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ASSESSMENT OF THE IMPACT OF COMPULSORY INSURANCE ON ENSURING ECONOMIC GROWTH (THE CASE OF THE RA)

In the framework of this study, we have studied the works of many international authors related to the identification of the connections between the insurance market and economic growth, after which we have carried out our analysis using the Granger causality test model. The relationships between compulsory insurance and economic growth of the RA, using annual data throughout 2011-2022, have been examined in this paper. During the research descriptive statistical analysis and econometric models have been applied. The significance of the insurance-growth relationship has been better understood thanks to this study, which also includes other methods used in recent scientific publications.

The following findings are the outcome of the research.

- *In Armenia we have a high correlation between voluntary and compulsory insurance sectors and economic growth indicators.*
- *The Granger test has demonstrated a one-way causal relationship between GDP and voluntary insurance and bidirectional causality between compulsory insurance premiums and GDP variables.*

As a result of this research, the positive consequences of the introduction of a new type of compulsory insurance in the processes of ensuring economic growth have been substantiated.

Keywords: *insurance density, penetration, economic growth, Granger causality test, Unit root test*

JEL: G22, O40
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INTRODUCTION. In the financial sector of any country, insurance companies play an important role in the economy, and insurance activities are a guarantee of sustainable economic growth. As we know, the financial market has an important impact on economic growth, but in order to understand to what extent and in what directions the insurance sector affects or can affect the processes of economic growth, it is necessary to carry out quantitative, econometric and/or statistical analyses.

In contrast to the banking system, quantitative modeling that relates macroeconomic variables to the balance sheet, profit and loss, or investment performance of insurance companies is scarce. Despite the limited scope of the insurance sector, the topic has not been deeply explored by the wider academic community. Most published documents come from regulatory bodies responsible for financial system stability.

LITERATURE REVIEW. The prospective expansion of the insurance markets in Eastern, Central and Southeastern Europe was investigated in a study conducted by European economists Bianchi et al. They estimated the increase in insurance premiums using panel regression (a statistical method for the analysis of longitudinal data), where the real increase in insurance premiums is explained by the increase in real GDP. In the modeling framework, however, other macroeconomic variables that may contribute to the development of the insurance market are not considered. The research showed a dependency ratio of insurance premiums of 1.51, which meant that for 1% increase in GDP, the insurance market would grow by 1.51% (measured by gross premiums) (Bianchi et al, 2011).

Marco Arena conducted an empirical examination the purpose of which was to evaluate the insurance market's capacity to spur economic expansion. Applying the moments generalized approach to dynamic panel data, he demonstrated how insurance market's activity (divided into life and non-life insurance) might affect economic development using data from 55 nations between 1976 and 2004. The findings confirmed that insurance had a substantial and favorable causal impact on economic growth. For non-life insurance, this link is not as strong as it is for life insurance in high-income nations (Arena, 2008). In a similar vein, Lee and colleagues used a panel regression model to analyze data from 41 nations between 1979 and 2007. In the study real GDP and life insurance premiums were shown to have an equilibrium connection over the long term in. The results have shown that a 1% increase in life insurance premiums increases real GDP by 0.06% (Lee et al, 2013).

Romanian economists Burca and Batrinka focused on marine insurance and estimated and anticipated changes in gross insurance premiums from 1996 to 2011 using ARIMA models (ARIMA - Autoregressive Integrated Moving Average). Although macroeconomic variables are not addressed, the research

shows the high stability of gross insurance premiums for the industry (Burca and Batrinca, 2013).

Distinctive analysis of the relationship between insurance and economic growth was also carried out by V. Peleckienei et al. The authors studied the correlations between the insurance system and economic growth of the European Insurance Federation member countries. Using annual data from 2004-2015, the authors used statistical analysis and econometric methods. The research had the following results:

- Nations with strong economic growth, such as the Netherlands, Great Britain, Ireland, Finland and Denmark, had more developed insurance sectors.
- Insurance penetration and economic growth rates were shown to be positively and statistically significantly correlated in Denmark, Luxembourg, Finland and the Netherlands. Conversely, a negative relationship was found in Belgium, Austria, Estonia, Malta and Slovakia.
- In Finland and Luxembourg the Granger test showed unidirectional causality from GDP to the insurance sector, and on the contrary from insurance to GDP in Malta, the Netherlands, and Estonia. Austria showed a bilateral causality between the variables. There was no correlation found in Slovakia between insurance and economic development (Peleckienei et al, 2019).

European Committee's studies have shown that the insurance market stimulates economic growth in the following ways:

- shields companies from the negative effects of suffering significant losses,
- reduces losses to support lending and commercial operations,
- encourages entrepreneurship, market vigor, competitiveness, and innovation,
- increases the use of life insurance to facilitate financial intermediation,
- allows for the engagement of risk-averse individuals and organizations in higher return/risk activities (Brainard, 2008).

