RELATIONSHIP BETWEEN INSURANCE MARKET AND ECONOMIC GROWTH IN THE EUROPEAN UNION

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Abstract

This paper examines the relationship between insurance market development and economic growth in EU member states in the period 1998–2018. Our results indicate that there is no causality between premium per capita and GDP per capita growth in the case of 11 out of the 23 analysed countries, including four countries classified as emerging markets. However, in the case of panel data covering all the countries, we determined a two-way causality between insurance market development and economic growth. In the short run, premium per capita has a positive and significant impact on the economic growth as proven in the data panel and in the case of individual countries, except in the case of Ireland and Luxembourg, where the applied model shows only error-correction coefficient values. Besides, our results indicate that premium per capita has a significant positive effect on economic growth in the long run in the case of Belgium, Cyprus, Bulgaria, Romania and Slovenia, *i.e.*, insurance premium is a key determinant of long-term economic growth. The results show a statistically significant long-term positive relationship between premium per capita and GDP growth per capita in the case of a panel analysis of all the observed countries and countries classified as emerging markets. On the other hand, the panel data analysis of the countries classified in the category of developed markets showed a long-term positive relationship, but not a statistically significant one. Since that results indicate that the insurance market development could contribute to ensuring long-term economic stability and growth of observed countries, special attention needs to be paid to the strategy of insurance market development in a changing business environment.

Keywords: Insurance density, GDP per capita, emerging market, ARDL approach, causality

JEL Classification: G22, C23, O52

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Introduction

It is generally accepted that the insurance sector has a positive impact on financial and economic development. A few authors have proven the positive impact of insurance sector development on economic growth (Piljan *et al.*, 2015; Arena, 2008; Haiss and Sümegi, 2008, Ward and Zurbruegg, 2002). Due to the fact that insurance is a huge capital, that is, a part of national savings, the importance of insurance for the economy of each country is unquestionable. By pooling risk and reducing the impact caused by large losses in firms and households, insurance enables reducing the amount of capital needed to cover the losses individually; simultaneously encouraging investments, innovation and competitiveness (Feyen *et al.*, 2011).

The subject of the paper is an analysis of the trends in insurance market development in the European Union and the relationship with economic growth. The insurance sector plays a vital role in financial and economic development and presents an important component of the economic system of developed European countries. According to data from the magazine Sigma 3/2019[1], the share of insurance premiums realized on the EU insurance market in the total global premium in 2018 amounted to 28.80%. The largest share in the total global premium expressed in US dollars was in the United Kingdom (6.48%), France (4.97%) and Germany (4.65%), ranked 4th, 5th and 6th, respectively; after the United States, China and Japan. However, it is clear that the level of realized insurance premium does not necessarily indicate the development of the insurance market, but it depends on the size of the country. In 2018, the highest premium per capita (premium density) in Europe was recorded in Switzerland (6,934 USD), Denmark (6,289 USD) and Ireland (5,253 USD). These countries are ranked 3rd, 4th and 5th, respectively, in terms of per capita premiums worldwide.

In the analysed period, the share of average insurance premium in GDP amounted to 7.41%, with Luxembourg having the largest share (39.78%), whereas Romania had the smallest one with an average insurance premium of 1.28% of GDP, being in line with the degree of economic development of the analysed countries[2].

The insurance sector plays a key role in financial and economic development. By combining risks and reducing the impact of large losses on firms and households, insurance affects the reduction of the amount of capital that would be needed to cover these losses individually, encouraging investment, innovation and competitiveness (Feyen *et al.*, 2011).

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1 Swiss Re, *Sigma*, *3/2019,* https://www.swissre.com/institute/research/sigma-research/sigma-2019-03.html

2 The data are available at: https://www.sigma-explorer.com/

The research published by the United States Agency for International Development (USAID) in February 2006 indicated that the growth in insurance spending, expressed as insurance penetration, generally followed the S-curve: slower growth was recorded at lower levels of development, accelerating as the insurance market and economy developed, and then slowing down again as the market matured (Chemonics, 2006).

In this paper, we are going to analyse the relationship between the insurance sector and economic growth in EU countries in the period 1998–2018, aiming to establish whether life and non-life insurance make an equal contribution to economic development, and whether some differences can be noticed depending on the level of development of a specific country. The paper is divided into three parts.

The first part provides an overview of the results of scientists who have observed the insurance market of the selected countries in order to examine to what extent insurance contributed to economic growth (Arena, 2008; Han *et al.*, 2010; Wanat *et al.*, 2016; Lee, 2011; Lee *et al.*, 2013; Demirci and Zeren, 2017; Apergis and Poufinas, 2020; Haiss and Sümegi, 2008; Peleckienė *et al.*, 2019).

In the second part of the paper, the emphasis is on a description of the methodology used to identify the type and nature of the causality between the analysed variables, as well as the long-term and short-term effect of insurance premium on economic growth.

The empirical results are the results of an Augmented Dickey Fuller (ADF) stationarity test, the autoregressive distributed lag (ARDL) approach, and VAR Granger causality/block exogeneity Wald tests. At the end of the paper, the obtained results are discussed and a proposal is made regarding possible theoretical and methodological issues relevant for future research.

The paper can contribute in many ways to the existing empirical results and research in the field of insurance. Covering the period from 1998 and 2018, *i.e.*, 10 years before and 10 years after 2008, when the financial crisis reached global proportions, enabled us to observe the consequences of the crisis on the indicators of economic development and insurance market development, and thus perceive certain trends.

Our findings suggest that reliance on insurance market development in terms of economic development is encouraging, as insurance premiums per capita (insurance density) have a statistically significant positive short-term and long-term impact on economic growth in Belgium, Bulgaria, Cyprus, Romania and Slovenia.

The results can be significant not only for insurance market regulators, but also for all analysts, experts and institutions of the economic system of the analysed countries, and for the global EU market as well.

1. Literature Review

This part of the paper will review the literature of authors who have applied panel data analysis to determine the relationship between economic growth and insurance market development.

Arena (2008) used the generalized method of moments (GMM) for dynamic models of panel data on 56 countries in the period 1976–2004 to assess the effect of life and non-life insurance on economic growth. The results of the test proved that the indicator of life and non-life insurance penetration had a positive and statistically significant impact on GDP per capita growth. Life insurance had a positive impact in high-income countries. Non-life insurance had a positive effect also in developing countries; however, the effect is less powerful for economic growth than in high-income countries.

Unlike the previous research with the application of GMM models on a dynamic panel to the data for 77 countries in the period 1994–2005 while using insurance density as a measure of insurance development, Han *et al.* (2010) reached the conclusion that insurance market development, as well as the development of individually observed life and non-life insurance markets, had a far more significant role for developing economies than for developed economies.

To examine the causal relationship between insurance market activities and economic growth for 10 selected OECD countries during the period 1979–2006, Lee (2011) used panel unit root tests, heterogeneous panel cointegration tests and panel causality techniques in his research and concluded that there was strong evidence to support the hypothesis of a long-term equilibrium relationship between real GDP and insurance market activity, with a greater influence of the non-life insurance market in relation to the life insurance market. The implementation of a dynamic panel-based error correction model indicated the existence of a two-way long-term and short-term causal relationship between insurance market development and economic growth.

The existence of long-term and short-term two-way causality between the life insurance market and economic growth using Engle and Granger's (1987) two-step procedure to estimate a panel-based error correction model on a sample covering 41 countries in the period 1979–2007 was also confirmed in the co-authored research of Lee *et al.* (2013).

Examining the relationship between insurance activities and economic growth for 10 OECD countries from 1979 to 2006 using cross-sectional estimates and a dynamic panel data technique, Chang *et al.* (2013) found that different countries showed different causality directions regarding insurance activities and economic growth when observing both total insurance activities and life and non-life insurance activities. Moreover, they compared these results with the results of Ward and Zurbruegg (2000), who had made similar findings.

The fact that the relationship between insurance and economic growth varied from country to country was also proved by Demirci and Zeren (2017), who investigated the relationship between insurance premiums per capita and real GDP for 13 OECD countries in the period 1983–2011. Their results indicate the existence of a causality between the insurance premium per capita and real GDP in 4 out of 13 analysed countries (France, Iceland, Italy and Spain).

