration analysis is required to determine whether they move together over time despite short-term fluctuations. Cointegration implies that a linear combination of non-stationary variables remains stationary, indicating the presence of a long-run equilibrium relationship.

Several established techniques exist for testing and estimating cointegrated relationships. These include the Engle–Granger residual-based approach, the Johansen system method, the Johansen–Juselius procedure, the Fully Modified Ordinary Least Squares estimator, the Autoregressive Distributed Lag framework, and the Dynamic Ordinary Least Squares estimator. Each method addresses cointegration from a different econometric perspective.

In this study, long-run coefficients are estimated using the FMOLS and DOLS techniques. Both approaches correct for the biases that affect standard OLS in cointegrated systems, particularly those arising from endogeneity and serial correlation. As a result, they provide consistent and reliable parameter estimates.

The FMOLS method improves conventional OLS by adjusting for serial dependence in the residuals and for correlation between the regressors and the error term. These corrections are based on estimates of the long-run covariance structure, which ensures asymptotic efficiency and unbiased inference. FMOLS is especially useful in smaller samples, where standard estimators often perform poorly.

The DOLS approach, by contrast, incorporates leads and lags of the differenced explanatory variables directly into the regression model. This strategy explicitly controls for feedback effects and serial correlation in a parametric manner. By allowing for dynamic adjustments, DOLS often delivers more accurate estimates in finite samples.

The DOLS specification includes the dependent variable, the cointegrated regressors, and the lead–lag structure of the differenced explanatory variables. This setup reduces endogeneity concerns and improves estimation precision. Model selection criteria such as AIC or BIC are commonly used to determine the appropriate number of leads and lags.

Both FMOLS and DOLS are suitable tools for estimating long-run relationships in cointegrated systems. FMOLS relies on non-parametric corrections, while DOLS introduces dynamic adjustments through additional regressors. Empirical studies frequently favor DOLS because of its strong performance in small and medium samples and its ability to produce stable long-run elasticity estimates.

5. Empirical Results

In this section, we analyse the results from our empirical estimation.

Table 5 Empirical Results

Variable	**FMOLS Coefficient**	**FMOLS Std. Error**	**FMOLS Prob.**	**DOLS Std. Error**	**DOLS Prob.**	**FMOLS Coefficient**
CDR	-0.51506*	0.160649	0.0491	-0.511214*	0.146081	0.0173
ODR	0.816681***	0.061749	0.0009	0.81129***	0.107325	0.0006
LEXP	-0.891562**	0.128502	0.0061	-0.863988**	0.17173	0.004
URB	0.704965**	0.119854	0.0098	0.67049*	0.196774	0.0191
LGDPPC	4.576206**	0.631047	0.0054	4.566057**	0.876564	0.0034
GINI	-0.312248**	0.036522	0.0034	-0.31276***	0.02754	0.0001
INF	0.061893*	0.01513	0.0264	0.064197**	0.01435	0.0066
DCPS	0.071004*	0.021103	0.0436	0.070931**	0.017339	0.0094
LAW	-0.819195	0.544497	0.2295	-0.803776*	0.386269	0.092
PS	0.956028**	0.111331	0.0033	0.97656**	0.181982	0.003
COR	-8.138337***	0.524482	0.0006	-8.224774***	0.809411	0.0002

Source: Own calculations

Note (***p < 0.01, *$p < 0.05$, $p < 0.1$)

1. Demographic Factors

Young dependency ratio (CDR) — negative, significant the coefficient for the young dependency ratio is negative and statistically significant in both FMOLS and DOLS estimations. This indicates that a higher share of young dependents reduces life insurance density in Macedonia. From an economic perspective, households with more children face higher short-term consumption needs related to education, healthcare, and basic living expenses. These financial pressures limit their ability to allocate resources toward long-term financial instruments such as life insurance. In the Macedonian context, where household budgets remain relatively constrained, child-related expenditures crowd out precautionary savings and insurance purchases.

