EFFECTS OF SOME INSURANCE VARIABLES ON SUSTAINABLE ECONOMIC GROWTH. EVIDENCE FROM EU USING GMM PANEL DATA ANALYSIS

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Abstract
The present paper analyses the impact of financial intermediation, and implications to economic growth. The main object of the paper is to prove empirically the existence of a positive association between insurance market indicators and economic development. The novelty of our study is related to the use of variables from the insurance sector, which is considered, along with the banking sector (and capital markets), as a major player involved in financial intermediation. The variables of interest used in our sample refer to the macroeconomic levels in the Member States of the European Union, and the time span being 2007-2019. For econometric analysis, we chose to use a dynamic panel data model using the generalized method of moments. Thus, we investigate how the variation of economic growth measured by the level of GDP per capita is influenced by the first lag of it, together with the insurance sector, the banking sector and the government expenditures. The variables used in our study are insurance penetration rates, measured as a percentage of gross written premiums and GDP, inflation, private consumption, balance of payments, government spending, and level of private credit (calculated as a percentage of GDP).

Key words
economic growth, insurance sector, financial system, financial intermediation, banking sector.

JEL Classification
E22, G22, O16.

Introduction

The present paper analyses the impact of financial intermediation, as a core activity of financial system, and its implications to economic growth. The specialized literature also suggests a strong and positive link between the soundness of the economic (and financial) system and long-term development. In this approach, a financial system contributes (through intermediation process) to the optimal improvement of economies, facilitates

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transactions, optimizes coverage, diversification and risk control. There is also evidence that a sound system boosts the management processes and corporate control, the mobilizing of saving and investing, while facilitating the exchange of goods and services. The main object of the paper is to prove empirically the existence of these relationships, so the hypothesis from which we start our inquiry concerns the existence of a positive association between them (and economic development). The novelty of our study is related to the use of variables from the insurance sector, which is considered, along with the banking sector (and capital markets), as a major player involved in financial intermediation. The variables of interest used in our sample refer to the macroeconomic levels in the Member States of the European Union, respectively EU-28, and the time span being 2007-2019. For econometric analysis, we chose to use a dynamic panel data model (GMM) using the generalized moment method developed by Arellano-Bond. Thus, we investigate how the variation of economic growth measured by the level of GDP per capita is influenced by the delayed variation at the level of a first lag of it, together with the insurance sector, the banking sector and public sector. The variables used in our study are insurance penetration, measured as a percentage of gross written premiums and GDP, inflation, private consumption, balance of payments, government spending, level of private credit (all variables are calculated as a percentage of GDP). The methodology and data are explained in the following section.

1. Literature review

Financial systems are a basis for supporting the framework for the manifestation of economic processes, especially through the financing mechanisms provided. Thus, whether we are referring to consumption or investment, the public sector or the private sector, financial systems contribute to the redistribution of financial resources in an economy.

The role of financial systems in economics and criticize the traditional approach to the process of growth that is based on accumulation factors, not considering the implications of financial systems (Allen and Oura, 2004). The authors discuss the opportunities for growth generated in this case by the combination of banking and stock market activities. They conclude that the architecture of financial systems is important for the economy, even when it comes to the devastating impact of crises and speculative bubbles. There is thus a compensatory and complementary effect between the banking sector and the financial markets, in terms of maintaining economic stability, with both subsystems having capital management and risk-limiting instruments. In this sense, it is preferable for economic actions to be carried out according to market mechanisms, but when gaps appear, banks can intervene as a stabilizer. We could say that this is also true in the opposite situation, in which bank lending mechanisms no longer work optimally, and in which market instruments can restore balance. However, (Trichet, 2005) complements this role, arguing that the implications of the banking sector for capital market movements on maintaining financial stability are no longer sufficiently viable. He also fully argues the role of the insurance and reinsurance sector in the economic context, identifying a number of connections between banks, insurance companies and stock exchanges that contribute cumulatively to financial stability. Thus, both banks and insurance companies

contribute to the mobilization of capital from individuals and legal entities to the financial markets, through liquidity control mechanisms such as interest rates, risk reduction, damage limitation and investment boosting. All these resource mobilization and control activities undertaken under the three subsystems can be generically referred to as financial intermediation.

