HUMAN DEVELOPMENT AND PERCEIVED CORRUPTION AS KEY FACTORS OF LIFE INSURANCE

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Abstract: *A commonly recognized proxy, life insurance penetration was used as a dependent variable in our analysis for the 28 EU countries during the period 2004 – 2014. We apply a panel data analysis to assess the influence of human development, corruption level, inflation, population growth, and* employment rate to life insurance penetration. *Our contributions resides in a new effort to understand the life insurance penetration in terms of* behavioural finance. *Moreover, our results shows that Human Development generates increases of the life insurance market.*

Keywords: *behavioural finance; life insurance; human development; panel data.*

JEL Classification: *G22; C23; D73; O15.*

Introduction

Life insurance domain has an interesting development during the period 2004 – 2014. Financial instability can be caused by many variables, including the level of inflation, corruption, education and unemployment rate.
This paper started from the assumption that human development, in terms of health, education, poverty, inequality and other components should be the most important driver for the life insurance market. Our contributions resides in a new effort to understand the life insurance penetration in terms of behavioural finance.
The structure of the paper is as follows: *Section 2* presents some previous research on the issue, *Section 3* describes the methodology and provides descriptive statistics, *Section 4* offers information regarding our results, *and Section 5* presents the conclusions.

1. Literature review

Insurance demand is measured by insurance penetration or insurance density. We chose to use *penetration* such as Outreville, (1996); Omoke, (2012); Alhassan and Fiador (2014), Olayungbo and Akinlo, (2016), further we have included population growth rate. The insurance penetration is defined as the ratio of total life premiums to gross domestic product.
There are numerous studies on the insurance literature which have evidenced the direct impact of *education* on life insurance development such as Gandolfi and Miners (1996); Truett and Truett (1990); Elango and Jones (2011); Kjosevski (2012); Muresan and Armean (2016). Mantis and Farmer (1968, apud Zietz, 2003) show a positive relationship between *employment* and life insurance demand.
In a recent paper, Dragos and Dragos (2013), prove that a low level of *corruption* increases the life insurance density. *Inflation level* should have an indirect impact,

according to Browne and Kim (1993); Beck and Webb (2003) but Elango and Jones (2011) obtained a significant positive impact. In addition, Mare et al. (2016) find that inflation is not a significant variable in a convergence process.

2. Methodology

We use the following variables based on previous studies for achieving our declared aim and for the period 2004 – 2014:

Table 1: Description of the variables used in the panel analysis

Variable	Variable description	Codification	Expected Sign	Source
ENDOGENOUS VARIABLE				
Life insurance penetration	The ratio of life insurance premiums divided by GDP.			Insurance Europe & fred.stlouisfed.org
EXOGENOUS VARIABLES				
Corruption perceptions index	This index measures the perceived levels of public sector corruption.	**CPI**	**-**	Transparency International
Employment rate	Is the ratio of the country's working-age population divided by total population.	**EMP**	**+**	OECD
Human Development Index	Is a proxy of a decent, knowledgeable and healthy life.	**HDI**	**+**	United Nations Development Programme
Population growth rate	Derived from total population.	**ΔPOP**	**+**	Eurostat
Inflation	Measured by consumer price index (PPP).	**PPP**	**-**	World Bank

Source: own construction

As it can be seen in first table, we expect a positive correlation between human development, population growth, employment rate and life insurance demand, but inflation and corruption perception index should have a negative impact.
Our sample contains a total of twenty-eight countries, the entire output of European Union member states, while the temporal dimension covers eleven years, between 2004 – 2014. The analysis was conducted using the econometric modelling software Eviews 7.0, while the construction of the final quantile maps was possible by making use of GeoDa 1.8.14.
Given the panel structure implied, the three models estimated were the Pooled Ordinary Least Square (Pooled OLS), the Fixed Effects model and the Random Effects model. According to Green (2012), the panel analysis presents an advantage over the cross-section procedures due to the fact that it offers the researcher a higher versatility regarding the modelling of the interactions between individuals (Green, 2012, p. 385). The most minimalist approach regarding this type of analysis is represented by the first model displayed by the *Equation 1.*

$$y_{it} = x'_{it}\beta + z'\alpha_i + \varepsilon_{it}$$
$$y_{it} = x'_{it}\beta + c_i + \varepsilon_{it} \qquad \textit{(Equation 1)}$$

