

# Economics and Business Review

Volume 1 (15) Number 3 2015

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Paper based publication

**ISSN 2392-1641**

POZNAŃ UNIVERSITY OF ECONOMICS PRESS  
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postal address: al. Niepodległości 10, 61-875 Poznań, Poland

Printed and bound in Poland by:  
Poznań University of Economics Print Shop

Circulation: 300 copies

## The determinants of non-life insurance penetration in selected countries from South Eastern Europe<sup>1</sup>

*Klime Poposki<sup>2</sup>, Jordan Kjosevski<sup>3</sup>, Zoran Stojanovski<sup>4</sup>*

**Abstract:** This study examines the determinants of non-life insurance penetration in 8 countries from South Eastern Europe (SEE), during the period 1995–2011, applying a panel vector error correction model (PVECM). This model will help us to identify the most important determinants of non-life insurance penetration in selected SEE countries. As a measure for non-life insurance demand we used non-life insurance penetration. Empirical results provided the evidence that the number of passenger cars per 1,000 people, GDP per capita and rule of law positively and significantly influence the non-life insurance penetration. The results also indicate that when the non-life insurance penetration deviates from its long-run equilibrium the speed of adjustment will subsequently bring it back to the equilibrium level, which in our case will take almost 1 year.

**Keywords:** non-life insurance penetration, South Eastern Europe, PVECM.

**JEL codes:** C39; G22; O16.

### Introduction

The non-life insurance markets in almost all transition countries in Central and Eastern Europe started to grow rapidly in 1990's due to improved economic conditions and introduced reforms, which had to be conducted prior to EU entry. By introducing risk pooling and reducing the impact of large losses on the corporate sector and households, the insurance industry reduces the amount of capital that would be needed to cover these losses individually, encouraging additional output, investment, innovation and competition. Furthermore, using risk-based pricing for insurance protection, the insurance industry can change the behaviour of economic agents, contributing to the prevention of accidents, improved health outcomes and efficiency gains. Finally, insurance can also im-

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<sup>1</sup> Article received 23 January 2015, accepted 3 August 2015.

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prove the efficiency of other segments of the financial sector, such as banking and financial markets (e.g., by enhancing the value of collateral through property insurance and reducing losses at default through credit guarantees and enhancements). Nevertheless this growth did not rise evenly. For instance in 1999 the non-life insurance penetration in SEE countries was 2.97% and it reached 3.20% in 2011, whilst in Central and Eastern Europe it was 1.24% in 1999 and increased to 2.03% in 2011. The large disparity across countries in the use of non-life insurance raises questions about what causes this variation and, thus, what determines non-life insurance penetration. Some authors have proposed a variety of different socio-economic and institutional factors as possible determinants of non-life insurance penetration. The contribution of this paper is to understand what drives the non-life insurance consumption within a sample of 8 countries from SEE (Albania, Belarus, Bosnia and Hercegovina, Croatia, Macedonia, Moldova Serbia and Ukraine) for the period 1995–2011. As a measurers of non-life insurance demand we will follow Feyen, Lester, and Rocha [2011] and will use non-life insurance penetration (non-life insurance premiums in relation to GDP)<sup>5</sup>. We apply the Kao panel cointegration test and panel vector error correction model to estimate the relationship between the variables.

The paper is organized as follows. Section 2 highlights literature on theoretical research and empirical findings relevant to the demand for non-life insurance. Section 3 presents methodology and data which we incorporate in the analysis. The results of the empirical research are given in Section 4. The paper finishes with some concluding remarks and suggestions for the future work that are outlined in section 5.

## **1. Literature review**

In this section we present the theoretical research and highlight the most relevant findings. The theoretical frameworks are usually followed by the empirical investigation of the developed models. Then we proceed to the empirical studies which for the most part evaluate the impact on non-life insurance demand in and across particular countries.