Using the bootstrap panel causality approach, Wanat *et al.* (2016) also noticed the relationship between insurance and economic growth varying from country to country in the case of 10 transition countries in the EU in the period 1993–2013.

Apergis and Poufinas (2020) used a sample of 27 OECD countries in the period 2006–2016. The results of the Dumitrescu-Hurlin panel Granger causality test indicated that there was a statistically significant two-way causality between economic growth and gross insurance premium (total and life insurance premium), and in the case of gross non-life insurance premium the causality was one-way from GDP to gross non-life insurance premiums.

Haiss and Sümegi (2008) conducted a panel data analysis for 29 European countries covering the period 1992–2005 to examine the impact of insurance company investments and insurance premiums on GDP growth. Their research implied that there were differences between less developed countries and countries with financial markets that were in a mature stage of development. On the other hand, in the markets of EU-15, Switzerland, Norway and Iceland, there was a positive impact of life insurance on real GDP growth. Still, liability insurance had bigger impact in new EU member states in Central and Eastern Europe.

Peleckienė *et al.* (2019) examined the relationship between insurance market development and economic growth in 27 EU countries using annual data from the Eurostat and European Insurance Industry database for the period 2004–2015. They used GDP per capita as an indicator of economic development and total premiums per insured as a measure of the development of the insurance market. Their Granger causality test (1969) showed that there was two-way causality in the case of Austria, and no causality between the variables in the case of Slovakia. The results of the conducted test showed the existence of one-way causality from GDP per capita to total premiums per insured in Luxembourg and Finland, and one-way causality from total premiums per insured to GDP per capita in the Netherlands, Malta and Estonia.

Previous studies, especially those that covered the countries that are the subject of this research as well, enable us to compare the results that will be presented in the following part of the paper, that is, to draw a more valid conclusion regarding the mutual influence of insurance market development and economic growth.

2. Methodology and Data

The analysis of the impact of insurance market development on the economic growth of the countries that were part of the European Union in 2020 was conducted on the basis of the annual data for the period from 1998 and 2018, *i.e.*, 10 years before and 10 years after the financial crisis that reached global proportions in 2008. This specific period was chosen to establish a balanced panel that would cover as many countries as possible. The aim of forming a balanced panel was to exclude countries for which the data for the analysed period were not available in the world insurance market statistics published on the website of the reinsurer Swiss Reinsurance Company[3]; therefore, the research was conducted on a sample of 23 out of 27 EU member states (excluding Malta, Estonia, Latvia and Lithuania[4]). Out of these countries, 8 countries (Slovenia, the Czech Republic, Slovakia, Poland, Hungary, Croatia, Bulgaria and Romania) whose markets were classified as emerging markets according to Sigma no. 4/2020 were marked in our analysis with an asterisk (*). Furthermore, some differences appeared in the International Monetary Fund (IMF) classification in the case of the Czech Republic, Slovenia and Slovakia, mostly due to the development degree of the insurance market in the observed countries.

In this study, we opted for GDP per capita growth as a measure of the level of economic development, using data from the World Bank database. Annual nominal GDP is used, being expressed in US dollars ($).

The two most commonly used indicators of insurance market development in the existing literature are the share of insurance premiums in gross domestic product (insurance penetration) and the amount of premium per capita (insurance density). Annual nominal insurance premium is expressed in US dollars ($) and insurance density is used as the indicator of insurance market development in this paper. The following table shows a description of the variables that will be used in our research.

3 www.swissre.com/sigma

4 For these countries, the data for the analysed period were not available in the world insurance market statistics published on the website of the reinsurer Swiss Reinsurance Company.

Table 1: Description of variables

Variable name	Notation	Source	Method of calculation
GDP per capita growth	*GDP*	World Bank database	Gross domestic product per capita growth in US dollars (annual %)
Insurance density	*ID*	Swiss Reinsurance Company	Annual premium per capita in US dollars
Life insurance density	*LID*	Swiss Reinsurance Company	Annual life premium per capita in US dollars
Non-life insurance density	*NID*	Swiss Reinsurance Company	Annual non-life premium per capita in US dollars

Source: Own elaboration

Our research was based on the relations between insurance market development and economic growth developed by Hugh (1966). Wanat *et al.* (2016) also used his assumption.

1. Insurance market development follows economic growth, *i.e.*, the insurance market is adjusted to the actual demand for its services (demand-following hypothesis).
2. Insurance market development contributes to economic growth (supply-leading hypothesis).
3. There is two-way causality between insurance market development and economic growth (feedback hypothesis).
4. There is no causality between insurance market development and economic growth (neutrality hypothesis).

Since we are going to use Granger causality tests to determine the causality directions, we will base our research on two null hypotheses:

The first $\boldsymbol{H_0}$: GDP does not Granger-cause insurance density.
The second $\boldsymbol{H_0}$: Insurance density does not Granger-cause GDP.

We are going to test these hypotheses for the total insurance market and separately for non-life and life insurance markets.

If the null hypothesis "GDP does not Granger-cause insurance density" is rejected, then insurance market development follows economic growth ($\boldsymbol{H_1}$: demand-following hypothesis).

If the null hypothesis "Insurance density does not Granger-cause GDP" is rejected, then insurance market development contributes to economic growth ($\boldsymbol{H_2}$: supply-leading hypothesis).

If both null hypotheses are rejected, then there is two-way causality between insurance market development and economic growth (***H_3***: feedback hypothesis).

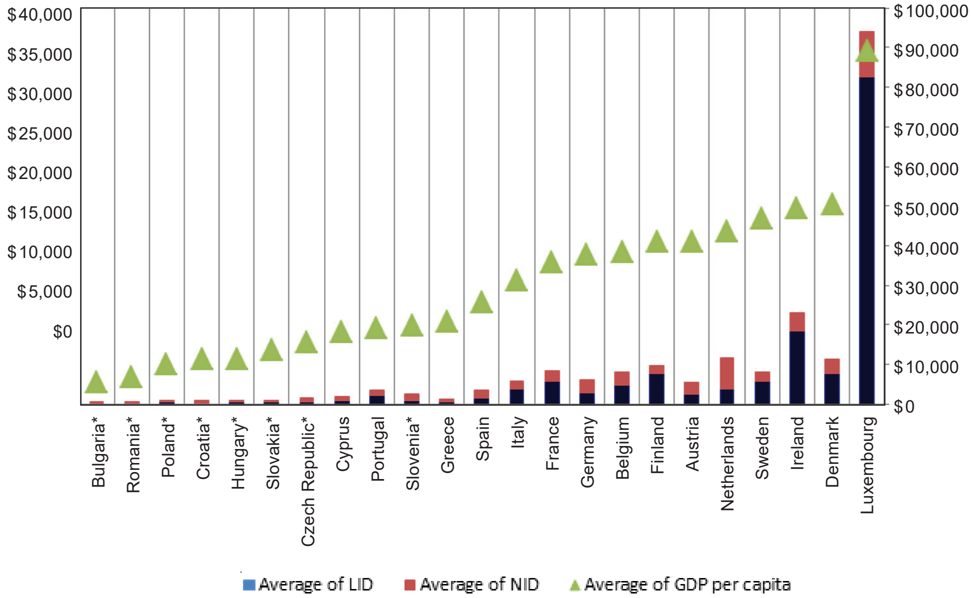
If neither hypothesis is rejected, then there is no causality between insurance market development and economic growth (***H_4***: neutrality hypothesis).

Furthermore, we will examine the existence of a positive short-term and long-term relationship between economic growth and premium per capita.

The analysis of the relationship between insurance and economic growth in EU countries is shown in Graph 1. The data are arranged by the size of the average GDP per capita ($). The countries whose markets are classified as emerging markets are marked with an asterisk (*).

The highest average values of premium per capita were recorded in Luxembourg at $37,679.24, while the lowest ones were in Romania* at $90.03 and Bulgaria* at $113.12; which indicates significant differences in the development of insurance in the analysed countries.