Thus, in the financial systems it is found that the main responsible actors that involve the mechanism of money circulation in the economy are the banking subsystem, the insurance subsystem and the financial markets. The process of financial intermediation is thus the one that underlies the banking, insurance and capital market activities, which are outlined as the main means of efficient development of economic relations within the financial systems.

Another study (Adrian and Shin, 2010) suggests that financial intermediation is an important process in mobilizing resources in economies. They analyze the implications of financial intermediation in terms of the 2007 credit crunch, and conclude that in the process of financial intermediation, developments in the banking sector are inter-conditioned with developments in the capital market, under the influence of bank balance sheet changes that directly affected liquidity. It is thus pointed out that banks' lending mechanisms work optimally only where prices are stable and capital market investments are opportunistic. This reinforces the idea that there are close links between the banking sector and the financial markets that contribute to the post-crisis economic recovery. The incursions of insurance companies as secondary partners in the intermediation process, which intervene in the economy mainly as distributors of the resources provided by banks, for investments and compensations, are also briefly pointed out.

It can be seen that most studies in this field address the importance of financial intermediation in terms of the impact of the banking and financial markets and less of the insurance sector. Therefore, important studies have been carried out that demonstrate with certainty the impact of banks and stock markets on the process of economic growth. We mention in this sense the work of (Levine and Zervos, 1998), who managed to show that there is a link between the stock market, banks and economic growth. They start from the traditional idea that banks and stock exchanges have tools for predictability and influence of economic mechanisms, which in the long run increases productive activities and capital investment. A number of indicators were used in the econometric analysis, such as economic growth, capital market growth, the level of private sector savings, stock market capitalization, the value level of traded instruments and goods, stock market volatility and the level of private loans granted by the banking system. They made different combinations of these indicators that measure banking and the stock market, and they obtained a series of equations in which the variations of the dependent variable represented by the economic growth responded positively to the variations of the independent variables. The sample used by them was represented by 47 states with developed and developing economies, for a period of 17 years, with data from the period 1976-1993. They conclude that there is a strong link between the banking system, stock markets and economic growth, by the simple fact that the financial development determined by the evolution of banking systems and stock markets leads to an

accumulation of capital and a technological impulse of production economic growth.

A more recent study is that of (Beck and Levine, 2004) which also confirms that the banking sector and stock markets have an impact on the process of economic growth. This study is practically a successor to the one conducted in 1998 by (Levine and Zervos, 1998), which uses indicators that measure banking and stock markets such as stock market liquidity, value of instruments and trading assets relative to GDP and level of loans to the private sector.

The sample used was composed of 40 states, and the analyzed period was 22 years, more precisely the years between 1976 and 1998. The authors start their analysis by using a static econometric model, and then build a dynamic model that can capture more effectively a possible causal relationship between banks, stock markets and growth. Finally, they conclude that the banking system and the stock market directly promote the development of the financial system, and thus economic growth. Thus, the results obtained reflect that between the two major components of the financial system, namely the banking sector and the stock market, there is a strictly positive causal relationship with the process of economic growth.

Another study (Outreville, 2013) manages the main reasons and implications that insurance has in the economy. In economic intermediation systems, he argued, the insurance promotes financial stability and reduces crisis situations, it can replace government security programs as needed, and that insurance facilitates trade, mobilizes savings, enables more efficient risk management, promotes loss mitigation and more efficient allocation of capital. In the study, the insurance sector is often treated in the literature as a secondary area of financial intermediation. Thus, most studies on this topic quantify the insurance sector together with the banking sector and financial markets, or even as an integral part of the financial system. There are few studies that accurately attest to the importance of insurance. However, the few papers in the field that have studied the direct relationship between insurance and the process of economic growth approach the analysis from the point of view of the neoclassical theory in which the production function is dependent on the labor factor, capital and technological factor.