Old-age dependency ratio (ODR) — positive, highly significant the old-age dependency ratio shows a strong positive and highly significant effect. This suggests that population ageing increases life insurance demand in Macedonia. As the share of elderly dependents rises, working-age individuals become more concerned about income security, family protection, and future financial obligations. This stimulates demand for life insurance products, particularly those linked to survivor benefits and long-term financial planning. Unlike in some Western European countries where pension systems dominate old-age security, Macedonia's relatively modest pension replacement rates make private insurance more relevant.

Life expectancy (LEXP) — negative, significant Life expectancy has a negative and significant impact on life insurance density. Rising life expectancy lowers perceived short-term mortality risk, reducing the urgency to purchase life insurance. In Macedonia, where insurance products are still dominated by basic protection contracts rather than savings-linked policies, longer expected lifespans do not translate into higher insurance demand. Instead, households delay or avoid purchasing coverage when mortality risks appear less immediate.

Urbanization (URB) — positive, significant Urbanization exerts a positive and statistically significant influence on life insurance density. Urban residents have better access to insurance providers, higher financial literacy, and greater exposure to financial marketing. In Macedonia, insurance activity is concentrated in urban centers such as Skopje, while rural areas remain underserved. Urban households also tend to have more stable incomes, making them more likely to invest in long-term financial products.

2. Economic and Social Conditions

Income (LGDPPC) — positive, highly significant GDP per capita shows a strong positive effect across both models. Higher income levels increase households' capacity for long-term financial planning and risk management. As Macedonian incomes rise, families become more willing and able to purchase life insurance to secure future financial stability. This confirms classical insurance demand theory and highlights economic growth as a key driver of insurance market development.

Income inequality (GINI) — negative, significant The Gini coefficient has a negative and significant effect on life insurance density. Higher inequality reduces overall market participation, as large segments of the population lack the financial means to afford insurance products. In Macedonia, insurance demand is concentrated among higher-income groups, while lower-income households remain excluded. Rising inequality therefore limits the expansion of the insurance market at the aggregate level.

Inflation (INF) — positive, significant Inflation shows a positive and significant relationship with life insurance density. This suggests that during periods of higher inflation, households increase their demand for insurance as a form of financial protection. In Macedonia, inflation often signals economic uncertainty. Under such conditions, households may view life insurance as a precautionary instrument to protect family income against unforeseen risks.

Domestic credit to private sector (DCPS) — positive, significant Financial depth, measured by domestic credit to the private sector, has a positive and statistically significant effect. A more developed banking sector improves financial inclusion, enhances financial literacy, and facilitates cross-selling of insurance products. In Macedonia, banks play a central role in distributing insurance products, particularly credit-linked life insurance. As credit expands, insurance demand increases alongside it.

3. Institutional and Governance Factors

Rule of law (LAW) — negative, insignificant in FMOLS; weakly significant in DOLS The rule of law shows a negative effect, which is statistically insignificant in FMOLS and only weakly significant in DOLS. This indicates that formal legal improvements alone have not translated into higher insurance demand in Macedonia. A likely explanation is the gap between legal reforms and actual enforcement. Public trust in institutions remains limited, and households continue to rely on informal risk-sharing mechanisms rather than formal insurance contracts.

Political stability (PS) — positive, significant Political stability has a positive and significant impact on life insurance density. A more stable political environment strengthens confidence in long-term financial commitments and reduces uncertainty about future income conditions. In Macedonia, political stabilization supports household willingness to engage in long-term contracts such as life insurance policies.

Control of corruption (COR) — negative, highly significant Control of corruption has a strong negative coefficient, implying that higher perceived corruption reduces life insurance density. Corruption undermines trust in institutions, financial intermediaries, and contract enforcement. When households doubt the integrity of insurers and regulators, they hesitate to commit to long-term insurance products. This result highlights governance quality as a critical barrier to insurance market development in Macedonia.