Graph 1: Average values of GDP per capita and insurance density in analysed EU countries



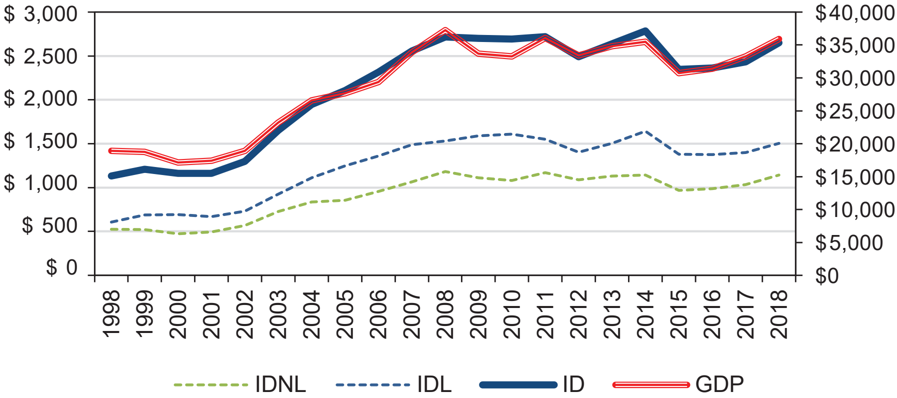
Note: Average values of life insurance density and non-life insurance density are shown on the left. Average values of gross domestic product per capita are shown on the right.

Source: Authors' calculations based on World Bank database and Swiss Re's sigma database

We can notice that the eight countries whose markets were classified as emerging markets according to Sigma no. 4/2020 have a lower average value of premium per capita compared to the countries classified in the category of developed countries, except in the case of Slovenia, which according to the average size of GDP per capita ($) in the analysed period was ranked 14th, and according to the average value of premium per capita it was ranked 13th. The chart highlights Luxembourg as the country with the highest average value of premium per capita and GDP per capita. The inclusion of Luxembourg in the panel analysis did not affect the different interpretations of the test results we conducted. The graph indicates that higher GDP per capita ($) does not necessarily imply higher value of premium per capita, and since our task is to examine the interdependence between economic development and the development of the insurance sector, we are going to conduct a panel analysis along with examining the data for the entire panel (Panel 1), especially the panel data of the countries classified in the category of emerging markets (Panel 2), as well as the countries classified in the category of developed markets (Panel 3), and observe the interdependence of the analysed variables in the case of individual countries.

Graph 2 illustrates the movement of the weighted average value of gross domestic product per capita and the weighted average value of premium per capita in the period 1998–2018. It can be noticed that until the beginning of the global financial crisis, these values had a rising trend, while in the following period there was a decline or somewhat more moderate growth.

Graph 2: Weighted average values of gross domestic product per capita and weighted average values of premium per capita in the period 1998–2018 ($)



Note: Weighted average values of insurance density are shown on the left.
Weighted average values of gross domestic product per capita are shown on the right.
Source: Authors' calculations based on World Bank database and Swiss Re's sigma database

We can conclude that all the countries recorded a far slower, even negative growth of gross domestic product per capita and insurance premiums per capita after the crisis compared to the period before the crisis. Actually, the somewhat slower growth of premiums in the observed period may refer to the development phase of the market, due to the fact that markets in the mature phase of development are not expected to experience significant growth, *i.e.*, their growth slows down. Additionally, we should be aware that the movement of the indicators is influenced by the dollar exchange rate.

In further analysis, a logarithmic transformation of the mentioned variables was performed, and before the transformation, all negative values were corrected (Mickey *et al.*, 2004). We corrected all negative and zero values by adding the appropriate value of the constant M.

Since the statistical properties of a macro panel model depend on the fulfilment of the assumption regarding stationarity, Augmented Dickey Fuller (ADF) panel unit root test (Dickey and Fuller, 1979) was applied in the paper.

The panel autoregressive distributed lag (ARDL) model will be applied to assess the long-term and short-term effects of insurance density on GDP per capita growth in the countries covered by Panels 1, 2 and 3. The advantage of this approach is that it can be used in case the variables are I(0) and/or I(1) and if they have different optimal lag lengths. Before applying this model to the panel, we will use Pedroni's test (2004) to examine the existence of cointegration.

We are also going to apply the ARDL model to assess the long-term and short-term effects of insurance density on GDP per capita growth for each of the analysed countries individually. Nkoro and Uko (2016) noted that the ARDL model begins by testing the existence of cointegration based on the bounds test proposed by Pesaran *et al.* (2001). If the existence of a long-term relationship between the observed variables is proven, long-term and short-term coefficients are estimated.

In addition, a Jarque-Bera distribution normality test was performed (Jarque and Bera, 1987), as well as a Breusch-Godfrey LM serial correlation test (Breusch, 1978; Godfrey, 1978a), and a Breusch-Pagan-Godfrey heteroskedasticity test (Godfrey, 1978b; Breusch and Pagan, 1979).

Finally, VAR Granger causality/block exogeneity Wald tests were performed in order to identify the type and nature of causality between the observed variables. The software packages EViews v. 10.0 and Microsoft Excel were used for statistical and econometric data processing.

3. Empirical Results

3.1 Unit root test

Since the presence of stationarity is an important context for accurate statistical inference in time series analysis, in this part of the paper we are going to test the values of the series for the existence of a unit root. The analysis includes Augmented Dickey Fuller tests, starting from the null hypothesis which suggests that panels contain unit roots.

When conducting the Augmented Dickey Fuller (ADF) Z-tests of Choi (2001), we used automatic lag length selection based on the Akaike Information Criterion (AIC).

Since all the *p*-values are higher than 0.10, we cannot reject the null hypothesis that the chosen time series are nonstationary. The ADF results for Panels 1, 2 and 3 are shown in Table 2.

Table 2: Results of ADF Z-tests (Choi Z-statistic) for Panels 1, 2 and 3

	Panel 1		**Panel 2**		**Panel 3**	
Variable	**Individual effects**	**Order of integration**	**Individual effects**	**Order of integration**	**Individual effects**	**Order of integration**
log*GDP*	−6.97235	I(0)	−3.37538	I(0)	−6.16868	I(0)
log*ID*	−5.71325	I(1)	−1.74768	I(1)	−5.79828	I(1)
log*NID*	−6.30539	I(1)	−1.84864	I(1)	−6.45778	I(1)
log*LID*	−5.62861	I(1)	−2.35637	I(1)	−5.24894	I(1)

Source: Evaluation results in the EViews software package

Testing of the values of the series for the existence of a unit root was also done by countries.

Table 3: Results of application of unit root test in individual countries

Variable	**Austria**	**Belgium**	**Bulgaria**	**Cyprus**	**Denmark**	**Czech Republic**	**Finland**	**France**	**Greece**	**Croatia**	**Ireland**	**Italy**	**Luxembourg**	**Hungary**	**Germany**	**Netherlands**	**Portugal**	**Poland**	**Slovakia**	**Romania**	**Slovenia**	**Spain**	**Sweden**
log*GDP*	I(0)	I(0)	I(0)	I(1)	I(1)	I(1)	I(0)	I(0)	I(1)	I(1)	I(0)	I(0)	I(0)	I(0)	I(0)	I(1)	I(0)	I(0)	I(1)	I(1)	I(1)	I(1)	I(0)
log*NID*	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)	I(0)	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)
log*LID*	I(1)	I(0)	I(1)	I(0)	I(1)	I(1)	I(1)	I(1)	I(0)	I(1)	I(1)	I(0)	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)
log*ID*	I(1)	I(1)	I(0)	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)	I(0)	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)	I(0)	I(1)

Source: Evaluation results in the EViews software package

The results indicate that the selected time series in some countries are integrated at the order 0, while there are countries whose selected time series are integrated at the order 1, which allows us to apply the Autoregressive distributed lag (ARDL) method. Alhassan (2016) used this approach to examine the causal relationship between insurance penetration and economic growth in 8 selected African countries.