Some researchers (Ward and Zurbruegg, 2000) highlight the relationship between insurance and the process of economic growth. They admit the involvement of insurance in economic terms especially on the side of financial intermediation which enhances the accumulation of capital and causes an increase in production. To empirically test a possible causal relationship between insurance and growth, they used a model built on bivariate vector autoregression (VAR). The sample used is represented by 9 representative OECD countries (Australia, Austria, Canada, Switzerland, France, Italy, Japan, the United Kingdom and the United States of America), and the analyzed period was between 1961-1996. The indicators used in the analysis covered insurance premiums, real change in insurance premiums, GDP, and real change in GDP. Early tests of causation reflected the existence of a one-way relationship from insurance to growth only in Canada and Japan, while in Italy a two-way relationship was identified. The results obtained by applying the VAR determined the presence of causal relationships between insurance and economic growth. Thus, in most countries it has been found that a dynamic at the level of GDP leads

to short-term changes in the dynamics of insurance premiums, while the dynamics of premiums only cause the dynamics of GDP in the long term. In other words, insurance can generate long-term changes in GDP dynamics, which can increase or slow down the process of economic growth. They argue that the impact of insurance on economic growth differs from country to country and depends in many cases on cultural, social and economic factors.

Further papers (Arena, 2008) continued the analysis, based on the results obtained by them, and tests whether there is a random relationship between the activity of the insurance market and economic growth in 56 states (states with economies developed countries with developing economies) for the period 1976-2004. The econometric regression model used is a dynamic one that uses the generalized method of moments. The dependent variable of the model was the average GDP growth rate per capita, and the independent variables, penetration of life insurance, non-life insurance and total insurance, calculated as the ratio of total gross written premiums to GDP. Unlike the previous, (Arena, 2008) goes further and chooses to include in its analysis a number of control variables that quantify involvement in growth and other macroeconomic factors, such as the average high school enrollment rate, for to measure investment in human capital, the average inflation rate, the share of government spending in GDP, the level of private loans granted, the degree of liquidity of the stock market, the opening of the economy as the total value of imports and exports relative to GDP and the average growth rate exchange. The results show a positive impact of insurance on economic growth, with a higher impact of life insurance in developed countries and a lower impact of non-life insurance in both developed and developing countries. However, as a component of the financial sector, Arena does not obtain favorable results attesting to the existence of a complementary and causal relationship between the insurance sector, the banking sector and the capital market, arguing that collinearity problems are possible within other previous studies or even in one's own study, which may lead to erroneous results.

Another paper (Haiss and Sümegi, 2008) quantifies the impact of insurance on economic growth in 29 European countries, including the Member States of the European Economic Area, the EU-15 states (including the then candidate countries, Turkey and Croatia), Switzerland, Norway and Iceland, for the period 1992-2005. They started by developing static models using the least squares method by fixed effects and continued the analysis by applying dynamic models motivating that the use of delayed effects leads to more conclusive results. The dependent variable used in the modeling was the real GDP per employee, and the independent variables were the income from insurance premiums (income from life insurance, income from non-life insurance and income from total insurance) and real physical capital. , all expressed in constant prices in US dollars since 2000. As control variables were also used the stock of human capital, calculated according to the weighted education of employees, respectively based on the costs of research and development of employee knowledge, the interest rate on government securities for a period of 10 years and the inflation rate. The results for the whole sample showed a lack of significance between insurance and economic growth, respectively a negative impact of general insurance premiums on GDP.