### **1.1. Theoretical studies**

Theoretical models of non-life insurance demand, starting from the seminal papers of [Pratt 1964; Arrow 1971; Mossin 1968], predict that for a given level

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<sup>5</sup> Penetration indicates the level of development of insurance sector in a country. Penetration is measured as the ratio of premium underwritten in a particular year to GDP. Within insurance there is life insurance penetration which considers premiums from life insurance policies only as a percentage of GDP and non life insurance penetration which considers premiums from other than life insurance policies such as auto insurance, health insurance, etc.

of risk exposure and a given price, insurance demand is increasing with risk aversion, probability of loss and total wealth [Sweeney and Beard 1992; Szpiro 1985]. Whether the propensity to insure – i.e., the desired coverage as a percentage of the wealth at stake – should increase or not, depends on the behaviour of risk aversion: Arrow [1971] shows that it increases if people are characterized by increasing relative risk aversion.

Most of the above authors have commented on the elasticity of insurance consumption with respect to income and wealth in the light of the long-standing debate on insurance as an inferior good. Mossin [1968] first delineated the conditions for this to happen: the intuition is that if the utility function is characterized by decreasing absolute risk aversion, then a higher endowment of wealth reduces risk aversion and therefore the demand for insurance). Moreover whilst by Mossin's Theorem full coverage is optimal under the fair actuarial price, the degree of coverage decreases with the loadings – Schlesinger [2000].

The so-called “inverted economic cycle” of insurance in which one pays first then, in the event of loss, receives his dues, suggests that the financial rate of return, seen as an opportunity cost for those who allocate funds in an insurance policy, should be inversely related to demand. That is self-insuring gives an opportunity-gain to invest the amount of the premium saved on financial markets, which increases along with the prevailing rate of return. However, Falciglia [1980] shows that higher market interest rates should lower insurance demand only if consumers have a decreasing risk aversion and are net savers; although these conditions seem reasonable, the relationship between interest rates and insurance demand nevertheless remains an empirical question.

## **1.2. Review of the empirical evidence**

Despite the critical role that the insurance sector plays for financial and economic development and reasonable evidence that the sector has promoted economic growth, there have been few studies examining the factors that drive the development of the insurance sector. Moreover the bulk of the existing empirical research focuses on the growth of the life insurance sector, using the most frequently cited papers [Beck and Webb 2003; Browne and Kim 1993; Outreville 1996; Li et al. 2007]. The dependent variables for the vast majority of models was the life insurance density (number of US Dollars spent annually on life insurance per capita) and the life insurance penetration (total life premium volume divided by GDP). Explanatory variables that have been shown to significantly impact life insurance demand are GDP per capita, inflation (real, anticipated or feared), development of the banking sector, institutional indicators (such as investor protection, contract enforcement, and political stability). Variables that appear to have a borderline impact include education, old and/or young dependency ratio (ratio of the population above the age of 65, or below 15, to

the number of persons aged 15 to 64), urbanization, size of the social security system, life expectancy, and market structure.

Sherden [1984] was first to focus on the sensitivity of non life insurance purchase. In a cross-sectional analysis of consumption patterns limited to automobile insurance in 359 townships in the state of Massachusetts in 1979, Sherden [1984] finds that the demand for motor insurance is generally inelastic with respect to price and income and that the demand for comprehensive and collision coverage increases substantially with increased population density.

Beenstock, Dickinson, and Khajuria [1988] using an international dataset (12 countries over a period of 12 years) to examine the relationship between property liability insurance premiums and income, found that marginal propensity to insure i.e., increase in insurance spending when income rises by 1\$, differs from country to country and premiums vary directly with real rates of interest. Again the decision of consumer and his/her initial wealth status are significant factors also when shortrun or longrun consumption of insurance is considered.

Based on a cross-sectional logarithmic model of non-life insurance penetration of 55 developing countries, Outreville [1990] confirms the Beenstock, Dickinson, and Khajuria [1988] main result of an income elasticity greater than unity. The level of financial development is the only other factor found to significantly impact non-life insurance consumption.

Browne, Chung, and Frees [2000] study 22 OECD countries from 1987 through 1993 and focus on the premium density of two lines of insurance: motor vehicle (usually purchased by households) and general liability (normally bought by businesses). Panel data analysis demonstrates that income (GDP per capita), wealth, foreign firms' market share, and the form of legal system (civil law or common law) are significant factors to explain the purchase of the two types of insurance. Per capita income has a much greater impact on motor insurance than on general liability.