The investigations by Haiss and Sumegi produced some significant conclusions about the connection between insurance and economic growth, notwithstanding the variations in the outcomes of the studies conducted in different countries. They examined how insurance premiums and investments affected Europe's economic expansion. The authors analyzed panel data for 29 European countries from 1992 to 2005. The findings demonstrated that life insurance had a favorable impact on economic growth in fifteen EU countries, such as Norway, Switzerland and Iceland. The study indicated that the impact of liability insurance is greater for the recently admitted member states of the European Union in Central and Eastern Europe. The results also emphasized

how real interest rates and economic development level affected the link between insurance and economic growth. The researchers insisted that the insurance sector should be given more attention when analyzing the financial sector and in the development of macroeconomic policies (Haiss and Sumegi, 2008).

Using a static panel data model, Zouhaier investigated the connection between insurance and economic development in 23 OECD member nations between 1990 and 2011. The main findings showed a positive effect of non-life insurance on economic growth, as measured by the penetration coefficient, and a negative effect of total insurance premiums and non-life insurance when calculated using coefficients of economic growth and insurance density. Without providing evidence, the author came to the conclusion that this study could only partially shed light on the connection between the insurance industry and the expansion of emerging nations' economies. Uncertainty in the findings implies that it may be challenging to measure or forecast a direct correlation between insurance and economic progress (Zouhaier, 2014).

Consequently, despite the intimate ties between the banking, insurance, and stock markets, the insurance industry has not gotten all of the emphasis in recent research. Researchers contend that insurance, as opposed to banking and stock markets, serves somewhat different economic purposes and that this merits further consideration and research. A survey of recent studies has revealed that, despite the insurance sector's widely acknowledged importance in economic growth, little is known about the relationship between insurance and growth, particularly in the emerging nations.

RESEARCH METHODOLOGY. As previously mentioned, some writers developed a model for exposing the relationships between insurance and economic growth based on variations in the dynamics of aggregate premiums by utilizing the coefficients of insurance penetration (the ratio of insurance premiums to GDP) and the degree of insurance density (the amount of insurance premiums per person). Some authors have looked at total insurance premiums by constructing and analyzing panel regression series, but again without disaggregating the sources of premium formation. The only separation encountered was between life and non-life insurance.

We have made a clear distinction between mandatory and voluntary insurance premiums during the construction of our model and conducted the study based on their simultaneous and independent changes. In the model, we have focused on the index characterizing the insurance curve - the level of insurance density and selected GDP per capita from the indicators characterizing economic growth. The choice of indicators is based on the fact that the only mandatory insurance type of the RA is CMTPLI, and the largest voluntary insurance - health insurance, are significantly affected by the change in the number of the population, and to be as accurate as possible in our

estimations, we have chosen an indicator that carries the effect of population change. The indicator of economic growth has been chosen based on all this.

We have conducted a correlation analysis to identify the relationship between insurance and economic growth in the RA. However since correlation analysis does not provide information about causality, we have also conducted Granger causality testing (Granger, 1969). The Granger testing model is widely used in the context of identifying the relationship between financial markets and economic growth (Granger, 1980).

The Granger test is performed with the help of two regression equations:

$$yt=\beta_1, 0+\sum i=1p\beta_1, iyt-i+\sum j=1p\beta_1, p+jxt-j+\varepsilon 1t \quad [1]$$

$$xt=\beta_2, 0+\sum i=1p\beta_2, iyt-i+\sum j=1p\beta_2, p+jxt-j+\varepsilon 1t \quad [2]$$

where p is the lag or time step number, β is the parameter, and ε is the error.

If the p parameters $\beta_{1,p+j}$ are jointly significant, then the null hypothesis that x is not the Granger cause of y can be rejected. Similarly, if the p parameters $\beta_{2,i}$ are jointly significant, then the null hypothesis that y does not Granger cause x can be rejected. The Granger causality test assumes that a variable x is Granger cause for another variable y if past values of x help predict the current level of y given all other relevant information. We must first determine if the time series data are stationary or non-stationary before applying the Granger causality test. We have used the Augmented Dicky-Fuller (ADF) unit root test method (Fuller, 1976) for this purpose. Time series can be subjected to one of three ADF test conditions. These prerequisites are listed below: [3] The process has an interruption, but there is no trend; [4] The process has both a trend and an interruption; and [5] There is neither a trend nor an interruption.