The use of subsamples by dividing the initial sample into two groups led to more promising results. The first group of EU-15s, Norway, Switzerland and Iceland led to a positive impact of life insurance on GDP, while the second group of new EU states, Central and Eastern European states and candidates for accession The EU, Turkey and Croatia have led to a greater impact on non-life insurance. They conclude that in developed countries the impact of insurance on economic growth is insignificant, while in developing countries insurance has either a positive or a negative impact. However, their research was hit by a number of limitations, such as major differences between the economies of the countries under analysis and the lack of data for Lithuania, which led to its exclusion from the analysis. Croatia and Latvia were also states with too little data to be able to achieve relevant results. They indicate the need to separate in the analysis of developed countries with mature financial markets and less developed countries, by applying multiple indicators that reflect the degree of development of the insurance market over a longer period of time.

Romanian authors (Cristea, Marcu and Cârstina, 2014) conducted a study in which they follow the causal relationship between the insurance sector and economic growth in the case of Romania. For the construction of the econometric model, a series of representative indicators for the insurance market were used, namely the penetration of insurance, the density of insurance and the real increase of insurance. The analyzed period was 1997-2012. The representative econometric model in which a strong correlation was obtained was the one in which the dependent variable was represented by the GDP per capita, and the independent variables the share of gross written premiums in GDP for life insurance and the share of gross written premiums in GDP for non-life insurance. The results show a positive impact between the increase in life insurance and economic growth, but with a low degree of significance. Compared to the results obtained in other studies in the field conducted in other states, where there is a significant correlation between real insurance growth and GDP growth, the lack of significance in Romania was explained by the fact that the Romanian insurance market is underdeveloped dominated by general insurance mandatory.

We consider that the contradictory results in the literature do not contradict the general theory underlying all the studies in question, namely that financial intermediation by the components of a financial system occurs in the general process of economic growth.

2. Methodology and Data

The choose for the difference GMM methodology is related to objectives of the analysis - the impact of insurance market factors on economic growth. The model can be written as in equation no. 1, that specifies the panel data error term:

$$y_{it} = \alpha y_{i,t-1} + \mathbf{x}'_{it}\beta + \mu_i + v_{it} \quad (1)$$

The (difference) GMM estimators are configured for panel analysis and has the following assumptions (see (Roodman, 2009) for further details):

- the process is dynamic (lag values of dependent variable);

- some regressors may be endogenous (in our case at least the variable of interest – GSPcap can be considered endogenous);
- the existence of arbitrarily distributed fixed individual effects;
- the idiosyncratic disturbances are uncorrelated across individuals
- the idiosyncratic disturbances (other than fixed effects, μi) may have individual-specific patterns of heteroskedasticity and serial correlation;

The presence of non-stationarity of data may conduct to a spurious regression. To test the series for stationarity, we have performed unit roots tests. The null hypothesis for tests (Harris and Tzavalis, 1999; Choi, 2001; Levin, Lin and Chu, 2002; Im, Pesaran and Shin, 2003; Breitung and Das, 2005) is H0: all the panels contain a unit root.

Some of the tests (see section with empirical results) suggests that variables may not be stationary in levels (but are stationary in first difference), so difference GMM methods will be applied.

To use the difference GMM, matrices with instruments are used as in (2), see (Anderson and Hsiao, 1982; Arellano and Bond, 1991; Roodman, 2009).

The second problem is related to the endogeneity which refers, as stated in (Ullah, Akhtar and Zaefarian, 2018), to "the condition in which an explanatory (endogenous) variable correlates with the error term, or if two error terms correlate when dealing with structural equation modelling. Endogeneity bias can therefore cause inconsistent estimates (i.e., not tend to be the true value as sample size increases), which potentially leads to wrong inferences, misleading conclusions and incorrect theoretical interpretations."

In this approach, the problem of simultaneity may also occurs when "two variables simultaneously affect/cause each other and have reciprocal feedback loops (non-recursive models)", and the problem of omitted bias can appear. (see (Ullah, Akhtar and Zaefarian, 2018), p. 4-10). The problem can be resolved using instrumental variables, which is the core of the GMM method.