In the case of this model it can be stated that x_{it} represents the vector of exogenous variables (without the classical term of constant), while the z_i term is meant to encompass the individual influences of each unit (with constant). Having this specification as a baseline, three models are to be taken into consideration. The first of the three, the Pooled OLS model ignores the panel structure and runs a classical least square regression. Due to the fact that the individual influences cannot be taken into consideration by the Pooled regression, a second configuration is proposed – the Fixed Effects model. This is due to the possible correlation between the components of the x_{it} vector, which can result in inconsistency problems for the β parameters (Green, 2012, p.386). The second model is presented by the *Equation 2*.

$$y_{it} = x'_{it}\beta + \alpha_i + \varepsilon_{it} \qquad \textit{(Equation 2)}$$

The second configuration proposes an additional regression, in the form ofα_i, which is comprised by $z'_i\alpha$ – a constant for each country in the sample – this being the essence of the Fixed Effects model (Green, 2012, p. 386). While the model pays little attention to the unobservable heterogeneity, while the third and final model – with Random Effects – focuses on the presumption of independence among the observable effects and unobservable (Alan and Hansen, 2009).

$$\begin{aligned} y_{it} &= x'_{it}\beta + E[z'\alpha_i] + \{z'_i\alpha - E[z'_i\alpha]\} + \varepsilon_{it} \\ y_{it} &= x'_{it}\beta + \alpha + u_i + \varepsilon_{it} \end{aligned} \qquad \textit{(Equation 3)}$$

The model, displayed in the *Equation 3*, u_i represents a series of random elements specific to the group, similar to the ε_{it} element. Green (2012) notes that in certain cases the Random Effects model would be more appropriate due to the fact that it can become unstable if new observations – in our case, new countries – are to be included (Green, 2012, p.410).

3. Results

The analysis is opened by presenting several elements of descriptive statistics. *Table 2.* emphasizes the mean, standard deviation, median, skewness, kurtosis, minimum and maximum values, in addition to the range for the Euro Zone. As it can be observed, the highest mean value is attributed to Finland (7.40%), while the lowest is registered by Latvia (0.19%). Moreover, we can conclude that the Baltic States are at the bottom of the hierarchy for this particular indicator, as the neighbour of the latter, Estonia (0.52%), scores the second-lowest penetration rate. Sample means exceeding the 5% level are registered by France (6.44%), Belgium (5.63%), Ireland (5.54%) and Portugal (5.25%), with Italy (4.8%) and Malta (4.51%) also presenting particularly high rates. The lowest levels, in addition to the Baltic States, with percentages just above the unit are Greece (1.02%), Slovakia (1.58%) and Slovenia (1.62%).

From a skewness point of view, Austria displays the lowest value (-0.63). Other negatively skewed countries being Greece, Portugal, Slovakia, Slovenia and the Netherlands, all the rest displaying a positive value for the skewness coefficient. In the case of this six countries, their mean is also lower than their median, with the sole exception of Greece. Also, particularly leptokurtic distributions – i.e. more peaked – are presented by Ireland (1.18), Italy (1.44) and Latvia (1.86), while Cyprus (-1.90), France (-1.46) and the Netherlands (-1.54) display the lowest values for the kurtosis coefficient, meaning that their distributions follow a more platikurtic path. The closest to a normal distribution is Germany that presents a kurtosis coefficient of 0.004, the lowest in the entire sample.

Table 2: Descriptive statistics for Euro Zone, 2004 – 2014

Country	Mean	StDev	Median	Skewness	Kurtosis	Min	Max	Range
Austria	2.44%	0.29%	2.60%	-0.631	-1.183	2.00%	2.80%	0.80%
Belgium	5.63%	1.19%	5.40%	0.632	0.578	4.00%	8.10%	4.10%
Cyprus	2.34%	0.71%	2.00%	0.570	-1.904	1.60%	3.30%	1.70%
Estonia	0.52%	0.15%	0.50%	0.640	-0.443	0.30%	0.80%	0.50%
Finland	7.40%	0.94%	7.10%	0.696	-0.860	6.40%	9.10%	2.70%
France	6.44%	0.71%	6.10%	0.079	-1.457	5.40%	7.50%	2.10%
Germany	3.25%	0.14%	3.20%	0.971	0.004	3.10%	3.50%	0.40%
Greece	1.02%	0.08%	1.00%	-0.329	-0.877	0.90%	1.10%	0.20%
Ireland	5.54%	0.85%	5.40%	1.301	1.177	4.70%	7.40%	2.70%
Italy	4.80%	0.96%	4.50%	0.740	1.436	3.30%	6.90%	3.60%
Latvia	0.19%	0.05%	0.20%	-0.154	1.861	0.10%	0.30%	0.20%
Lithuania	1.23%	0.32%	1.23%	-0.560	-0.843	0.67%	1.65%	0.98%
Luxembourg	2.43%	0.94%	2.40%	0.448	-0.703	1.30%	4.20%	2.90%
Malta	4.51%	2.35%	3.10%	1.005	-0.381	2.40%	9.20%	6.80%
Portugal	5.25%	0.88%	5.30%	-0.502	-0.964	3.90%	6.50%	2.60%
Slovakia	1.58%	0.10%	1.60%	-0.345	-0.587	1.40%	1.70%	0.30%
Slovenia	1.62%	0.12%	1.60%	-0.422	-0.293	1.40%	1.80%	0.40%
Spain	2.45%	0.20%	2.40%	0.467	-0.652	2.20%	2.80%	0.60%
The Netherlands	3.75%	0.74%	4.00%	-0.210	-1.536	2.70%	4.80%	2.10%