The results point to several clear policy priorities for strengthening life insurance demand in Macedonia. Income growth remains a central driver, so policies that raise real wages and employment stability will directly support insurance affordability. Urban–rural gaps in access should be reduced by expanding insurance distribution networks and digital channels outside major cities. High youth dependency pressures household budgets, so family support measures such as childcare subsidies and tax relief can free resources for long-term financial planning. Financial sector development matters, which means closer bank–insurance integration and broader credit access will help normalize insurance

use. Inflation stability also matters, since price volatility weakens confidence in long-term contracts. Governance reforms are critical, especially in reducing corruption and improving institutional trust, because households avoid long-term commitments when they doubt enforcement and transparency. Legal reforms must focus on implementation, not only formal rules, to strengthen contract credibility. Financial literacy programs should target younger and lower-income households to expand inclusion. Together, these measures can shift life insurance from a niche product toward a broader financial protection tool in Macedonia.

Conclusion

This study analyzed the demographic, economic, financial, and institutional factors influencing life insurance density in Macedonia over the period 2003 to 2024. Life insurance plays an important role in household financial security and long-term risk management. Identifying the drivers of demand helps improve market development and policy design.

Demographic factors show mixed effects. A higher young dependency ratio reduces life insurance demand. Households with more children prioritize short-term spending over long-term protection. The old-age dependency ratio does not show a significant influence. This reflects the dominant role of public pensions in old-age income support. Life expectancy has a negative impact on insurance demand. Longer expected lifespans lower perceived mortality risk and reduce the urgency of coverage. Urbanization strongly increases life insurance density. Urban residents benefit from better financial access, higher literacy, and stronger market presence.

Macroeconomic conditions play a central role. Income growth significantly raises life insurance demand. Higher earnings improve households' ability to invest in long-term protection. Income inequality reduces market participation, since lower-income groups face affordability constraints. Inflation shows a positive effect, indicating precautionary behavior during periods of economic uncertainty. Financial development also supports insurance demand by expanding access to formal financial services and credit.

Institutional quality remains a key constraint. Stronger control of corruption increases life insurance demand by improving trust in financial contracts. Political stability supports long-term planning and confidence in insurers. The rule of law shows weak effects, suggesting that legal reforms alone do not guarantee effective enforcement or public trust.

Several policy directions emerge from these findings. Governments should support income growth and employment stability to improve insurance affordability. Rural access to insurance services needs expansion through digital platforms and regional outreach. Family-support measures can ease child-related financial pressures and encourage long-term planning. Financial literacy programs should target young and low-income households. Anti-corruption efforts must remain a priority to strengthen confidence in insurance markets. Institutional reforms should focus on enforcement, not only legislation.

This study has limitations. The analysis relies on aggregate time-series data, which does not capture household-level differences. Insurance-specific data availability in Macedonia remains limited. Supply-side factors such as product design, pricing, and distribution channels were not directly modeled.

Future research should use micro-level household data to capture demand heterogeneity. Studies should include insurer competition and product innovation. Regional comparisons within the Western Balkans would improve external validity. Behavioral factors such as trust, risk perception, and financial awareness deserve deeper attention. The role of digital insurance platforms also requires further investigation.