The difference GMM uses a matrix as in (2), instrumenting the endogenous variable (e.g. the lag of y) with further lags in difference. The equation no. 2 presents the collapsed instruments (matrix).

$$\begin{bmatrix} 0 & 0 & 0 & \cdots \\ \Delta y_{i2} & 0 & 0 & \cdots \\ 0 & \Delta y_{i3} & 0 & \cdots \\ 0 & 0 & \Delta y_{i4} & \cdots \\ \vdots & \vdots & \vdots & \ddots \end{bmatrix} \tag{2}$$

Our model has the following form, considering the insurance market variables, as in equation no. 3:

$$GDPcap_{it} = \alpha GDPcap_{i,t-1} + \beta'_{INSF} X_{it}^{INSF} + \beta'_{MF} X_{it}^{MF} + \varepsilon_{it} \tag{3}$$

Regarding the equation no. 3, the following explanations should be considered: the subscripts i and t represent country and year, respectively; $GDPcap_{it-1}$ is the one-period

lagged leverage variable; the $\alpha_{i,t-1}$ is the coefficient of the first lag-dependent variable L.GDP; β'_{INSF} and β'_{MF} contains insurance market factors (INSF) and macroeconomic factors (MF), being the coefficients vectors to be estimated from models using proposed methodology; the X_{it}^{INSF} and X_{it}^{MF} are sets of firm-level factors and macroeconomic variables, containing the instrumental variables or exogenous variables respectively; ε_{it} contains the unobserved firm-specific effects and the error term.

Data variables codification, short explanations of their economic interpretation and the expected signs are presented in table no. 1

Table no. 1. Variables' definition and expected signs

Variable name	Model codification	Short description	Expected sign
GDP per capita growth (annual %)	gdpcap	Annual percentage growth rate of GDP per capita based on constant local currency	not applicaple (dependent variable)
Insurance sector variables (INSV)			
Total insurance penetration rate (annual %)	ptotal	The value of the total gross written premiums on GPD.	+
Life insurance penetration for life (annual %)	plife	The value of the life gross written premiums on GPD.	+
General insurance penetration rate (annual %)	pgeneral	The value of the general gross written premiums on GPD.	+
Macroeconomic variables (MF)			
Government Expense (%	gov	Expense is cash payments for operating activities of the government in providing	+/-

Variable name	Model codification	Short description	Expected sign
of GDP)		goods and services	
External balance on goods and services (% of GDP) -	extbal	External balance on goods and services equals exports of goods and services minus imports of goods and services (previously nonfactor services).	+/-
Private credit (Domestic credit to private sector) (%GPD)	credit	Domestic credit to private sector refers to financial resources provided to the private sector by financial corporations,	+/-
Investment (Gross capital formation) (% of GDP) -	inv	Gross capital formation (formerly gross domestic investment) consists of outlays on additions to the fixed assets of the economy plus net changes in the level of inventories.	+
Inflation, consumer prices (annual %)	infl	Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly. The Laspeyres formula is generally used.	-

Data description and summary statistics are presented as follows.

Data description and summary statistics

Our variable of interest is gross domestic product per capita (coded in model as *gdpcap*). The time frequency is annual, the data being obtained from World Bank, Insurance Europe, Eurostat and O.E.C.D. statistics. The statistics for the data are presented as follows (in Table no. 2)

Table no. 2: Descriptive statistics

Variable		Mean	Std. Dev.	Min	Max
gdpcap	364	1.5093	3.7008	-14.4643	23.999
ptotal	364	7.1719	8.1303	0.9053	51.3394
pgeneral	364	2.5911	1.9581	0.6393	14.6777
plife	364	4.5807	7.2466	0.1523	48.1905
extbal	364	2.8795	8.3779	-19.7488	36.0147
inv	364	22.212	4.7186	11.9024	54.6975
infl	364	1.9138	2.0746	-4.4781	15.4023
gov	364	19.8039	2.9949	11.8821	27.9349
credit	364	90.2396	46.8727	0.1000	255.3102