The null hypothesis of the ADF test is that the time series have a unit root, which indicates non-stationarity. Mathematically, the null hypothesis can be expressed as $H_0:\rho=1$, where ρ represents the coefficient of the lagged term in the time series regression equation. An alternative hypothesis is that the time series are stationary, meaning they do not have a unit root. This is expressed as $H_1:\rho<1$.

$$\Delta yt=a+\delta yt-1+ut, \text{ (there is an intercept, no trend)} \quad [3]$$

$$\Delta yt=a+\delta yt-1+\beta t+ut, \text{ (there is an intercept and trend)} \quad [4]$$

$$\Delta yt=\delta yt-1+ut, \text{ (no intercept, no trend)} \quad [5]$$

where a is an intercept and δ and β are coefficients, u_t is white noise, and t is a time variable.

If it becomes evident after using ADF that a particular variable is non-stationary, the value of the first difference and, if required, the second difference should be used.

Statistical analyses have been performed using the econometric software E-views v.12 and Microsoft Excel.

ANALYSIS. We have chosen two insurance indicators – total insurance premiums per person, or density degree, and the ratio of total insurance premiums to GDP, or insurance penetration – as well as one economic growth indicator, GDP per capita, to examine trends and relationships between insurance and economic growth in the RA. When calculating insurance indicators, we have made a distinction between insurance premiums collected from compulsory insurance and voluntary insurance premiums. As the only mandatory insurance type operating in the RA - CMTPLI has been implemented since 2011, the time series of our study are taken for the years 2011-2022.

Table 1 presents the RA GDP per capita for 2011-2022, insurance penetration and density indicators for mandatory and voluntary types of insurance during 2011-2022.

The data in the table represent the results of a descriptive analysis. We can see from the table that the main indicator characterizing the economy, GDP per capita, had a clearly expressed growth trend, with the only decline in 2020, which was predictable considering the war and its consequences. The ithnsurance premiums/GDP ratio characterizing the insurance market had a steady upward trend in terms of general insurance types, but the indicator had a different behavior for voluntary and mandatory insurance types. The coefficient was more stable in terms of compulsory insurance.

Regarding the index of insurance premiums per capita, the dynamics was again upward and had different behaviors in terms of compulsory and voluntary insurance types.

Table 1[1]

Years	*GDP per capita (AMD)*	*Gross insurance premiums/GDP ratio (%)*			*Insurance premiums per capita (AMD)*		
		Voluntary ins.	*Mandatory ins.*	*Gross ins.*	*Voluntary ins.*	*Mandatory ins.*	*Gross ins.*
2011	1,247,711	0.10%	0.39%	0.58%	1,191	4,889	7,242
2012	1,410,820	0.48%	0.35%	0.83%	6,744	5,003	11,748
2013	1,507,491	0.43%	0.35%	0.78%	6,485	5,346	11,831
2014	1,602,172	0.26%	0.37%	0.62%	4,088	5,901	9,989
2015	1,678,637	0.27%	0.35%	0.62%	4,581	5,878	10,459
2016	1,693,444	0.29%	0.36%	0.65%	4,952	6,123	11,075
2017	1,867,656	0.29%	0.34%	0.63%	5,401	6,434	11,836
2018	2,026,620	0.35%	0.34%	0.69%	7,093	6,845	13,937
2019	2,208,716	0.38%	0.37%	0.75%	8,428	8,206	16,634
2020	2,087,423	0.38%	0.34%	0.72%	7,933	7,156	15,089
2021	2,360,253	0.39%	0.33%	0.71%	9,091	7,764	16,854
2022	2,863,304	0.42%	0.31%	0.73%	12,058	8,902	20,960
Time-period average	1,879,521	0.34%	0.35%	0.70%	6,504	6,537	13,138

[1] The calculations were carried out by the author using the databases of the Statistical Committee of the Republic of Armenia and the CB of the Republic of Armenia (07/02/2024).

To assess the relationship between insurance and economic growth, we conducted a Correlation Analysis, which measured the strength of the correlation between the two variables. Table 2 shows the results of the insurance density degree and GDP per capita correlation analysis. The correlation coefficient expresses the degree of strength of the linear regression relationship between two indicators. We have also used T^{Stat} and T^{Cr} indices to assess the strength of the correlation between two arrays and determine whether the correlation is statistically significant or not. In economics, T^{Stat} and T^{Cr} are key concepts used primarily for hypothesis testing and evaluation. If the absolute value of the calculated T-Statistic (T^{Stat}) is greater than the critical value (T^{Cr}), then the Correlation coefficient is statistically significant at the selected significance level (the significance level of the numerical series is set to the standard 5%, and the freedom of the critical value is n−2 for testing the significance of the correlation coefficient). In other words, there is evidence that the correlation is not the result of random sampling.

Table 2

Indicators	*Voluntary ins.*	*Mandatory ins.*	*Gross ins.*
Correlation coefficient	88.5%	97.6%	95.4%
$\mathbf{T^{Stat}}$	6,02	14,09	10,06
$\mathbf{T^{Cr}}$	2,23	2,23	2,23

The results shown by the coefficients state that there is a positive statistically significant relationship between the degree of insurance density and economic growth. However, correlational analysis does not say anything about the causality of the relationship between the variables. For this purpose, we have used the Granger causality test to time series data on insurance and economic development indicators.