Esho, Kirievsky, and Zurbruegg [2004] expand the work of Browne, Chung, and Frees [2000] by using a larger set of countries and by introducing the origin of the legal system and a measure of property rights in their model. Dummy variables, characterizing the English, French, German, and Scandinavian legal systems' origins, are found to have an insignificant effect. Results show a robust relationship between the protection of property rights and insurance consumption as well as a significant effect of loss probability and income. Esho et al. [2004] also include one of Hofstede's dimensions, Uncertainty Avoidance, as a proxy for risk aversion. They find a marginally positive relationship and conclude that culture does not seem to play an important role in non-life insurance demand.

Based on a analysis of 5 countries (Bosnia and Herzegovina, Croatia, Macedonia, Serbia and Slovenia) Njegomir, Stojić, and Marković [2011] analysed the performance in the non-life insurance industry for the period

2004–2008. They used three models for capturing influences of market structure and liberalisation on market profitability. Firstly, market structure, liberalisation and performance are put in relation to the strength of economy and corresponding rate of return, model 2 connects the former with the number of competitors and their dominant line of insurance, whilst in model 3 they used the threat of substitutes as a control variable. The research results of all three models show support for the S-C-P hypothesis. Their results are important for governments that wish to achieve affordable and available insurance for all. Governments interfere in insurance markets by pro-competitive and pro-liberalising policies. Their research results could provide insurance companies with a useful comparison across different national markets throughout the ex-Yugoslavia region, thus enabling them to formulate optimal competitive strategies.

The research of Njegomir and Stojić [2012] examines factors that affect the attractiveness of the Eastern European non-life insurance market for foreign insurers for the period 2004–2009. The region encompasses non-life insurance industries in 15 countries: Bosnia and Herzegovina, Croatia, Macedonia, Montenegro, Serbia, Slovenia, Hungary, Czech Republic, Slovakia, Romania, Bulgaria, Poland, Lithuania, Latvia and Estonia. The research results indicate that the main forces affecting market attractiveness are insurance demand, entry barriers, market concentration and the return on investment and only market concentration has negative impact.

Poposki and Kjosevski [2013] used an international dataset (16 countries from Central and South-Eastern Europe (CSEE) over the period of 1998–2010 years) to identify determinants of the demand of non-life insurance. They used a fixed-effects panel model. As a measure for demand for non-life insurance they used non-life insurance penetration and non-life insurance density. Their results show that GDP per capita, number of passenger cars, gini coefficients, level of education and rule of law are the most robust predictors of the use of non-life insurance. Private credit, inflation, trade, population density, control of corruption and government effectiveness do not appear to be strongly associated with non-life insurance demand.

## **2. Data**

In our study we use an unbalanced panel for 8 countries from SEE (Albania, Belarus, Bosnia and Hercegovina, Croatia, Macedonia, Moldova Serbia and Ukraine), over the period 1995–2011. In order to obtain more information we used annual panel data. The choice of the time period in this paper was contingent upon the availability of data.

Following a similar approach nearly every international comparative study uses insurance density and penetration as dependent variables. These variables

have the advantage of being easily available, annually, for a large number of countries. A disadvantage of density and penetration is that they combine premiums across various lines of insurance. In some countries motor insurance is the dominant line of business whilst in others the focus is on the liability line of insurance. Aggregate premiums result in a loss of information reducing the likelihood that significant explanatory variables will be discovered. Density and penetration measure slightly different effects. Penetration measures non-life insurance consumption relative to the size of the economy, whilst density compares non life insurance purchases across countries without adjusting for income. High GDP countries will spend more on insurance, in absolute terms, as they have more assets to protect. Therefore we expect a very high correlation between insurance density and GDP – indeed one of the reasons for the paucity of research in determinants of non-life insurance may have been a belief that purchases are driven by wealth and little else. Penetration measures relative insurance consumption, as the overall wealth effect has been removed through division by GDP per capita. It measures how wealth is allocated to insurance in relative terms: two countries with similar GDP per capita may exhibit different insurance consumption patterns, an effect captured by penetration and not by density. For this reason we use nonlife insurance penetration – NLIP to be our primary variable, and we do not use density in our research.