Based on the ARDL approach, using logID as an independent variable and logGDP as a dependent variable we created a model for Panels 1, 2, and 3 and the models for each country which will be analysed in the next part of the paper. Akaike Information Criterion (AIC) was used to estimate the optimal number of shifts (lags) for each variable. The maximum number of lags is 2.

3.2 ARDL method

The autoregressive distributed lag (ARDL) method will be applied first to the data of Panels 1, 2 and 3. In the paper, we use the Pooled Mean Group estimator, proposed by Pesaran *et al.* (1999).

Before applying the model, we are going to examine the existence of cointegration among the variables in the analysis by using residual-based test developed by Pedroni (1999, 2004).

Table 4: Panel cointegration test results

Alternative hypothesis: common AR coefficient (within-dimension)

	Statistic			Weighted		
	Panel 1	Panel 2	Panel 3	Panel 1	Panel 2	Panel 3
Panel v-statistic	2.011977^{++}	2.450322^{+++}	0.242254	−0.427969	2.391737^{+++}	−1.146907
Panel rho-statistic	−4.025442^{+++}	−2.334768^{+++}	−3.293843^{+++}	−3.963140^{+++}	−2.294073^{++}	−3.213633^{+++}
Panel PP-statistic	−4.749979^{+++}	−2.620214^{+++}	−4.042092^{+++}	−4.763755^{+++}	−2.576628^{+++}	−3.920300^{+++}
Panel ADF-statistic	−6.195978^{+++}	−3.030554^{+++}	−5.671624^{+++}	−7.017776^{+++}	−3.065755^{+++}	−5.984008^{+++}

Alternative hypothesis: individual AR coefficient (between-dimension)

	Statistic		
	Panel 1	Panel 2	Panel 3
Group rho-statistic	−1.366956^{+}	−0.726639	−1.162010
Group PP-statistic	−3.885845^{+++}	−1.984598^{++}	−3.362413^{+++}
Group ADF-statistic	−6.103300^{+++}	−2.702447^{+++}	−5.583996^{+++}

Note: +, ++ and +++ indicate significance at 10%, 5%, and 1%.
Source: Evaluation results in the EViews software package

Based on the results displayed in Table 4, we can conclude that the null hypothesis of no cointegration was rejected in 10 out of 11 tests performed on the data of Panels 1 and 2, and in 8 out of 11 tests performed on the data of Panel 3; therefore, we can conclude that there is a long-term equilibrium relationship between the analysed variables.

Since the panel ARDL approach is applicable to our analysis, in the following two tables we are going to present the values of long-term and short-term coefficients using a PMG estimator.

Table 5: Values of long-term coefficients using panel ARDL model and PMG estimator

	Panel 1	**Panel 2**	**Panel 3**
Selected model:	**ARDL(2,1)**	**ARDL(2,1)**	**ARDL(1, 1)**
Variable	**Coefficient (Std. error)**	**Coefficient (Std. error)**	**Coefficient (Std. error)**
log*ID*	0.100392^{++} (0.047490)	0.201303^{+++} (0.059587)	0.045389 (0.084297)

Note: +, ++ and +++ indicate significance at 10%, 5% and 1%.

Source: Evaluation results in the EViews software package

Table 6: Values of short-term coefficients using panel ARDL model and PMG estimator

	Panel 1	**Panel 2**	**Panel 3**
Selected model:	**ARDL(2,1)**	**ARDL(2,1)**	**ARDL(1, 1)**
Variable	**Coefficient (Std. error)**	**Coefficient (Std. error)**	**Coefficient (Std. error)**
***COINTEQ*01**	−0.897232^{+++} (0.028863)	−0.882585^{+++} (0.018664)	−0.762182^{+++} (0.043381)
***D*(log*GDP*(−1))**	0.195846^{++} (0.031517)	0.145000^{+++} (0.045447)	–
***D*(log*ID*)**	3.401455^{+++} (0.305851)	4.111100^{+++} (0.217527)	2.839488^{+++} (0.466617)
C	1.059462^{+++} (0.034139)	0.663128^{+++} (0.063304)	1.148735^{+++} (0.058459)

Note: +, ++ and +++ indicate significance at 10%, 5%, and 1%.

Source: Evaluation results in the EViews software package

These results will be discussed in the concluding remarks.

The first step of the ARDL approach on the data of insurance density and GDP per capita growth for each of the analysed EU countries individually involves conducting a bounds *F*-test to determine the existence of a long-term relationship (Pesaran *et al.*, 2001).

The calculated *F*-statistic exceeds the upper limit at the significance level of 1% (Table 7), so the null hypothesis about the non-existence of a long-term relationship between the variables can be rejected. Since the results indicate the existence of co-integration between the variables, the estimation of long-term and short-term coefficients can be performed. Estimated long-term coefficients using the ARDL approach are shown in Table 7. We created a model for each country with unrestricted intercept and restricted trend.

Diagnostic tests show that there is no serial correlation (Breusch-Godfrey serial correlation LM test – lag 2) and heteroskedasticity (Heteroskedasticity test: Breusch-Pagan-Godfrey) in the residues of the estimated ARDL model, and the Jarque-Bera test confirms the normal distribution of the residue model.

The following tables (Table 8a and 8b) show the ARDL error correction model (ARDL ECM). Coefficients on the first difference terms represent the short-run coefficients. The results show that the error correction coefficient ($COINTEQ(-1)$) is statistically significant for all the countries and has a negative sign. In some of the countries, the value of this coefficient may be more than minus one in absolute terms, and the possibility of such results is indicated by Atique and Malik (2012).

Table 7: Bound test results

Country	**Austria**	**Belgium**	**Bulgaria***	**Croatia***	**Cyprus**	**Czech Republic***
***F*-statistics**	16.35974^{+++}	8.931304^{+++}	22.13738^{+++}	32.94037^{+++}	15.27954^{+++}	15.16814^{+++}
Country	**Ireland**	**Italy**	**Luxembourg**	**Netherlands**	**Poland***	**Portugal**
***F*-statistics**	7.855992^{+++}	6.297113^{+++}	6.303468^{+++}	10.58628^{+++}	12.91347^{+++}	6.556760^{+++}
Country	**Denmark**	**Finland**	**France**	**Germany**	**Greece**	**Hungary***
***F*-statistics**	7.104846^{+++}	6.699047^{+++}	9.115533^{+++}	14.05008^{+++}	10.02187^{+++}	11.43377^{+++}
Country	**Romania***	**Slovakia***	**Slovenia***	**Spain**	**Sweden**	
***F*-statistics**	9.342758^{+++}	20.94018^{+++}	23.99687^{+++}	7.993981^{+++}	6.517958^{+++}	

Note: +, ++ and +++ indicate significance at 10%, 5% and 1%.
Source: Evaluation results in the EViews software package

Table 8: Estimated long-run coefficients

Variable	Austria ARDL(2,1)	Belgium ARDL(1,2)	Bulgaria* ARDL(1,1)	Croatia* ARDL(2,1)	Cyprus ARDL(2,2)	Czech Republic* ARDL(2,1)
log*ID*	0.418055	0.968478^{+++}	0.476099^{+++}	−0.109473	1.229045^{+++}	0.144394
C	−1.324973	−5.964828^{++}	−0.565961	2.485100^{++}	10.21506^{+++}	1.017921
Variable	**Ireland ARDL(1,0)**	**Italy ARDL(2,1)**	**Luxembourg ARDL(1,0)**	**Netherlands ARDL(2,1)**	**Poland* ARDL(1,1)**	**Portugal ARDL(2,1)**
log*ID*	−0.323243	−0.007357	−0.238574	−0.077722	0.279982	−0.164221
C	5.208419	1.875693	4.732859	2.551999	0.382643	3.091595
Variable	**Denmark ARDL(1,2)**	**Finland ARDL(1,2)**	**France ARDL(2,1)**	**Germany ARDL(2,2)**	**Greece ARDL(2,1)**	**Hungary* ARDL(2,1)**
log*ID*	0.103842	−0.352356	0.181518	0.258929	−0.251260	0.195685
C	0.807841	4.759275	0.347981	−0.209549	3.362389	0.824578
Variable	**Romania* ARDL(1,2)**	**Slovakia* ARDL(1,1)**	**Slovenia* ARDL(2,1)**	**Spain ARDL(2,1)**	**Sweden ARDL(1,1)**	
log*ID*	0.307817^{+++}	0.172424	0.689071^{+++}	−0.936662	0.277432	
C	0.642995	0.798007	−3.001280^{++}	8.760927	−0.414742	