References

1. Abenezer, D. (2017). Determinants of life insurance demand in Ethiopia. *International Journal of Research in Finance and Marketing*, *7*(6), 36–49.
2. Alhassan, A. L., & Biekpe, N. (2016). Insurance market development in Africa: Do institutions matter? *Research in International Business and Finance*, *37*, 127–146. https://doi.org/10.1016/j.ribaf.2015.10.016
3. Amrot, A. (2014). Determinants of life insurance demand in Ethiopia. *Journal of Economics and Sustainable Development*, *5*(17), 31–40.
4. Beck, T., & Webb, I. (2003). Economic, demographic, and institutional determinants of life insurance consumption across countries. *The World Bank Economic Review*, *17*(1), 51–88. https://doi.org/10.1093/wber/lhg011
5. Beenstock, M., Dickinson, G., & Khajuria, S. (1986). The determinants of life premiums: An international cross-section analysis. *Insurance: Mathematics and Economics*, *5*(4), 261–270.
6. Boonyasai, T., Grace, M. F., & Skipper, H. D. (2002). The effect of liberalization and deregulation on life insurer efficiency. *Journal of Risk and Insurance*, *69*(4), 535–558. https://doi.org/10.1111/1539-6975.00033
7. Borges, M. R., Nektarios, M., & Barros, C. P. (2008). Analysing the efficiency of the Greek life insurance industry. *European Research Studies*, *11*(3), 1–18.
8. Borges, M. R., Nunes, J. P., & Rego, J. C. (2008). Mergers and acquisitions in the European insurance industry. *Journal of Risk Finance*, *9*(3), 231–245. https://doi.org/10.1108/15265940810875661
9. Browne, M. J., & Kim, K. (1993). An international analysis of life insurance demand. *Journal of Risk and Insurance*, *60*(4), 616–634.
10. Camino-Mogro, S., Armijos-Bravo, G., & Cornejo-Marcos, G. (2019). Competition in the insurance industry in Ecuador: An econometric analysis in life and non-life markets. *The Quarterly Review of Economics and Finance*, *71*, 291–302. https://doi.org/10.1016/j.qref.2018.10.001
11. Camino-Mogro, S., Bermúdez-Barrezueta, N., & Ordóñez-Matamoros, G. (2019). Insurance market liberalization and performance: Evidence from Latin America. *Journal of Economic Policy Reform*, *22*(4), 329–346. https://doi.org/10.1080/17487870.2018.1436545

12. Cargill, T. F., & Troxel, T. E. (1979). Modeling life insurance savings: Some econometric results. *Journal of Risk and Insurance*, *46*(3), 391–412.

13. Catalan, M., Impavido, G., & Musalem, A. R. (2000). *Contractual savings or stock market development: Which leads?* (Policy Research Working Paper No. 2421). World Bank. https://documents.worldbank.org/en/publication/documents-reports/documentdetail/993331468739485179

14. Chandrapal, J. D. (2019). Impact of liberalisation on Indian life insurance industry: A truly multivariate approach. *IIMB Management Review*, *31*(3), 283–297. https://doi.org/10.1016/j.iimb.2019.03.003

15. Chandrapal, J. D. (2019). Regulatory reforms and efficiency of insurance companies. *Asian Journal of Economics and Finance*, *1*(1), 1–12.

16. Cummins, J. D. (1999). Efficiency in the US life insurance industry: Are insurers minimizing costs and maximizing revenues? In J. D. Cummins (Ed.), *Changes in the life insurance industry: Efficiency, technology and risk management* (pp. 75–115). Springer. https://doi.org/10.1007/978-1-4615-5045-7_3

17. Cummins, J. D., Doherty, N. A., & Lo, A. (1999). Can insurers pay for the "big one"? Measuring the capacity of the insurance market to respond to catastrophic losses. *Journal of Banking & Finance*, *23*(6), 859–884. https://doi.org/10.1016/S0378-4266(98)00079-2

18. Cummins, J. D., Klumpes, P., & Weiss, M. A. (2015). Mergers and acquisitions in the global insurance industry: Valuation effects. *The Geneva Papers on Risk and Insurance – Issues and Practice*, *40*(3), 444–473. https://doi.org/10.1057/gpp.2015.18

19. Cummins, J. D., Rubio–Misas, M., & Vencappa, D. (2017). Competition, efficiency and soundness in European life insurance markets. *Journal of Financial Stability*, *28*, 66–78. https://doi.org/10.1016/j.jfs.2016.11.007

20. Cummins, J. D., Tennyson, S., & Weiss, M. A. (2017). International insurance markets: Trends and challenges. *Risk Management and Insurance Review*, *20*(1), 7–39. https://doi.org/10.1111/rmir.12074

21. Davutyan, N., & Klumpes, P. J. M. (2008). Consolidation in the European insurance industry: Do mergers and acquisitions create value for shareholders? *Journal of Risk and Insurance*, *75*(3), 661–688. https://doi.org/10.1111/j.1539-6975.2008.00271.x

22. Dragos, S. L. (2014). Institutional drivers of insurance consumption: The role of governance quality in Europe. *Transylvanian Review of Administrative Sciences*, *42E*, 30–46.