Factors that we use as control variables, which may explain the consumption of non-life insurance, include the following:

- Economic: GDP per capita – GDPPC; number of passenger cars per 1,000 people – NPV; ratio of quasi-money – RQM; inflation annual percentage – INF;
- Demographic: population density – PD; level of education-EDU;
- Institutional: rule of law-RL.

Table 1 shows the descriptive statistics for the variables used in our main regression. We observe a large variation in levels of non-life insurance penetration

**Table 1. Descriptive statistics**

	NLIP	GDPPC	INF	NPV	RQM	PD	EDU	RL
Mean	1.467951	3,235.130	20.99215	146.8917	34.61879	85.98519	40.95094	-0.571447
Median	1.515000	2,294.356	8.200000	132.0000	28.80000	81.00000	39.40245	-0.571275
Maximum	4.770000	15,889.35	415.8000	372.0000	276.0000	127.0000	85.69712	0.534200
Minimum	0.330000	321.0268	-1.700000	19.00000	-8.300000	47.00000	9.091730	-1.935360
Std. Dev.	0.867376	3,022.882	49.02067	79.55874	37.10290	22.47021	17.87228	0.437886
Jarque-Bera	9.013120	247.3972	9639.323	14.05565	1969.573	3.216263	4.835785	0.053405
Probability	0.011036	0.000000	0.000000	0.000887	0.000000	0.200261	0.089109	0.973651
Observations	122	134	135	120	132	135	113	110



across countries, from 0.33 to 4.77 of GDP. We also present the Jarque-Bera (JB) test of normality distribution. From this we can conclude that just two of the variables do not satisfy the assumption for normal distribution (GDP and INF).

Data are obtained from various sources. Non-life insurance penetration is obtained from Sigma, Swiss Re Economic Research & Consulting, Swiss Re, Zurich and national insurance associations. Education is obtained from EdStats, World Bank. GDP per capita, inflation, number of passenger cars per 1,000 people, ratio of quasi-money, trade and population density are obtained from the World Development Indicators (WDI) database. Rule of law is obtained from the Worldwide Governance Indicators.

## **2.1. Economic factors**

All previous studies, whether on life or non-life insurance, conclude that income, measured as GDP per capita, is the most important factor affecting purchasing decisions [Fortune 1973; Campbell 1980; Beenstock, Dickinson, and Khajuria 1986; Lewis 1989; Outreville 1990]. Beck and Webb [2003], Ward and Zurbruegg [2000], Beenstock, Dickinson, and Khajuria [1988], point out a positive relationship in industrialized countries between national income and non-life insurance spending. Browne, Chung, and Frees [2000], analyzed general liability and motor vehicle insurance in OECD countries and found a significantly positive relationship between premium density and GNP per capita. Additionally [Esho, Kirievsky, and Zurbruegg 2004] examined developed and developing countries between 1984 and 1998 and found a strong positive relationship between national income and the nonlife insurance premium. Outreville [1990] and Ward and Zurbruegg [2000] strongly emphasized that the insurance industry, through risk transfer, financial intermediation and employment can generate externalities and economic growth. The higher level of income creates a greater demand for non-life insurance to safeguard acquired property. We expect income to have a strong, positive impact on non-life insurance consumption.

We include the number of passenger cars per 1,000 inhabitants because most countries require mandatory third party liability insurance (comprehensive car insurance is usually voluntary but also common in many countries).

Financial development is associated with the widespread securitization of cash flows, which enables households to secure future income through the ownership of financial assets. By offering similar benefits, life insurance is expected to generate higher sales in countries with a high level of financial development. The measurement of financial development is very controversial [Jung 1986], but two alternative proxies are usually employed. One is the ratio of quasi-money (M2-M1) to the broad definition of money (M2) – it shows the complexity of the financial structure (a higher ratio indicates a higher level of financial development) and another is the ratio of M2 to the nominal GDP – financial

deepening (demand for money per unit of output). Broad money M2 is often taken as an adequate measure of the financial sector in developing countries in view of the predominance of the banking sector due to the lack of data on other financial assets [Hemming and Manson 1988; Liu and Woo 1994]. Following the previous studies we use the ratio of quasi-money (M2-M1) as a measure of financial development. We hypothesize a positive correlation with non-life insurance demand. The next economic variable that we used in our research is the inflation rate. It is used to account for monetary discipline. It is expressed by the GDP deflator (annual percentage). For non-life insurers unanticipated inflation leads to higher claims costs, thereby eroding profitability. Inflation is often accompanied by rising interest rates, which reduce the value of guarantees of return. Rising inflation can have a negative effect on demand and may lead to policyholders cancelling their policies as well as increasing costs for insurers. In the case of deflation, or if very low inflation persists, interest rates tend to fall. With this variable we expect a negative correlation with non-life insurance consumption.