	Austria	Belgium	Bulgaria*	Croatia*	Cyprus	Czech Republic*
Jarque-Bera test	0.944641 (0.623554)	1.090956 (0.579565)	0.390969 (0.822436)	0.612595 (0.736168)	1.130767 (0.568142)	1.688703 (0.429836)
Breusch-Godfrey serial correlation LM test	0.823273 (0.4623)	0.312570 (0.7373)	0.474988 (0.6316)	2.105060 (0.1646)	0.802751 (0.4727)	0.522495 (0.6059)
Heteroskedasticity test: Breusch-Pagan-Godfrey	0.403774 (0.8028)	2.425553 (0.2970)	0.194546 (0.8986)	0.196092 (0.9363)	0.644341 (0.6706)	0.975652 (0.4518)
	Ireland	**Italy**	**Luxembourg**	**Netherlands**	**Poland***	**Portugal**
Jarque-Bera test	1.9117889 (0.383297)	0.687211 (0.709209)	1.500363 (0.472281)	0.862395 (0.649731)	1.604499 (0.448319)	0.094162 (0.954010)
Breusch-Godfrey serial correlation LM test	0.316444 (0.7335)	0.588788 (0.5703)	1.031953 (0.3803)	1.277046 (0.3642)	0.104828 (0.9012)	0.554416 (0.5884)
Heteroskedasticity test: Breusch-Pagan-Godfrey	0.511369 (0.6086)	0.099325 (0.9809)	1.412434 (0.2707)	0.743703 (0.5780)	0.341896 (0.7954)	0.360129 (0.8328)
	Denmark	**Finland**	**France**	**Germany**	**Greece**	**Hungary***
Jarque-Bera test	1.348239 (0.509605)	1.109979 (0.574078)	0.472605 (0.789542)	0.680886 (0.711455)	0.819089 (0.663953)	0.579447 (0.7484461)
Breusch-Godfrey serial correlation LM test	1.693049 (0.2251)	0.893712 (0.4347)	0.625218 (0.5517)	0.621773 (0.5548)	1.080309 (0.3703)	1.372625 (0.3022)
Heteroskedasticity test: Breusch-Pagan-Godfrey	0.716118 (0.5947)	0.594133 (0.6727)	1.566130 (0.2377)	1.871178 (0.1681)	1.706139 (0.2045)	1.113726 (0.3022)
	Romania*	**Slovakia***	**Slovenia***	**Spain**	**Sweden**	
Jarque-Bera test	0.756828 (0.684947)	1.639688 (0.440500)	0.260228 (0.877995)	0.961943 (0.618182)	1.203123 (0.547955)	
Breusch-Godfrey serial correlation LM test	1.675875 (0.2281)	2.327216 (0.1341)	0.438814 (0.6547)	4.796483 (0.2295)	0.224874 (0.8017)	
Heteroskedasticity test: Breusch-Pagan-Godfrey	2.327905 (0.1070)	2.009670 (0.1532)	2.435456 (0.1960)	0.912436 (0.4836)	1.774134 (0.1866)	

Note: +, ++ and +++ indicate significance at 10%, 5%, and 1%.

Source: Evaluation results in the EViews software package

Table 8a: Error-correction representation of the selected ARDL

Variable	Austria ARDL(2,1)	Belgium ARDL(1,2)	Bulgaria* ARDL(1,1)	Croatia* ARDL(2,1)	Cyprus ARDL(2,2)
***D*(log*GDP*(–1))**	0.187025^{+}	–	–	0.123519	0.256126^{++}
***D*(log*ID*)**	6.082372^{+++}	4.600339^{+++}	5.736436^{+++}	4.438160^{+++}	2.342802^{+++}
***D*(log*ID*(–1))**	–	2.586093^{++}	–	–	0.987659^{++}
COINTEQ(–1)*	–1.140433^{+++}	–1.511197^{+++}	–1.008089^{+++}	–0.792134^{+++}	–1.041017^{+++}
Country	**Ireland ARDL(1,0)**	**Italy ARDL(2,1)**	**Luxembourg ARDL(1,0)**	**Netherlands ARDL(2,1)**	**Poland* ARDL(1,1)**
***D*(log*GDP*(–1))**	–	0.424955+	–	0.370170^{++}	–
***D*(log*ID*)**	–	1.604863+	–	2.818598^{+++}	3.230454^{+++}
***D*(log*ID*(–1))**	–	–	–	–	–
COINTEQ(–1)*	–0.667815^{+++}	–0.864161^{+++}	–0.785265^{+++}	–0.939121^{+++}	–0.852364^{+++}

Note +, ++ and +++ indicate significance at 10%, 5% and 1%.
Source: Evaluation results in the EViews software package

Table 8b: Error-correction representation of the selected ARDL

Variable	Czech Republic* ARDL(2,1)	Denmark ARDL(1,2)	Finland ARDL(1,2)	France ARDL(2,1)	Germany ARDL(2,2)	Greece ARDL(2,1)	Hungary* ARDL(2,1)
***D*(log*GDP*(–1))**	0.284657^{++}	–	–	0.356444^{++}	0.296589++	0.317975^{++}	0.300034^{++}
***D*(log*ID*)**	4.470148^{+++}	4.719446^{+++}	5.428948^{+++}	4.216794^{+++}	5.061802+++	3.287308^{+++}	4.146354^{+++}
***D*(log*ID*(–1)**	–	1.653222^{+}	–2.464458^{++}	–	2.493363++	–	–
COINTEQ(–1)*	–0.835545^{+++}	–1.135980^{+++}	–0.741057^{+++}	–1.120208^{+++}	–1.560086+++	–0.846458^{+++}	–0.917130^{+++}
Country	**Portugal ARDL(2,1)**	**Romania* ARDL(1,2)**	**Slovakia* ARDL(1,1)**	**Slovenia* ARDL(2,1)**	**Spain ARDL(2,1)**	**Sweden ARDL(1,1)**	
***D*(log*GDP*(–1))**	0.364517^{++}	–	–	0.256895^{++}	0.316285^{+}	–	
***D*(log*ID*)**	1.377524^{++}	3.738828^{+++}	4.618408^{+++}	6.279987^{+++}	1.567742^{+}	3.722809^{+++}	
***D*(log*ID*(–1)**	–	1.874122^{+}	–	–	–	–	
COINTEQ(–1)*	–0.841096^{+++}	–1.270299^{+++}	–0.876607^{+++}	–1.079430^{+++}	–0.490262^{+++}	–0.903813^{+++}	

Note +, ++ and +++ indicate significance at 10%, 5% and 1%.
Source: Evaluation results in the EViews software package

In the case of Ireland and Luxembourg, the optimal lag structure of the selected model is ARDL(1,0) and the results show only the magnitude of the error correction coefficient. For other countries, short-run coefficients show a statistically significant positive effect, ranging from 1.37 for Portugal to 6.27 for Slovenia.

In the next segment of the research, the focus is on examining the potential causality between gross domestic product per capita (*GDP*) as a measure of the level of economic development and total premium (*ID*), non-life insurance premium (*NID*) and life insurance (*LID*) for the time horizon from 1998 to 2018.

3.1 Granger causality

Causality testing and measuring were conducted using VAR Granger causality/block exogeneity Wald tests (Lütkepohl, 2006; Toda and Yamamoto, 1995), where causality was defined at the level of the selected EU countries, and individually for each country for the analysed period.

Granger causality test applied to Panels 1, 2 and 3 indicates that the null hypothesis which suggests there is no causality between gross domestic product per capita growth as a measure of the level of economic development and total premium, non-life and life insurance premium per capita is rejected (Table 9).