Source: own computations

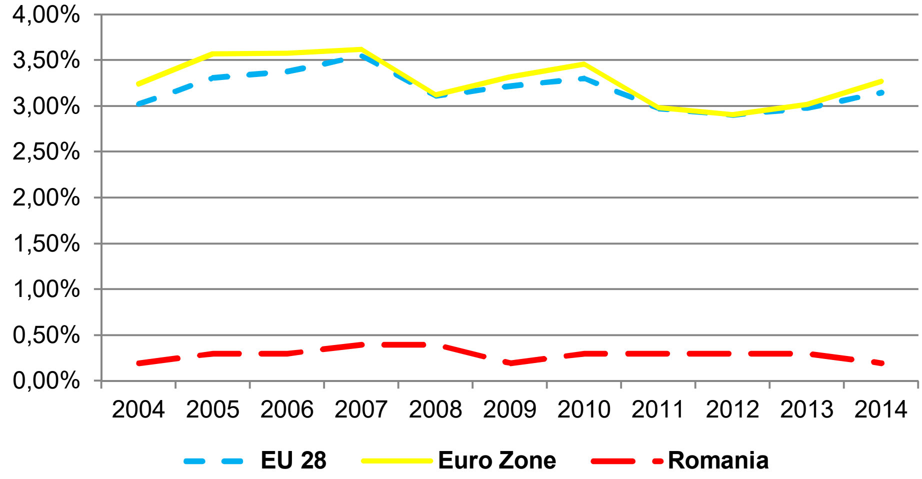
On the other hand, in the cluster of states that are not in the Euro Zone despite being a European Union member, the United Kingdom presents the highest mean of the penetration rate (9.05%). Ranked second, Denmark also shows high levels of this indicator, its mean being scored at 5.97%, with a rather low range of 1.70%. Excluding the two states with an output option from adopting the Euro currency (Denmark and the United Kingdom have negotiated output options from the *Maastricht Treaty*, obtaining the right to reject the adoption of the Euro currency), the highest penetration rate is achieved by Sweden, at a 5.21% level.

Table 3: Descriptive statistics for Non-Euro Zone, 2004 – 2014

Country	Mean	StDev	Median	Skewness	Kurtosis	Min	Max	Range
Bulgaria	0.32%	0.06%	0.30%	-0.027	0.412	0.2%	0.4%	0.2%
Croatia	0.73%	0.06%	0.70%	-0.291	-0.208	0.6%	0.8%	0.2%
Czech Republic	1.41%	0.20%	1.40%	0.133	-1.865	1.2%	1.7%	0.5%
Denmark	5.97%	0.61%	6.00%	-0.455	-1.139	5.0%	6.7%	1.7%
Hungary	1.54%	0.22%	1.60%	0.541	0.472	1.2%	2.0%	0.8%
Poland	2.01%	0.44%	2.00%	0.665	1.968	1.3%	3.0%	1.7%
Romania	0.29%	0.07%	0.30%	0.123	-0.452	0.2%	0.4%	0.2%
Sweden	5.21%	0.66%	5.00%	-0.197	-0.622	4.0%	6.1%	2.1%
United Kingdom	9.05%	1.67%	8.70%	1.647	3.279	7.3%	13.0%	5.9%

Source: own computations

Contrary to the results shown for the UK and the Scandinavian states, the lowest levels of the indicator are registered in the Balkan countries. With rates lower than the unit, Bulgaria, Croatia and Romania present means of 0.32%, 0.73% and 0.29%, respectively, the latter being also the lowest in the non-Euro Zone cluster. However, both Scandinavian states present a negative coefficient of skewness, meaning that the existence of a few low levels implies a shift to the left of their respective means. From a kurtosis point of view, the highest values for this statistic are displayed by the United Kingdom and Poland, with 3.28 and 1.97, respectively. The Czech Republic presents the lowest kurtosis coefficient in the second group of countries, its value of -1.87 being a proof of a platikurtic-oriented distribution.