## **2.2. Demographic factors**

Feyen, Lester, and Rocha [2011] explained that the size of population determines the operating background, that is to say, the size of market, for the non-life insurance industry. We, therefore, include the population density (people per sq. km. of land area) for each country into our regressions and assume that its effect on the non-life insurance consumption is positive.

A primary determinant for purchasing insurance is to minimise the damage from an adverse event. Unfortunately measuring attitudes to risk is difficult and in the past most insurance studies have used education to proxy risk aversion. Schlesinger [1981], demonstrates that an individual with a higher loss probability, a higher degree of risk aversion, or a lower level of initial wealth, will purchase more insurance. According to the discussion of Browne and Kim [1993], in general a higher level of education may lead to a greater degree of risk aversion and greater awareness of the necessity of insurance. Nonetheless Szpiro [1985] proved the negative correlation between the level of education and risk aversion. It was deemed that higher education leads to lower risk aversion, and that, in turn, leads to more risk-taking by skilled and well-educated people. When [Browne, Chung, and Frees 2000; Esho, Kirievsky, and Zurbruegg 2004] were discussing non-life insurance; they also took the level of education as a proxy for risk aversion.

Therefore education is hypothesized to be ambiguous in relation to non-life insurance demand. As an indicator of the level of education across countries we use the tertiary gross enrollment ratio defined by the UNESCO Institute of Statistics as the total enrolment in tertiary education, regardless of age, expressed as a proportion of the eligible school-age population.

### 2.3. Institutional factors

Legal stability is important for a vibrant and growing non-life insurance market. The more stable the legal system in the country the higher the willingness of contracting parties to initiate business relationships.

To measure property rights' protection we use the rule of law index provided by the The Worldwide Governance Indicators. This index reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular, the quality of contract enforcement, property rights, the police and the courts, as well as the likelihood of crime and violence. The legal system in force in a country may impact the development of insurance as it specifies the liabilities of those responsible for damage, and defines the business environment of insurers [Browne, Chung, and Frees 2000]. The United States is the world leader in per capita consumption of liability insurance. The American legal system may be a contributing factor by encouraging Americans to over consume property-liability insurance [Syverud et al. 1994]. Browne, Chung, and Frees [2000] find the legal system to be a significant factor in the development of non-life insurance. Esho, Kirievsky, and Zurbruegg [2004] also investigate the impact of the legal system but find it insignificant after checking income and property rights. Recently Park, Lemaire, and Chua [2010] showed that the use of a Common Law legal system is the most important determinant of toughness of bonus-malus systems in automobile insurance. Therefore it is hypothesized that there is a positive relationship with non-life insurance consumption.

### 3. Methodology

Given the hypotheses specified above we employ co-integration and error correction techniques to capture the long-run relationship and short-run dynamics between the dependent and independent variables. We specify the model for the determinants of non-life insurance penetration (NLIP) in the Western Balkans with an expected sign for each variable, as follows:

$$NLIP = f(GDPPC(+), NPC(+), RQM(+), INF(-), PD(+), \\ EDU(+), RL(+)). \quad (1)$$

The most common specification is the log-linear form used by [Outreville 1996; Browne and Kim 1993; Feyen, Lester, and Rocha 2011]. The log-linear form is used for demand functions specified on macroeconomic variables which tend to display exponential growth. The above model is hereby written in log-linear form as:

$$L(\text{non-life insurance penetration})_{it} = \beta_0 + \beta_1 L(\text{GDP per capita})_{it} + \beta_2 L(\text{number of passenger cars per 1,000 people})_{it} + \beta_3 (\text{ratio of quasi-money})_{it} + \beta_4 (\text{inflation})_{it} + \beta_5 L(\text{population density})_{it} + \beta_6 L(\text{education level})_{it} + \beta_7 (\text{rule of law})_{it} + uit, \quad (2)$$

where:

$\beta$  – a coefficient that should be an estimate,

$uit$  – a scalar disturbance term,

$i$  – indexes a country in a cross section,

$t$  – indexes time measured in years.