Table 9: Results of VAR Granger causality/block exogeneity Wald tests at the level of the selected EU countries

Null hypothesis:	Chi-sq		
	Panel 1	Panel 2	Panel 3
log*ID* does not Granger-cause log*GDP*	20.93785^{+++}	14.33424^{+++}	28.84926^{+++}
log*GDP* does not Granger-cause log*ID*	53.27456^{+++}	8.042643^{+}	6.812661^{+++}
log*NID* does not Granger-cause log*GDP*	32.57732^{+++}	19.52696^{+++}	30.97310^{+++}
log*GDP* does not Granger-cause log*NID*	9.688041^{+++}	7.223535^{+}	2.243902
log*LID* does not Granger-cause log*GDP*	4.519262^{++}	3.641630	19.33952^{+++}
log*GDP* does not Granger-cause log*LID*	2.419788^{+}	8.050722^{+}	6.052367^{+++}

Note: +, ++ and +++ indicate significance at 10%, 5%, and 1%.

Source: Evaluation results in the EViews software package

The results of the Granger test applied indivually to each country for the analysed time period are displayed in the following table.

Table 10: Results of VAR Granger causality/block exogeneity Wald tests for each selected EU country

	H_0: log*ID* does not Granger-cause log*GDP*		H_0: log*GDP* does not Granger-cause log*ID*		H_0: log*NID* does not Granger-cause log*GDP*		H_0: log*GDP* does not Granger-cause log*NID*		H_0: log*LID* does not Granger-cause log*GDP*		H_0: log*GDP* does not Granger-cause log*LID*	
Country	**Chi-sq**	**Prob**	**Chi-sq**	**Prob**	**Chi-sq**	**Prob**	**Chi-sq**	**Prob**	**Chi-sq**	**Prob**	**Chi-sq**	**Prob**
Austria	2.511772	0.2848	0.899203	0.6379	0.186996	0.9107	2.697952	0.2595	1.876692	0.3913	2.474634	0.2902
Belgium	14.55176	0.0007+++	1.107426	0.5748	7.710076	0.0212++	0.898362	0.6382	12.30529	0.0021+++	1.799141	0.4067
Bulgaria*	3.489282	0.0747+	2.594154	0.2733	3.637773	0.1622	0.276740	0.8708	0.910129	0.6344	0.325349	0.8499
Cyprus	6.418896	0.0404++	8.275668	0.0160++	0.358525	0.8359	3.162321	0.2057	1.340987	0.5115	6.929768	0.0313++
Croatia*	4.079760	0.0300++	4.740516	0.0935+	3.346932	0.1876	0.799478	0.6705	0.545473	0.7613	0.085605	0.9581
Czech Republic*	1.658682	0.4363	3.473542	0.1761	1.138504	0.5659	4.503170	0.1052	1.250859	0.5350	6.773385	0.0338+
Denmark	2.451672	0.2935	1.417856	0.4922	0.826400	0.6615	0.564453	0.7541	8.227848	0.0163++	0.778448	0.6776
Finland	3.245157	0.1974	3.690229	0.0580+	4.877862	0.0873++	2.797413	0.2469	2.307328	0.3155	6.041617	0.0488+
France	1.967954	0.3738	1.652094	0.4378	0.412860	0.8135	3.069024	0.2156	3.282431	0.0937+	0.682390	0.7109
Germany	0.421080	0.8101	1.840632	0.3984	1.056780	0.5896	1.212524	0.5454	0.046797	0.9769	0.437074	0.8037
Greece	8.648987	0.0132++	3.258768	0.0961+	8.922443	0.0115++	0.562781	0.7547	5.835802	0.0540+	0.447775	0.7994
Hungary*	0.733315	0.6930	4.450608	0.0980+	1.479993	0.4771	0.911682	0.6339	1.652401	0.4377	1.019200	0.6007
Ireland	1.656608	0.4368	1.224092	0.5422	0.726360	0.6955	1.957083	0.3759	0.439648	0.8027	1.005975	0.6047
Italy	1.746928	0.4175	1.631147	0.4424	0.612225	0.7363	1.261395	0.5322	0.679525	0.74840	0.032089	0.9841
Luxembourg	4.683073	0.0962+	2.955760	0.2281	1.27936	0.27370	0.034141	0.9831	0.53001	0.47650	1.728438	0.4214
Netherlands	1.179070	0.5546	2.490681	0.2878	1.021281	0.6001	10.74205	0.0046+++	9.243231	0.0098+++	11.15206	0.0038+++
Poland*	1.07459	0.36800	1.55522	0.24550	1.031526	0.70050	0.636900	0.7273	2.157184	0.29720	3.895412	0.0826+
Portugal	6.808327	0.0332++	1.940646	0.3790	10.33213	0.0057+++	0.645897	0.7240	1.275084	0.54870	1.080903	0.5825
Romania*	1.336785	0.5125	4.282195	0.1175	2.478974	0.2895	6.248256	0.0440++	0.276641	0.8708	5.758060	0.0562+
Slovakia*	0.67200	0.42370	0.70055	0.41420	6.147207	0.0463++	0.994837	0.6081	0.400318	0.8186	3.429945	0.1800
Slovenia*	3.565398	0.0682+	0.92740	0.34900	4.217767	0.0914+	0.532375	0.95710	0.425917	0.8082	0.924986	0.6297
Spain	11.97071	0.0025++	3.473674	0.1761	14.11236	0.0009+++	0.267783	0.8747	0.275122	0.8715	0.734893	0.6925
Sweden	5.074093	0.0791+	3.161360	0.2058	8.782651	0.0124++	1.172190	0.5565	8.003341	0.0183++	1.283486	0.5264

Note: +, ++ and +++ indicate significance at 10%, 5%, and 1%.

Source: Evaluation results in the EViews software package

Table 11: Unrejected hypotheses

Country	Austria	Belgium	Bulgaria*	Cypšrus	Croatia*	Czech Republic*	Denmark	Finland	France	Germany	Greece	Hungary*	Ireland	Italy	Luxembourg	Netherlands	Poland*	Portugal	Romania*	Slovakia*	Slovenia*	Spain	Sweden
log*ID* – log*GDP*	H_4	H_2	H_2	H_3	H_3	H_4	H_4	H_1	H_4	H_4	H_3	H_1	H_4	H_4	H_2	H_4	H_4	H_2	H_4	H_4	H_2	H_2	H_2
log*NID* – log*GDP*	H_4	H_2	H_4	H_4	H_4	H_4	H_4	H_2	H_4	H_4	H_2	H_4	H_4	H_4	H_4	H_1	H_4	H_2	H_1	H_2	H_2	H_2	H_2
log*LID* – log*GDP*	H_4	H_2	H_4	H_1	H_4	H_1	H_2	H_1	H_2	H_4	H_2	H_4	H_4	H_4	H_4	H_3	H_1	H_4	H_1	H_4	H_4	H_4	H_2

Source: Evaluation results in the EViews software package

The following are the results of Granger causality test between GDP per capita growth and total premium per capita conducted individually for each country:

- The hypothesis that there is no causality between gross domestic product per capita growth and total premium per capita is rejected, *i.e.*, the *demand-following hypothesis* (***H_1***), is not rejected in the case of Finland and Hungary*.
- The hypothesis that there is no causality between total premium per capita and GDP per capita growth is rejected, *i.e.*, the *supply-leading hypothesis* that insurance market development contributes to economic growth (***H_2***), is not rejected in the case of Belgium, Luxembourg, Portugal, Spain, Sweden, Bulgaria* and Slovenia*.
- The feedback hypothesis (***H_3***), *i.e.*, there was two-way causality between the observed variables, is not rejected in the case of Cyprus, Greece and Croatia*.
- The neutrality hypothesis (***H_4***), *i.e.*, that there was no causality between insurance market development and economic growth is not rejected in the case of 7 developed countries: Austria, Denmark, France, Germany, Ireland, Italy and the Netherlands, and four emerging markets: the Czech Republic*, Poland*, Romania* and Slovakia*.