23. Dragota, I. M., Dragos, S. L., & Mitrică, E. (2023). Institutional determinants of life insurance demand in OECD countries. *Geneva Papers on Risk and Insurance*, *48*(2), 215–238.

24. Dragota, V., Dragota, M., Oprea, D. S., & Stoian, A. (2023). Determinants of life insurance demand: Evidence from OECD countries. *Economies*, *11*(3), 82. https://doi.org/10.3390/economies11030082

25. Eling, M., & Schaper, P. (2017). Under pressure: How the business environment affects productivity and efficiency of European life insurance companies. *European Journal of Operational Research*, *258*(3), 1082–1094. https://doi.org/10.1016/j.ejor.2016.08.070

26. Elisa, C., Danilo, L., & Marco, P. (2015). Household demand for life insurance in Italy. *Italian Economic Journal*, *1*(2), 157–179.

27. Eric, A., & Hadrat, Y. (2015). Factors influencing life insurance demand in Ghana. *Journal of African Business*, *16*(3), 276–295.

28. Feyen, E., Lester, R., & Rocha, R. (2011). *What drives the development of the insurance sector? An empirical analysis based on a panel of developed and developing countries* (Policy Research Working Paper No. 5572). The World Bank.

29. Financial Times. (2025, February 10). China's ageing population fuels demand for digital insurance. *Financial Times*. https://www.ft.com/content/2e6f247d-88d5-4d07-b496-67cc942350bd

30. Fortune, P. (1973). A theory of optimal life insurance. *Journal of Finance*, *28*(3), 587–600.

31. Ganesh, S. (2018). Socio-economic determinants of life insurance purchases in India. *Indian Journal of Finance*, *12*(4), 25–38.

32. Gockov, G., & Kamenjarska, O. (2021). Profitability determinants of insurance companies: Evidence from North Macedonia. *Economic Development*, *23*(1-2), 131–146. https://js.ugd.edu.mk/index.php/ed/article/view/4876

33. Hansen, B. E., & Phillips, P. C. B. (1991). Fully modified estimation and testing for cointegrated vectors. *Journal of Business & Economic Statistics*, *9*(3), 321–340.

34. Hasan, M., Rahman, M. T., & Akter, S. (2025). Dependence relationship between insurance demand and some economic, financial, and socio-demographic factors: Evidence from Bangladesh. *Insurance Markets and Companies*, *16*(1), 35–48. https://doi.org/10.21511/ins.16(1).2025.03

35. Headen, R. S., & Lee, J. F. (1974). Life insurance demand and household saving behavior. *Journal of Risk and Insurance*, *41*(4), 685–698.

36. Hoxha, E., & Bakraçi, K. (2017). Institutional determinants of life insurance consumption in transition economies. *International Journal of Economics, Commerce and Management*, *5*(7), 172–186.

37. Ibiwoye, A., Ideji, J., & Ogundele, A. (2010). Determinants of life insurance demand in Nigeria. *Journal of Emerging Trends in Economics and Management Sciences*, *1*(2), 87–95.