Based on the established model we will estimate the determinants that affect the demand for non-life insurance in the SEE countries

### 3.1. Panel unit root test

To formulate an econometrics model it is important to know whether the data generating process of variables is based on a stationary process or not. In the presence of non-stationary properties of standard estimation are not valid. In addition it might cause problem of spurious regression Verbeek [2004]. To avoid the problem which may arise because of the existence of non stationary variables one might have to identify the order of integration of variables. Although several methods have been proposed by considering different assumptions there is no uniformly powerful test for unit root. However, it has been widely acknowledged that standard unit root tests can have a low value against stationary alternatives for important cases [Campbell and Perron 1991]. As an alternative the recently developed panel unit root is applied. In this paper, we test for stationarity of the panel using a Maddala and Wu panel unit root test for unbalanced panels. Maddala and Wu [1999] proposed a Fisher-type test which combines the p-values from unit root tests for each cross-section  $i$ . The test is non-parametric and has a chi-square distribution with  $2n$  degrees of freedom where  $n$  is the number of countries in the panel. They state that not only does this test perform best compared to other tests for unit roots in panel data but it also has the advantage that it does not require a balanced panel, as do most tests.

### 3.2. Panel cointegration test

The concept of cointegration has been widely used in literature to test the presence of long-run relationships amongst variables. Similar to individual unit root tests, cointegration tests in time series literature suffer from low value when the time horizon is short. Panel techniques may be better in detecting cointegration relationships since a pooled levels regression combines cross-sectional and time series information in the data when estimating cointegrating coefficients.

Kao [1999], proposed panel cointegration tests similar to the Engle and Granger [1987] framework which include testing the stationarity of the residuals from a levels regression.

### 3.3. Panel vector error correction model

According to Engle and Granger [1987] if two series are cointegrated they can be characterized as being generated by an error correction mechanism. However the presence of a cointegration relationship cannot explain the direction of causality among the variables. In order to analyze the direction of causality, a panel-based vector error correction model (PVECM) should be performed. The PVECM is a restricted panel vector autoregression (PVAR) model with a cointegration built into its specification. The cointegration term is known as the correction term since deviations from the long-run equilibrium are corrected gradually through a series of partial short-run adjustments. The PVECM is shown as follows:

$$\Delta L(NLIP)_t = C_i + \sum_{k=1}^p \gamma' \Delta F_{i,t-k} + \alpha ECM_{t-1}, \quad (3)$$

where:

- $i$  – represents the panel identity or cross-country identifier  $k$  represents the lag length,
- $p$  – represents the optimal lag length selected in accordance with the Schwarz Criterion (SC),
- $F$  – a vector of the stationary forms for seven variables related to GDP per capita, number of passenger cars per 1,000 people, ratio of quasi-money, inflation, population density, level of education and the rule of law.

The error-correction-term  $ECM_{t-1}$  is defined as the difference between the actual non-life insurance penetration at time  $t-1$  and its estimate from the long-run equation in the same period. The presence of  $ECM_{t-1}$  in this equation demonstrates the dynamic short-run adjustment. When the non-life insurance penetration deviates from its long-run equilibrium the ECM term will subsequently work to bring it back to the equilibrium level. Therefore its coefficient  $\alpha$  is expected to be negative.

## 4. Empirical results

Table 2 shows the unit root tests results. The ADF and PP Fisher-type test were performed using 95% critical values (in parenthesis after each statistic). The table shows that rate of inflation (INF) and the ratio of quasi-money RQM are

stationary at levels I (0). The immediate conclusion from this analysis is that any dynamic specification of the model in the levels of the series is likely to be inappropriate and may be plagued by problems of spurious regression [Adam 1992]. It is also argued that econometric results of the model in the levels of the series may not be ideal for policy making. This proposition thus lends credence to the earlier doubts cast over the efficacy of past studies in policy decisions. Lastly the above mentioned variables were not included in the co-integration analysis because, by definition, an I (0), or I (2) is not expected to have a long-run relationship with I (1) series [Adam 1992].