The Granger causality test of gross domestic product per capita growth and non-life insurance premium per capita conducted individually for each country showed the following:

- The demand-following hypothesis (***H_1***) was not rejected in the case of the Netherlands and Romania*.
- The supply-leading hypothesis (***H_2***) was not rejected in the case of Belgium, Finland, Greece, Portugal, Spain, Sweden, Slovakia* and Slovenia*.

- The neutrality hypothesis (***H_4***) was not rejected in the case of Austria, Cyprus, Denmark, France, Germany, Ireland, Italy, Luxembourg, Bulgaria*, Croatia*, the Czech Republic*, Hungary* and Poland.

The results of the Granger causality test of gross domestic product per capita and life insurance premium per capita conducted individually for each country indicated the following:

- The demand-following hypothesis (***H_1***) was not rejected in the case of Cyprus, Finland, the Czech Republic*, Poland* and Romania*.
- The supply-leading hypothesis (***H_2***) was not rejected in the case of Belgium, Denmark, France, Greece and Sweden.
- The feedback hypothesis (***H_3***) was not rejected in the case of the Netherlands.
- The neutrality hypothesis (***H_4***) was not rejected in the case of Austria, Germany, Ireland, Italy, Luxembourg, Portugal, Spain, Bulgaria*, Croatia*, Hungary*, Slovakia* and Slovenia*.

These results are discussed in the following part of the paper.

4. Concluding Remarks

The results of the Augmented Dickey Fuller test in Panels 1, 2 and 3, as well as in the case of the countries classified in the category of emerging market and developed countries, indicate that selected time series are integrated at the order 0 or 1. Moreover, the results of the test by countries show that the selected time series in some countries are integrated at the order 0 or 1, enabling us to apply the autoregressive distributed lag (ARDL) approach.

The bounds test results suggest that gross domestic product per capita growth and total premium per capita are cointegrated, implying the existence of a long-run equilibrium relationship between these variables. Long-run coefficients are estimated using the ARDL approach. For all the analysed countries, as in the case of the analysis conducted on all three panels, the error correction coefficient indicates a relatively high rate of convergence towards long-run equilibrium. The obtained results indicate that the insurance market development strategy could contribute to ensuring long-term economic stability and growth.

The results of the autoregressive distributed lag (ARDL) approach confirm a statistically significant positive long-term effect of insurance density on GDP per capita growth (annual %) in the case of Belgium, Cyprus, Bulgaria*, Romania* and Slovenia*. Although the obtained coefficients in the three countries belonging to emerging markets are lower compared to the countries belonging to the category of developed countries, these results could indicate that countries whose markets are classified as emerging markets should pay more attention to the development of insurance.

Our results of the long-run coefficient assessment using the panel ARDL approach show that insurance density has a statistically significant positive long-term effect on GDP per capita growth when looking at panel data for all the selected countries (Panel 1). The results of the assessment of long-run coefficients in the case of panel data on the countries classified as emerging markets (Panel 2) also show that insurance density has a statistically significant positive long-term effect on GDP per capita growth, while in the case of panel data related to developed countries (Panel 3), the model did not show a statistically significant positive effect. Similarly, Han *et al.* (2010) conclude that insurance market development as well as the development of individually observed life and non-life insurance markets play a far more significant role for developing economies than for developed economies. On the contrary, according to Arena (2008), life insurance had a positive impact in high-income countries, and non-life insurance had a positive effect in developing countries; still, it is less powerful on economic growth than in high-income countries. Haiss and Sümegi (2008) implied that on the markets of EU-15 and Switzerland, Norway and Iceland, there was a positive impact of life insurance on real GDP growth, and on the other hand, for the Central and Eastern Europe countries that later became EU members during the period covered by the research , liability insurance had a greater impact.

The results of the panel ARDL approach show that insurance density has a statistically significant positive short-term effect on GDP per capita growth in the case of all three panels. Moreover, short-run coefficients show a statistically significant positive effect in the case of all the analysed countries, except in the case of Ireland and Luxembourg, where the optimal lag structure of the selected model is ARDL (1.0) and the results show only the magnitude of the error correction coefficient.

We apply a Granger causality test to check the direction of causality between the analysed variables. Using VAR Granger causality/block exogeneity Wald tests for panel data covering all the countries (Panel 1), we determined a two-way causality between insurance market development and economic growth, when observing non-life and life insurance markets, as well as the entire market. The existence of a two-way long-term and short-term causal relationship between insurance market development and economic growth for 10 selected OECD countries during the period 1979–2006 was also established by Lee (2011). In the case of countries classified as emerging markets (Panel 2), two-way causality was not established in the case of life insurance, where the test showed that insurance market development follows economic growth. Actually, the economic growth of developing countries stimulates the development of life insurance, while life insurance in these countries, which is certainly at a much lower level of development compared to developed countries, has no significant impact on economic growth and development. This result can be explained by the structure of the life insurance portfolio, in which instead of products linked to investment funds and financial markets, traditional life insurance products dominate. These results differ from those of Lee *et al.* (2013) in the case of 41 countries in the period 1979–2007, as well as the results of Apergis and Poufinas (2020), who used a sample of 27 OECD countries in the period 2006–2016. We need to emphasize that our results, which indicate that economic growth has an impact on the development of life insurance, are in line with previous theoretical assumptions. As for panel data on the countries classified in the category of developed countries (Panel 3), two-way causality was not established in the case of non-life insurance, where the test showed that insurance market development contributes to economic growth but not vice versa. The reason for this result lies in the fact that financial literacy and the awareness of the importance of risk and insurance among citizens in developed countries are at a significantly higher level compared to developing countries, so economic development has no significant impact on decisions to purchase non-life insurance products.

Our analysis shows that in 11 out of the 23 analysed EU countries, there was no causality between total premium per capita and gross domestic product per capita growth. The presented results of the Granger causality test conducted for each country showed that only in the case of Austria, Ireland, Italy and Germany it was not established whether there was causality between the selected indicators of insurance market development and economic growth.

The results of Chang *et al.* (2013), Ward and Zurbruegg (2000), Demirci and Zeren (2017), Wanat *et al.* (2016) and Peleckienė *et al.* (2019) confirm different directions of causality between insurance activities and economic growth. The differences in the results can be attributed to the applied methodology, selected indicators of insurance market development and economic growth and certain characteristics of the analysed countries.

In our research, we looked at the insurance premium per capita as an indicator of the development of the insurance market, not dealing with indicators of profitability and solvency of insurance companies, which should be taken into account when creating an insurance market development strategy. To ensure the stability and growth of the insurance market, in addition to the economic assumptions that we observed in this case through the GDP per capita growth indicator (annual %), it is necessary to provide an appropriate regulatory framework, including efficient supervision. It can be concluded that the countries that had a communist system in the last century differ in the degree of insurance development in relation to other countries, and that cultural tradition can have an impact on insurance development. The stability of the insurance market depends on these indicators, as well as the trust in the insurance sector. Significant activities in terms of ensuring the stability of the insurance market in the European

Union, which are also the subject of our analysis, are incorporated within the Solvency II Directive, which has been in force in EU countries since 1 January 2016.

The insurance market development strategy should include a connection between the insurance market and the financial market development. The impact of substitutes for insurance products on the attractiveness of insurance products, including the social security system (pension products and health insurance), banking products, statutory obligations to pay unemployment benefits, retirement, compensation in the name of natural disasters, *etc*., should not be neglected. In addition to the above, the life insurance market largely depends on the demographic trend.

One of the potential solutions that can affect the survival and development in an environment characterized by a new crisis, is to encourage the development of new insurance products. Innovation is also becoming necessary in situations where insurers are struggling to grow on a saturated market. It should be taken into account that the insurance offer can meet the requirements of the economy and the population and implement all necessary measures in terms of increasing capacity and resolving organizational weaknesses.

It follows from all this that the development of the insurance market must be viewed in the context of the development of the entire financial market and in relation to a number of economic, political and social factors.

Our results provide evidence that insurance growth contributes to the growth of an economy, quantifying long-term and short-term effects for all the countries of the European Union, which is the greatest contribution of this paper, separating it from the papers described in the literature review.