Most often, time series data are non-stationary and contain a unit root. So, we have begun our analysis with a Unit Root Test for all time series variables.

The concept of stationarity is essential in time series analysis. A stationary time series has a constant mean, variance, and autocovariance over time, which facilitates modeling and forecasting, increasing the degree of accuracy. On the other hand, non-stationary time series has trends, seasonal patterns, or other time-dependent structures that make modeling and forecasting more difficult.

The hypotheses are as follows.

- null hypothesis (H_0). variables are non-stationary or have a unit root,
- alternative hypothesis (H_1). variables are stationary.

Considering the significance levels of 1%, 5% and 10%, an ADF test has been performed with the three possible conditions already mentioned [3,4,5]. All calculations have been performed using the econometric software Eviews v. 12.0.

Analysis of baseline indicators showed that in all three conditions, the time series of the indicators were non-stationary, and had a unit root, which made it impossible to study the causality of the correlation. To check the existence of a

further unit root, as well as to try to make the time series stationary, we also performed first difference (Y_t-Y_{t-1}) and second difference ((Y_t-Y_{t-1})-(Y_{t-1}-Y_{t-2})) testing by the ADF method. In this case, we also found that not all indicators are stationary, or that the linear regression relationship is not effective for further studies to identify causal relationships. To correct such a situation, we performed ADF testing by examining the logarithmic relationship of numerical series. The logarithmic function of the numerical series has shown that this type of relationship is most suitable for making further predictions: when the p indicator is lower than the null condition of the 5% significance level. Table 3 gives the results of the ADF tests.

Table 3

Indicators	*there is an interruption [3]*	*there is a break, there is a trend [4]*	*no discontinuity, no trend [5]*
GDP per capita	-3.320969	-3.590496	-1.598068
Total insurance premiums	-3.212696	-4.107833	-2.81674
Voluntary insurance premiums	-4.297073	-5.295384	-1.60014
Mandatory insurance premiums	-2.771129	-3.515047	-1.599088

After making the time series of indicators stationary (logarithmic), we can apply the Granger causality test to determine the directions of effects between these indicators. The Granger causality test was used to investigate the connection between the coefficient of insurance density and economic growth for voluntary, compulsory and overall insurance markets.

According to the Granger model, one variable (the degree of insurance density) leads to another variable (economic growth - GDP) if its previous values (insurance) can be used to forecast the current level of that indicator (economic growth - GDP). The idea of causal order serves as the foundation for the Granger test. Furthermore, if economic growth does lead to changes in the insurance industry, then given past values of economic growth indicators, can predict the insurance industry's current performance. The results of the Granger causality test are summarized in Table 4 and presented below.

Table 4

Null Hypotheses	*Observations/ Interruptions*	*F-statistic*	*P-value*	*Test result*
Voluntary Insurance is not a Granger cause of economic growth	10/2	0.06696	0.9391	Is approved
Economic growth is not a Granger cause of Voluntary Insurance	10/2	9.58700	0.0195	Rejected
Compulsory Insurance is not a Granger cause of economic growth	10/2	3.99467	0.0919	Rejected
Economic growth is not a Granger cause of Compulsory Insurance	10/2	28.0509	0.0019	Rejected
Total Insurance is not a Granger cause of economic growth	10/2	0.01894	0.9813	Is approved
Economic growth is not a Granger cause of Total Insurance	10/2	2.71414	0.1592	Is approved

The null hypothesis has been rejected if the probability (P-value) associated to the F-statistic is ≤ 0.1. Conversely, the null hypothesis has been accepted if the associated probability (P-value) of the F statistic is > 0.1.

CONCLUSION. The results of the Granger causality test provide fresh empirical perspectives on the connection between insurance and economic expansion. The research shows a unidirectional direct effect from existing GDP to the voluntary insurance market in the case of observing two lags. This means that voluntary insurance has insignificant role in the context of ensuring the economic growth of the RA. The change in voluntary insurance follows or depends on the change in economic growth. And against all this, the Granger test shows a two-way causality between compulsory insurance and GDP. It becomes clear that just as economic expansion influences the establishment and development of the mandatory insurance industry, so does the impact industry on GDP, serving as a means of guaranteeing economic expansion. Nevertheless, the study reveals a weak or nonexistent causal association between total insurance premiums and economic growth, providing a basis to argue that the scenario is the result of declining relative quantities of mandatory insurance. It can be argued that the introduction of new compulsory insurance will have a good effect on the process of ensuring economic growth because the analysis has demonstrated that compulsory insurance types, in contrast to voluntary insurance types, have a favorable impact on the process of ensuring GDP.

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