**Table 2. Unit root tests**

	ADF – Fisher Chi-square LLP		PP – Fisher Chi-square IPS	
	Level	First Difference	Level	First Difference
LNLIP	20.8071 (0.1860)	41.7717 (0.0004)	14.2309 (0.5816)	81.4438 (0.0000)
LGDPPC	2.08823 (0.8636)	40.1109 (0.0008)	5.51594 (0.9925)	52.1942 (0.0000)
LNPV	24.6933 (0.1316)	22.3708 (0.0754)	35.5491 (0.0033)	50.8299 (0.0000)
RQM	38.8550 (0.0011)		35.5023 (0.0001)	
INF	41.036 (0.0005)		381.381 (0.0000)	
LPD	28.1975 (0.0299)	38.4756 (0.0013)	18.0005 (0.3239)	127.298 (0.0000)
LEDU	14.8111 (0.3219)	25.0422 (0.0342)	2.27838 (0.9998)	52.4518 (0.0000)
RL	30.2203 (0.1132)	59.8468 (0.0000)	59.7285 (0.0653)	97.7486 (0.0004)

But according to Juselius [2003], if the time perspective of the studies has macroeconomic behaviour in the medium and long- run then most macroeconomic variables exhibit considerable inertia, consistent with no stationary rather than stationary behaviour. Because inflation would not appear to be statistically different from a non-stationary variable, treating it as a stationary variable is likely to invalidate the statistical analysis and lead to incorrect economic conclusions. On the other hand, treating inflation as a non-stationary variable gives us the opportunity to find out which other variable(s) has/have exhibited a similar stochastic trend by exploiting the cointegration property. Because the time perspective of our study are the long historical macroeco-

conomic movements, the inflation ratio of quasi-money, we will include this in our model and will treat it as a non-stationary variable at their levels.

Since it has been determined that the variables under examination are integrated in order I (1), the co-integration test is performed. Cointegration analysis addresses the problem of spurious regressions amongst non-stationary time series. Estimation in a system context may shed light on important interrelationships amongst series whilst reducing the risk of endogeneity bias – Banerjee et al. [1993]. The most important application of cointegration in economic estimations is that it shows that there is a long-run relationship between variables which are cointegrated.

The results from the Kao test indicate that the null hypothesis of no cointegration is rejected at the 1 percent level of significance which implies that there exists a cointegration relation between direct non-life insurance penetration and selected variables.

**Table 3. Kao residual cointegration test**

Series	ADF	
	t-Statistic	Probability
D(NLIP) RQM D(LNPV) D(LGDPPC) INF D(LEDU) D(RL) D(LPD)	-4.859517	0.0000

Null Hypothesis: No cointegration.

In Table 4 the parameters  $\alpha$  have an expected negative sign in all four groups, which determines the speed of adjustment towards equilibrium. The speed of adjustment parameter is  $-0.55$ . These results indicate that when the non-life insurance penetration deviates from its long-run equilibrium the speed of adjustment will subsequently work to bring it back to the equilibrium level, which in our case will take almost 1 year. Next, the regression results indicate a positive association between the number of passenger vehicles per 1,000 people and non-life insurance penetration. This finding confirms the empirical result in literature that a high number of passenger cars per 1,000 people impacts positively on non-life insurance consumption Feyen, Lester, and Rocha [2011]. This result suggests that motor third party liability insurance takes a dominant place in the insurance market in SEE countries and confirms that car penetration is a driver of insurance development in SEE countries. The reason is that people in these countries are not yet sufficiently informed and have not yet acquired an insurance culture and mainly use car insurance or compulsory motor third party liability insurance (comprehensive car insurance is usually voluntary but also common in many countries). The positive effect of GDP per capita in non-life insurance penetration as demonstrated in development literature is confirmed by the results of this study. GDP per capita has a positive

impact on non-life insurance penetration during the period under investigation. Obviously increased income allows for higher consumption in general, makes insurance more affordable and creates a greater demand for non-life insurance to safeguard acquired property. The positive impact of macroeconomic conditions on purchasing decisions of non-life insurance indicates that the good shape of the domestic economy in countries from SEE is a source of the growth of operations of the real sector and other customers of insurance companies and creates higher demand for new insurance (i.e. property insurance and protection against financial risk).