Graph 1: The mirroring evolution of penetration rate for the period 2014 – 2014 in the EU 28, Eurozone and Romania
Source: own computations

The *Graph 1* presents the mirroring evolution of the European Union as a whole and the Euro Zone in the respect of penetration rate of life Insurance between 2004 – 2014. A level slightly higher for the Euro Zone is observable between the two, while both series edge-out Romania. The latter oscillates just above the 0.00% low, hitting its maximum in 2007 and 2008 at a 0.4% level, while the means for the EU 28 and Euro Zone exceeded 3.00% most of the time.
In order to establish if the series are stationary or not, it is mandatory to check for the presence of a unit root in each of the six variables. The conclusion is drawn using the test of Levin, Lin and Cho (2002), that is presented in the *Table 4*. All the six series validated the stationarity assumption, as the null hypothesis was rejected in every case, meaning that for a 1% significance level the panels did not contain unit roots.

Table 4: Unit root tests for every variable

Variable	Test	P-Value	Result
Penetration	-2.78490	0.0027	Reject Null – No Unit root
CDI	-5.74859	0.0000	Reject Null – No Unit root
Employment	-6.36932	0.0000	Reject Null – No Unit root
HDI	-5.01868	0.0000	Reject Null – No Unit root
Inflation	-5.28734	0.0000	Reject Null – No Unit root
Population (GR)	-3.20468	0.0007	Reject Null – No Unit root

Source: own computations in Eviews 7.

The analysis debuts with a Pooled Ordinary Least Squares (Pooled OLS) regression. As we can see by observing the second column of *Table 5.*, four out of five regressors' coefficients (sans the inflation) are statistically significant at a level of 10%. However, further aspects regarding this particular configuration will not be discussed. While the Pooled OLS has shown favourable results, it possesses several issues. The most notable would be the fact that it ignores the panel structure of the data. However, studies have shown that it is useful in underlining a starting point in the succession of procedures (Grigoli, Herman and Schmidt-Hebbel, 2014).

Table 5: Results of the panel estimations

Variable	Pooled	Fixed Effects	Random Effects
CPI	0.008985*** (0.001033) [8.697538]	0.001275 (0.001172) [1.087639]	0.003169*** (0.001041) [3.043838]
EMP	-0.000972*** (0.000248) [-3.927510]	-0.000299 (0.000218) [-1.373222]	-0.000303 (0.000209) [-1.451838]
HDI	0.070869** (0.029586) [2.395397]	0.035358** (0.015989) [2.211491]	0.038692** (0.015871) [2.437964]
ΔPOP	0.320218** (0.140014) [2.287044]	0.239500** (0.120105) [1.994086]	0.266477** (0.115378) [2.309597]
PPP	-0.000455 (0.000506) [-0.899001]	-0.0000458 (0.000250) [-0.183515]	-0.0000728 (0.000248) [-0.292836]
Constant	-0.0020097 (0.027139) [-0.740502]	0.012687 (0.019288) [0.657756]	-0.001938 (0.018572) [-0.104354]
Goodness of fit			
R^2	0.490479	0.914460	0.080433
R^2 (adjusted)	0.482043	0.904506	0.065208
F-statistic	58.14277 (0.00000)	91.87107 (0.00000)	5.283081 (0.000114)
Akaike Information	-5.190517	-6.799680	N/A
Schwartz	-5.117852	-6.400026	N/A
Hannan-Quinn	-5.161462	-6.639880	N/A

Source: own computations in Eviews 7.0.

In the second case, the Fixed Effects configuration proposes a model where the Human Development Index (HDI) is statistically significant at a level of 5%, while the population growth rate is also statistically significant at the same level. In this case, it can be stated that an increase of one unit in the HDI will determinate a 3.53% increase of the penetration rate, all other aspects remaining equal. In addition, an augmentation of 1% of the population growth rate implies a growth of 0.24% of the penetration rate in the European Union, Ceteris Paribus. The F-test, that underlines the statistical significance of the model as a whole, shows that the Fixed Effects model is more suitable than the one making use only of the intercept, its robustness being presented both by the value that exceeds 58 units and its associated probability that is smaller than 1%.

Regarding the model's goodness of fit statistics, its determination coefficient (R^2) can be noted for its high value (both the standard and adjusted form), explaining 91.45% and 90.45%, respectively, of the variance. Also, if we were to compare the two models by using the Information criterion, the Fixed Effects configuration would be more suitable, given the fact that it scores the minimum value between the two in every case (i.e. Akaike, Schwartz and Hannan-Quinn).