38. Jovanovski, T. (2005). *Osiguritelno pravo [Insurance law]*. Skopje: Prosvetno Delo.

39. Kjosevski, J. (2012). The determinants of life insurance demand in Central and Southeastern Europe. *International Journal of Economics and Finance*, *4*(3), 237–247. https://doi.org/10.5539/ijef.v4n3p237

40. Klumpes, P. J. M. (2022). Consolidation and performance in the European insurance market. *Geneva Papers on Risk and Insurance*, *47*(2), 203–224. https://doi.org/10.1057/s41288-021-00250-4

41. Li, D., Moshirian, F., Nguyen, P., & Wee, T. (2007). The demand for life insurance in OECD countries. *Journal of Risk and Insurance*, *74*(3), 637–652. https://doi.org/10.1111/j.1539-6975.2007.00228.x

42. Liu, Y. (2023). Framing effects in life insurance decisions. *Journal of Behavioral Finance*, *24*(2), 145–159.

43. Masih, R., & Masih, A. M. M. (1996). Stock-Watson dynamic OLS (DOLS) and error-correction modelling approaches to estimating long- and short-run elasticities in a demand function: New evidence and methodological implications from an application to the demand for coal in mainland China. *Energy Economics*, *18*(3), 315–334.

44. Namirembe, J., Kibirige, I., & Mwesigwa, R. (2023). Behavioral biases and insurance decisions in Uganda. *African Journal of Economic and Management Studies*, *14*(3), 412–428.

45. Outreville, J. F. (2023). Determinants of life insurance demand in BRICS countries: A panel data analysis. *Risks*, *11*(4), 73. https://doi.org/10.3390/risks11040073

46. Phillips, P. C. B., & Hansen, B. E. (1990). Statistical inference in instrumental variables regression with I(1) processes. *Review of Economic Studies*, *57*(1), 99–125.

47. Roman, M. (2011). Long-run determinants of life insurance demand in Ethiopia. *African Journal of Business Management*, *5*(5), 1885–1896.

48. Soo, H. H. (1996). Life insurance and economic growth: Theoretical and empirical investigation. *Journal of Risk and Insurance*, *63*(4), 642–650. https://doi.org/10.2307/253725

49. Srinivasan, P., & Mitra, A. (2024). Socioeconomic determinants of life insurance penetration in OECD countries. *Economic Modelling*, *121*, 106186.

50. Statista. (2025). *Life insurance market in North Macedonia – forecast 2025–2029*. Retrieved from https://www.statista.com

51. Stojanović, D., Milošević, S., & Urošević, B. (2021). Determinants of life insurance consumption in the Western Balkans. *Economic Annals*, *66*(229), 25–54. https://doi.org/10.2298/EKA2129025S

52. Stock, J. H., & Watson, M. W. (1993). A simple estimator of cointegrating vectors in higher order integrated systems. *Econometrica*, *61*(4), 783–820.

53. Swiss Re Institute. (2019). *World insurance: The great pivot east continues*. Zurich: Swiss Re Group.

54. Tigest, K. (2018). Determinants of life insurance demand in Ethiopia. *Journal of Economics and Development Studies*, *6*(3), 45–58.

55. Truett, D. B., & Truett, L. J. (1990). The demand for life insurance in Mexico and the United States. *Journal of Risk and Insurance*, *57*(2), 321–328.

56. Ucal, M., & Bilgin, M. H. (2009). *Income inequality and FDI in Turkey: FM-OLS estimation and ARDL approach to cointegration* (MPRA Paper No. 48765).

57. Ward, D., & Zurbruegg, R. (2000). Does insurance promote economic growth? Evidence from OECD countries. *Journal of Risk and Insurance*, *67*(4), 489–506. https://doi.org/10.2307/253847

58. Webb, I. P., Grace, M. F., & Skipper, H. D. (2002). *The effect of banking and insurance on the growth of capital and output* (Center for Risk Management and Insurance Working Paper 02). Georgia State University.

59. Xu, Y., & Zhang, H. (2024). Money illusion and insurance demand. *Journal of Economic Psychology*, *98*, 102578.

60. Zanghieri, P. (2009). *EU insurance regulation and market integration* (European Economy – Economic Papers No. 386). European Commission.