In this study inflation appears to have a negative influence on non-life insurance penetration. Therefore macroeconomic stability plays an important role in the development of the non-life insurance market. An unstable economic environment can result not only in lower disposable incomes, but is also associated with higher inflation, increased uncertainty for the insurer and the insured. Inflation leads to higher claims' costs thereby eroding profitability. It has the greatest effect on long-tail lines: the longer the tail, the greater the impact. If inflation rises in the short term it is less harmful if premium rates can be adjusted. But this is not always possible if regulations or the competitive environment do not allow it. Longer periods of high inflation are very costly for non-life insurers.

**Table 4. PVECM results**

Variables	Coefficient	Standard errors	t-statistics	Probability
$\alpha$	-0.554412 <sup>c</sup>	0.09772	-2.60336	0.0154
C	0.190013	0.024814	0.224548	0.8233
LNPV	2.314518 <sup>b</sup>	0.43935	5.26802	0.0777
RQM	0.019273	0.00185	10.4145	0.5334
LGDPPC	0.498557 <sup>b</sup>	0.28703	1.73695	0.0538
INF	-0.042795 <sup>a</sup>	0.00710	6.02467	0.0600
LPD	-4.722229	7.03927	-0.67084	0.7783
LEDU	-0.482487	0.69590	0.69333	0.9792
RL	0.823282	0.34365	2.39569	0.9953
Coefficient of determination $R^2$	52.03			
White Heteroskedasticity Tests				
Lagrange Multiplier p-value				0.1457
The Jarque berra normality test				0.6192

<sup>a</sup>, <sup>b</sup> and <sup>c</sup> indicates test statistic is significant at the 10%, 5% and 1% level.



The models are also checked for the explanatory power of the coefficient of determination, the important influence of dependent variables, heteroscedasticity, serial correlation and normality of the parameters of the equations.

The coefficient of determination  $R^2$  in the model presented is 52.03. This means that the dependent variable of 52.03% is found to be appropriate by the independent variables. The residual white heteroscedasticity test (p-value 0.7549) indicates no heteroscedasticity in the models. The Lagrange Multiplier (LM) test showed that there is no serial correlation between residuals at any lag (p-value 0.1457). The Jarque berra test is used for testing whether the series is normally distributed. As can be seen from Table 4 we cannot reject the null hypothesis of a normal distribution and can therefore conclude that these residuals have normal distribution.

## Conclusions

This paper ascertains empirically the determinants of non-life insurance consumption in 8 countries from SEE using time series data from 1995 to 2011 by applying the cointegration and panel vector error correction model. We find proof of the existence of a relationship amongst several of the variables under consideration. Specifically we discover that the number of passenger cars per 1,000 people, GDPPC and inflation are significant predictors of non-life insurance penetration. The results show that the parameter for the speed of adjustment ( $ECM_{t-1}$ ) indicates that short-term deviation from long-term balance corrected at rate of 55% takes almost 1 year.

In general, Croatia as a member of EU, has a more developed insurance (life and non-life) sector than the other seven countries included in the research (Albania, Bosnia and Hercegovina, Belarus Macedonia, Moldova, Serbia and Ukraine). Better regulation and supervision in Croatia were partly motivated by the European integration process and the need to adopt EU standards. Thus many of the insurance sector weaknesses traditionally characterising emerging markets have gradually been eliminated. The membership of the EU increases consumers' confidence in the stability of the market, thus stimulating the demand for non-life insurance products. Prior to becoming a member of the EU new entrant countries had to conduct a number of reforms in order to improve their economic environment and measure up to EU standards. Therefore we can emphasise the importance of working at joining the EU by the non-member countries included in the research.

In future research, when more data become available, it would be useful to take a much bigger sample in terms of countries and periods, which will lead to a greater understanding and knowledge of determinants of non-life insurance demand. Also in the future more attention should be placed on the sup-

ply side of insurance industries by analyzing and identifying factors that cause different degrees of cost and profit efficiencies across countries. This may further highlight factors that promote sound insurance growth.

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