The final model estimated is the one using Random Effects. In this case, both the Human Development Index and population growth rate are statistically significant at a level of 5%, similarly to the previous case. However, an additional variable becomes statistically significant, at a level of 1%, the CPI. The result is in line with the elements underlined by the Pooled OLS model regarding this particular variable. The third and final configuration notes that an increase of one unit in the Corruption Index implies a raise of 0.317% of the penetration rate, Ceteris Paribus. The F-statistic of the Random Effects model underlines, for a 0.000114 probability, that the model is more suitable that the one including only the constant.

Table 6: The results of the Hausman test

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	15.440268	5	0.0086

Source: own computations in Eviews 7.0.

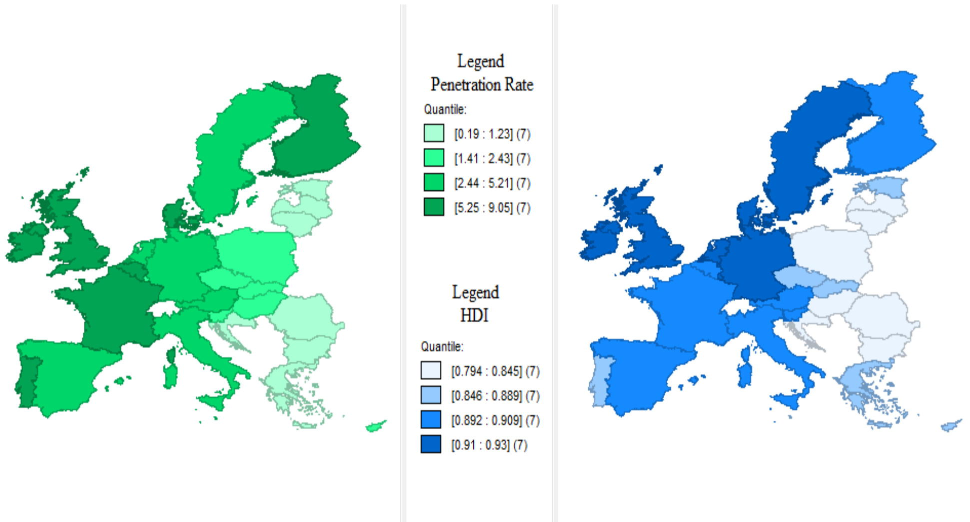


Figure 1: Quantile maps of the Life insurance penetration rate and HDI (mean for 2004 – 2014)
Source: own construction in GeoDa 1.8.14.

The most adequate model between the Fixed Effects model and the Random Effects model is to be determined by the result of a Hausman test. The Chi-Squared statistic that is used to build the test develops under the assumption (i.e. the null hypothesis) that the independent variables and the residuals of the model are not correlated. In

our case, the null hypothesis states that the Random Effects model is better for this configuration than the model with Fixed Effects. Following the results of the test, as shown in the *Table 5*, the probability of 0.012 (less than 1%) is implying that the Fixed Effects model is more suitable for our variables.
As we came to see, one variable in particular was recurrently statistically significant at a 5% level, the Human Development Index. Therefore, one of the main purposes of the study, to find a link between the two, was attained. In order to develop a better understanding of the relationship between the penetration rate and the HDI, we can study the quantile maps of the two, as displayed by the *Figure 1.*, computed by using the means of the data sample (2004 – 2014). It is observable that countries such as Denmark, Ireland, Sweden or the United Kingdom rank as having both the highest penetration rates in the European Union, while also placing very high on the Human Development Index hierarchy. On the other hand, it is shown that the Balkan region, and the countries in the Eastern Europe score particularly lower levels for both indicators, namely Bulgaria, Croatia, Latvia and Romania.

Conclusions

As we came to see by studying the descriptive statistics, the Scandinavian countries and generally the northern part of the European Union display high life insurance penetration rates, while the Central and Eastern Europe, particularly the Balkan region, present low rates for this indicator.
Also, our findings show that increases in the Human Development Index are bound to generate increases of the penetration rate.
In addition, the two models taken into account – the Fixed Effect and the Random Effects models – underlined the important role the population growth in augmenting the penetration rate. The results were in line with the initial assumption that the coefficient for this particular variable would be positive. Moreover, in the final configuration – the Random Effects model – increases in the Corruption Perception Index generate an increase of the life insurance penetration rate.
The findings of this paper are important for life insurance market and for governments, because human development refers to the people in term of skill, knowledge, poverty, health and security, which provide economic value.

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