Source: author's own calculation

The dataset has 336 observations and a time span between 2007 and 2019. The unit panel is referring to 28 countries from European Union. The variable of interest gdpcap has an average mean of 1.51, a minimum of -14.46, a maximum of 24.00, a variance of 13.70, and a standard deviation of 3.70. The variable ptotal (penetration rate of total insurance, calculated as total premiums to GDP in domestic market) has an average mean of 7.17, a minimum of 0.90, a maximum of 51.34, a variance of 66.10, and a standard deviation of 8.13. The variable pgeneral (penetration rate of general insurance) has an average mean of 2.59, a minimum of -0.64, a maximum of 14.68, a variance of 3.83, and a standard deviation of 1.96. The variable plife (penetration rate of life insurance) has an average mean of 4.58, a minimum of 0.15, a maximum of 48.19, a variance of 52.51, and a standard deviation of 7.25. The variable extbal (external balance) has an average mean of 2.88, a minimum of -19.75, a maximum of 36.01, a variance of 70.19, and a standard deviation of 8.38. The variable inv (capital investment) has an average mean of 22.21, a minimum of 11.90, a maximum of 54.70, a variance of 22.27, and a standard deviation of 4.72. The variable infl (inflation) has an average mean of 1.91, a minimum of -4.48, a maximum of 15.40, a variance of 4.30, and a standard deviation of 2.07. The variable gov (government expenditures) has an average mean of 19.80, a minimum of 11.88, a maximum of 27.93, a variance of 8.97, and a standard deviation of 2.99. The variable credit (private credit) has an average mean of 90.24, a minimum of 0.10, a maximum of 255.31, a variance of 2197.06, and a standard deviation of 46.87. The statistics shows sufficient variability across countries, so the panel data models should be considered.
The empirical results are explained in the next section.

3. Empirical Results

Preliminary tests

Some preliminary tests are conducted, regarding the stationarity. The results for tests Levin-Lin-Chu (noted LLC), Im-Pesaran-Shin (noted IPS), Harris-Tzavalis (noted HT), Breitung (noted as follows as Bre.), are presented in the following.

We present in table no. 3 only results for the dependent variable GDP per capita, coded as gdpcap, for one of the interested independent variables life insurance penetration rate, coded plife) and the first control interchangeable independent variable private credit, coded credit. For all other variables, due to space in the paper are not inserted here, but the results are available on demand.

Table no. 3: Unit-root tests results

Vars\Tests	LLC	IPS	HT	Bre
gdpcap				
levels	-6.1842***	-10.6226***	-13.9766***	-6.3067***
first-diff	-8.5317***	-42.2383***	-21.4825***	-7.8917***
plife				
levels	-0.2982***	-0.6979	-14.7213***	2.1324
first-diff	-7.9879***	-8.2979***	-25.076***	-5.5855***
credit				
levels	4.6608	-4.5979***	3.1361	3.1034
first-diff	-5.0182***	-9.1299***	-13.4289***	-1.9164**

Source: author's own calculation

The results suggest that there is stationarity problem regarding some variables (e.g. private credit - credit).

Regarding the results presented in table no. 2, for the variable gdpcap, none of of the unit root tests mentioned above suggest that the variable is not stationary in levels, the statistics being: adjusted t* statistic:-10.6226 , p-value: 0.0000, Zt-tilde-bar:-6.1842 , p-value: 0.0000, z statistic:-13.9766 , p-value: 0.0000, lambda:- 6.3067 , p-value: 0.0000. For the variable d.gdpcap, all of the unit root tests evince that the variable is stationary in first-difference (adjusted t* statistic:- 42.2383 , p-value: 0.0000, Zt-tilde-bar:-8.5317 , p-value: 0.0000, z statistic:-21.4825 , p-value: 0.0000, lambda:-7.8917 , p-value: 0.0000).