Future research could include the effects of further development of life insurance on economic development in the selected countries, including analysis of social policy related to the pension insurance system as an element that could have a major impact on the demand for life insurance products. Moreover, the analyses should include the effect of interest rate movements and the impact of the previous economic crisis and the crisis caused by the COVID-19 pandemic on the selected indicators.

References

Alhassan, A. L. (2016). Insurance market development and economic growth: Exploring causality in 8 selected African countries, *International Journal of Social Economics*, 43(3), 321–339, https://doi.org/10.1108/IJSE-09-2014-0182

Apergis, N., Poufinas, T. (2020). The role of insurance growth in economic growth: Fresh evidence from a panel of OECD countries. *The North American Journal of Economics and Finance*, 53(C), 101217, https://doi.org/10.1016/j.najef.2020.101217

Arena, M. (2008). Does Insurance Market Promote Economic Growth? A Cross-Country Study for Industrialized and Developing Countries. *Journal of Risk and Insurance*, 75(4), 921–946, https://doi.org/10.1111/j.1539-6975.2008.00291.x

Atique, R., Malik, K. (2012). Impact of domestic and external debt on the economic growth of Pakistan. *World Applied Sciences Journal*, 20(1), 120–129.

Breusch T. S. (1978). Testing for Autocorrelation in Dynamic Linear Models. *Australian Economic Papers*, 17, 334–355, https://doi.org/10.1111/j.1467-8454.1978.tb00635.x

Breusch, T. S., Pagan, A. R. (1979). A simple test for heteroscedasticity and random coefficient variation. *Econometrica*, 47, 1287–1294, https://doi.org/10.2307/1911963

Chang, T., Lee, C. C., Chang, C. H. (2013). Does insurance activity promote economic growth? Further evidence based on bootstrap panel Granger causality test. *The European Journal of Finance*, 20(12), 1187–1210, https://doi.org/10.1080/1351847x.2012.757555

Chemonics (2006). Assessment on how strengthening the insurance industry in developing countries contributes to economic growth, United States Agency for International Development. Washington, D. C.: Chemonics International Inc. and the International Insurance Foundation. 15 February 2006.

Choi, I. (2001). Unit root tests for panel data. *Journal of International Money Finance*, 20(2), 249–272, https://doi.org/10.1016/s0261-5606(00)00048-6

Demirci, Ş. Z., Zeren, F. (2017). Sigorta Primi ve Ekonomik Büyüme: OECD Ülkeleri üzerine bir araştırma. *İşletme Bilimi Dergisi*, 5(1), 1–11, https://doi.org/10.22139/jobs.286819

Dickey, D. A., Fuller, W.A. (1979). Distribution of the Estimators for Autoregressive Time Series with a Unit Root. JASA. *Journal of the American Statistical Association*, 74(366), 427–431, https://doi.org/10.2307/2286348

Engle, R. F., Granger, C. W. J. (1987). Co-Integration and Error Correction: Representation, Estimation, and Testing. *Econometrica*, 55(2), 251–276, https://doi.org/10.2307/1913236

EC (2009). Directive 2009/138/EC of the European Parliament and of the Council of 25 November 2009 on the taking-up and pursuit of the business of Insurance and Reinsurance (Solvency II) [online]. *OJ L* 335, 17. 12. 2009, 1–155; Available at: http://data.europa.eu/eli/dir/2009/138/oj

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*. The World Bank: Policy Research Working Papers: February 2011. https://doi.org/10.1596/1813-9450-5572

Godfrey, L. G. (1978a), Testing for Higher Order Serial Correlation in Regression Equations when the Regressors Include Lagged Dependent Variables. *Econometrica*, 46, 1303–1310, https://doi.org/10.2307/1913830

Godfrey, L.G. (1978b). Testing for multiplicative heteroscedasticity. *Journal of Econometrics*, 8(2), 227–236, https://doi.org/10.1016/0304-4076(78)90031-3

Granger, C. W. J. (1969). Investigating causal relations by econometric models and cross-spectral methods. *Econometrica*, 37(3), 424–438, https://doi.org/10.2307/1912791

Haiss, P., Sümegi, K. (2008). The relationship between insurance and economic growth in Europe: a theoretical and empirical analysis. *Empirica*, 35(4), 405–431, https://doi.org/10.1007/s10663-008-9075-2

Han, L., Li, D., Moshirian, F., et al. (2010). Insurance Development and Economic Growth. *The Geneva Studies on Risk and Insurance-Issue and Practice*, 35, 183–199, https://doi.org/10.1057/gpp.2010.4

Hugh, T. P. (1966). Financial Development and Economic Growth in Underdeveloped Countries. *Economic Development and Cultural Change*, 14(2), 174–189, https://doi.org/10.1086/450153

Jarque, C., Bera, A. (1980). Efficient tests for normality homoscedasticity and serial independence of regression residuals. *Econometric Letters*, 6(3), 255–259, https://doi.org/10.1016/0165-1765(80)90024-5

Lee, C. C. (2011). Does Insurance Matter for Growth: Empirical Evidence from OECD Countries, B.E. *Journal of Macroeconomics*, 11(1), 1–28, https://doi.org/10.2202/1935-1690.2080

Lee, Chien-Chiang, Lee, Chi-Chuan, Chiu, Y. B. (2013). The link between life insurance activities and economic growth: Some new evidence. *Journal of International Money and Finance*, 32(C), 405–427, https://doi.org/10.1016/j.jimonfin.2012.05.001

Lütkepohl, H. (2006). *New Introduction to Multiple Time Series Analysis*. Berlin: Springer. ISBN 978-3-540-40172-8.

Mickey, R. M., Dunn, O. J., Clark, V. A. (2004). *Applied statistics: Analysis of variance and regression*. Third edition, Hoboken: John Willey & Sons. ISBN 978-0-471-37038-3.

Nkoro, E., Uko, A. K. (2016). Autoregressive Distributed Lag (ARDL) cointegration technique: application and interpretation. *Journal of Statistical and Econometric Methods*, 5(4), 63–91.

Pesaran, M. H., Shin, Y., Smith, R. (2001). Bounds Testing Approaches to the Analysis of Level Relationships. *Journal of Applied Econometrics*, 16(3), 289–326, https://doi.org/10.1002/jae.616

Pesaran, M. H., Shin, Y., Smith, R. P. (1999). Pooled mean group estimation of dynamic heterogeneous panels. *Journal of the American Statistical Association*, 94(446), 621–634, https://doi.org/10.1080/01621459.1999.10474156

Pedroni, P. (1999). Critical values for cointegration tests in heterogeneous panels with multiple regressors. *Oxford Bulletin of Economics and Statistics*, 61(S1), 653–670, https://doi.org/10.1111/1468-0084.0610s1653

Pedroni, P. (2004). Panel cointegration: asymptotic and finite sample properties of pooled time series tests with an application to the PPP hypothesis. *Econometric Theory*, 20(3), 597–625, https://doi.org/10.1017/S0266466604203073

Peleckienė, V., Peleckis, K., Dudzevičiūtė, G., et al. (2019). The relationship between insurance and economic growth: evidence from the European Union countries. *Economic Research – Ekonomska Istraživanja*, 32(1), 1138–1151, https://doi.org/10.1080/1331677x.2019.1588765

Piljan, I., Cogoljević, D., Piljan, T. (2015). Role of insurance companies in financial market. *International Review*, (1–2), 94–102.

Toda, H. Y and T. Yamamoto (1995). Statistical inferences in vector autoregressions with possibly integrated processes. *Journal of Econometrics*, 66(1–2), 225–250, https://doi.org/10.1016/0304-4076(94)01616-8

Ward, D., Zurbruegg, R. (2000). Does Insurance Promote Economic Growth? Evidence form OECD Countries. *Journal of Risk and Insurance*, 67(4), 489–506, https://doi.org/10.2307/253847

Wanat, S., Papież, M., Śmiech, S. (2016). *Insurance Market Development and Economic Growth in Transition Countries: Some new evidence based on bootstrap panel Granger causality test*. MPRA Paper 69051, University Library of Munich, Germany.