For the variable plife (life insurance penetration rate), two of the four unit root tests indicate that the variable is not stationary in levels (adjusted t* statistic:-0.6979 , p- value:

0.2426, Zt-tilde-bar:-0.2982 , p-value: 0.3828, z statistic:-14.7213 , p-value: 0.0000, lambda: 2.1324 , p-value: 0.9835), while for the first-difference all tests suggests the stationarity. The first-difference d.plife is stationary (adjusted t* statistic:-8.2979, p-value: 0.0000, Zt-tilde-bar:-7.9879 , p-value: 0.0000, z statistic:-25.0760 , p-value: 0.0000, lambda:-5.5855 , p-value: 0.0000).

For the variable credit the value of adjusted t* statistic is -4.5979 (p-value 0.0000), Zt-tilde-bar is 4.6608 (p-value 1.0000), z statistic is 3.1362 (p-value 0.9991), lambda is 3.1034 (p-value 0.9990), z is 24.4604 (p-value 0.0000), suggesting that the variable may not be stationary in levels (three of four tests do not reject the null hypothesis). For the first-difference, d.credit, the value of adjusted t* statistic is -9.1299 (p-value 0.0000), Zt-tilde-bar is -5.0182 (p-value 0.0000), z statistic is -13.4289 (p-value 0.0000), lambda is -1.9164 (p-value 0.0277), z is 7.2753 (p-value 0.0000), suggesting that the variable is stationary.

Empirical results and interpretation

The results of our models are presented in table no. 4. We show here only the synthetic results (coefficients with variables in levels, lag of dependent variable and lag of inflation because the latest variable was not used in levels; the year dummy variables were removed, further lags of independent variables were also been removed). The full results are available on demmand.

Table no. 4: Synthetic results for GMM twostep robust models

	(1)	(2)	(3)	(4)	(5)	(6)
VARS	*gdpcap*	*gdpcap*	*gdpcap*	*gdpcap*	*gdpcap*	*gdpcap*
L.gdpcap	0.356**	0.321**	0.312***	0.311*	0.414**	0.329*
	(0.142)	(0.135)	(0.111)	(0.152)	(0.172)	(0.165)
ptotal	0.276**	0.123*				
	(0.114)	(0.0771)				
plife			0.291**	0.143*		
			(0.110)	(0.0726)		
pgeneral					0.291*	0.0401*
					(0.220)	(0.213)
extbal	2.219***	1.288***	2.287***	1.364**	2.376***	1.280***
	(0.604)	(0.394)	(0.587)	(0.523)	(0.763)	(0.407)
inv	1.805***	0.969**	1.940***	1.046*	1.833***	0.949**

VARS	(1) gdpcap	(2) gdpcap	(3) gdpcap	(4) gdpcap	(5) gdpcap	(6) gdpcap
	(0.593)	(0.411)	(0.549)	(0.547)	(0.631)	(0.448)
L.infl	-0.588	-0.961***	-0.546	-0.981***	-0.540	-1.013***
	(0.359)	(0.314)	(0.336)	(0.345)	(0.452)	(0.346)
credit	0.0203		0.0239		0.0233	
	(0.0357)		(0.0336)		(0.0434)	
gov		0.926		1.167		1.267
		(1.421)		(1.197)		(1.389)
Obs.	308	308	308	308	308	308
Groups	28	28	28	28	28	28

Note: Standard errors in parentheses $***p < 0.01$, $** p < 0.05$, $*p < 0.1$

The impact of total insurance penetration rate (ptotal) is positive and statistically significant (column no. 1). When using private credit credit as interchangeable control variable, the coefficient is 0.276**. The interpretation is that one unit change in total insurance penetration rate is associated with a 0.276 increase in GDP per capita in the short-run, at the 5% significance level, on average ceteris paribus. In this case, GDP per capita and penetration rate of total insurance shows an inelastic direct relationship. If government (gov) variable is used, the coefficient is 0.123*, having the same interpretation.

The coefficients of life insurance penetration rate plife (columns 3 and 4) and general insurance penetration rate pgeneral (columns 5 and 6) are also positive and statistically significant, for both control variables implied: credit and gov. The economic interpretation is that a unit change in penetration rate increases the GDPcap with 0.291**, 0.143*, and 0.291* 0.0401* units, respectively, depending on the models considered.

The external balance effect is positive and statistically significant in all of conducted models (the specific coefficients are: 2.219***, 1.288***, 2.287***, 1.364**, 2.376***, and 1.280***). The interpretation is that one unit change in external balance rate is associated, for example, with a 2.219 increase in GDP per capita in the short-run, at the 1% significance level, on average ceteris paribus. We see that GDP per capita and external balance shows an elastic direct relationship.

The investments show also a positive impact on economic growth, the coefficients from difference GMM being 1.805***, 0.969**, 1.940***, 1.046*, 1.833***, and 0.949**. All coefficients are statistically significant at least at 10% level, most of them being

significant at 1% level. One unit change in investments is related, for example, with a 1.805 increase in GDP per capita in the short-run, at the 1% significance level, on average ceteris paribus. We perceive that GDP per capita and investments shows an elastic direct relationship.

The inflation (first lag) effect is negative, but when using private credit credit as interchangeable control variable, the coefficient is statistically insignificant. It is statistically significant only we use government expense gov in model (the specific coefficients are: -0.961***, -0.981***, and -1.013***). In this case, the interpretation is that one unit change in inflation (first lag) rate is associated, for example, with a -0.961 decrease in GDP per capita in the short-run, at the 1% significance level, on average ceteris paribus. We see that GDP per capita and inflation (first lag) shows an elastic direct relationship.

The private credit and government expense effects are positive, but in the same cases the coefficient is statistically insignificant. In this case, we cannot say with certainty that an increase in private credit or government expense could lead to an increase in GDP per capita.

The results are in line with our expectations. It resonate with the results obtained in other study (Ward and Zurbruegg, 2000 and Arena, 2006), respectively outlining an inelastic direct relationship between the insurance sector and GPD per capita. In this situations, we can say that the dynamics of the insurance market can have an impact on economic growth. Like Arena (2006), we question the connection between insurance and banks, and even more so between insurance and government expense. So although by using both control variables we obtain conclusive results, but in the same case, the private credit and government expense coefficient is statistically insignificant. Finally, in comparison with another study (Haiss and Sümegi, 2008) we obtain promising results across the EU-28 group o states, which indicates the possibility of increasing the uniformity of the insurance markets in Europe.

Using the (difference) GMM estimators, we have controlled for the following:

- the economic growth process (proxy used is GDPcap) is dynamic (first lag of dependent variable was used);
- some regressors were considered to be endogenous (e.g. first lag of GDP per capita, investments, inflation, external balance, were considered as endogenous/ predetermined and were instrumented);
- the instruments were collapsed and only two and three lags were used, for keeping the number of instruments below the number of groups (28 countries);
- Arellano-Bond test for autocorrelation in first-difference errors, and Sargan and Hansen tests (available on demand) suggests no problem;
- the existence of arbitrarily distributed fi individual effects in countries (economic development, the law system, different type of institutional system etc.);
- the idiosyncratic disturbances (other than fixed effects, μi) have individual-specific patterns of heteroskedasticity or serial correlation;

Based on the arguments presented above, we can conclude that our results are robust.

Conclusions

The novelty of the paper is related to the analysis of the impact of the insurance sector on sustainable economic growth using variables from the insurance sector, which is considered, along with the banking sector (and capital markets), as a major player involved in financial intermediation. Our results are in line with other studies and we have found empirical evidence that the financial intermediation provided by the insurance sector is important in the economy. We have also demonstrated the existence of a direct link between insurance and economic growth. We believe that the paper is useful to the practitioners that study the role of insurance sector and financial systems and can extend our research. The results can also be also useful for the policy makers, who want to stimulate through public policies the analyzed sector.

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