Analysis on the Relationship between Rating and Economic Growth for the European Union Emergent Economies

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Abstract—This article analyses the relationship between sovereign credit risk rating and gross domestic product for Central and Eastern European Countries for the period 1996 – 2010. In order to study the metioned relationship, we have used a numerical transformation of the risk qualification, thus: we marked 0 the lowest risk; then, we went on ascending, with a pace of 5, up to the score of 355 corresponding to the maximum risk. The used method of analysis is that of econometric modelling with EViews 7.0. programme. This software allows the analysis of data into a pannel type system, involving a mix of periods of time and series of data for different entities. The main conclusion of the work is the one confirming the negative relationship between the sovereign credit risk and the gross domestic product for the Central European and Eastern countries during the reviewed period.

Keywords—credit rating agencies, economic growth, gross domestic product, sovereign credit risk rating.

I. INTRODUCTION

THE sovereign rating conveys the probability that a sovereign state, at a given time, could not meet or wish for meeting the external commitments due to causes controlled by the state government and it groups the risks related to the external public debt or publicly guaranteed. The sovereign risk qualification is a synthetic indicator of the business environment quality from a country. Into the international economic literature, a limited number of studies approach the relevance of sovereign risk for the big international investors, the financial market and the economic growth. As an example, the European Commission [5] shows that "into the macroeconomic models which use the interest of the governmental bonds with reference to the interest rates, an increase of the sovereign risk premium will lead to a similar outcome of the real rate of the interest that is going to be applied to the entire economy and will affect negatively the gross domestic product (GDP)".

This paper has as objective the assessment of the negative relationship between the qualification of sovereign risk and the increase of the GDP, following the example of Central and Eastern European countries (Czech, Estonia, Latvia, Lithuania, Hungary, Poland, Romania, Bulgaria, Slovakia and Slovenia), for the period 1996 – 2010.

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The rest of the paper is organized as follows. Section 1 provides a brief literature review describing how country risk relates to GDP growth and, more general how it relates to business cycles. The methodology and data are presented in Section II. Section III reports results for our baseline data set, and section IV concludes the paper.

II. LITERATURE REVIEW

Country risk, as it is known today, started to shape in the '70s, last century, at the same time with the quick development of the international loans, especially those intended for the emergent countries. We will come across terms as "country ceiling" and "issuer default/long term foreign currency" at Fitch [8], "country ceilings" and "sovereign risk" at Moody's [11] and "sovereign credit risk rating foreign currency" and "transfer and convertibility assessment" at Standard Poor's [17]. The meanings of the terms used by the three agencies are close but not identical. By "country ceiling" all the agencies understand to express the transfer risk, i.e. the risk for a sovereign government not to wish or not to make available the currency necessary to cover in due time the external bonds. The same is expressed by Standard Poor's through transfer and convertibility assessment. Moody's has a different view when defining the "foreign-currency deposit ceilings" as "the risk for a government to freeze the foreign currency deposits in order to preserve the rare currency resources during crisis" [11]. Financial un-factoring and globalization have made the rating agencies and their qualifications they offer, including the sovereign ones, occupy a central place within the system of capital assignment at international level. Into the international economic literature, a limited number of studies approaches the relevance of sovereign risk for the big international investors, for the financial market and for the economic growth. Reference [7] prove on a sample of ten countries, for the period 1989 – 1999, that rating agencies are procyclic and this cycle is determined by the little importance granted to the qualitative factors in the risk analysis. Reference [10] use data from the period 1933 – 1997 upon the USA and the indicators: GDP, credit spread and bankruptcy rate, showing there has been a positive and negative co-cycle between the spread, on one hand, and GDP and bankruptcy rate, on the other hand. Reference [14] proves on a sample of 29 countries, based upon statistical point in time data, through the method of OLS regression, that seven variables are essential for rating, reliability and spread: GDP/inhabitant, GDP increase rate,

inflation rate, external debt rates, international reserves and the opening degree of economy. Reference [3] show that "Moody's ratings are positively correlated with the cycle indicators". The official documents of the European Commission [6] and the USA Securities and Exchange Commision [15] describe the channels through which rating, in general, and especially risk qualifications of the derived instruments, have affected the international financial stability. But there are studies stating that the sovereign risk does not influence the economic cycle. Reference [13], studying the sovereign ratings during 1979 – 1999, comes to the conclusion that rating agencies were reactive and they systematicly failed in anticipating the currency crises. Kraussl (undated) cited by [16], argues that rating agencies do not initiate business cycles into the emergent countries. Reference [1] conclude that "ratings are not very sensitive to the economic cycles". With reference to the criticism brought to the rating agencies in respect to the fact they exacerbate crises, [12] proves that ratings are rather rigid than pro-cyclic and "they are simple reactions to the new macroeconomic or market information". Also, [4] refute the hypothesis of procyclical ratings during the Asian crises.

Based on data from The World Bank and Fitch Credit Rating Agency, our paper highlights the negative relationship between sovereign credit rating and economic growth in Central and Eastern Europe during 1996 – 2010.

III. METHODOLOGY AND DATA

To study the correlation between the sovereign rating and the growth of the GDP, we have used a numerical transformation of the risk qualification, different from the one given into the professional literature by [2]. Thus, they used to transform numerically the risk qualifications related to the three rating agencies ranging from 0 (the highest risk) to 23 (the lowest risk), with a pace of one for each risk class. We have used a more refined scale of assessment, due to the fact that the rating for the developed countries varied during a short period of time. Thus, we detailed within each risk class three more categories related to the three possible perspectives: positive, stable or negative. We have market with 0 the lowest risk because it really corresponds to a historical cease of payment of 0 as [9]. Then, we have continued ascending, with a pace of 5, up to the score of 355 that corresponds to the maximum risk:

TABLE I
SOVEREIGN RATING: NUMERICAL TRANSFORMATION

Class of risk	Outlook	Numerical equivalent
AAA	Positive	0
	Stable	5
	Negative	10
AA+	Positive	15
	Stable	20
	Negative	25
AA	Positive	30
	Stable	35
	Negative	40
AA-	Positive	45
	Stable	50
	Negative	55
A+	Positive	60
	Stable	65
	Negative	70
A	Positive	75
	Stable	80
	Negative	85
A-	Positive	90
	Stable	95
	Negative	100
BBB+	Positive	105
	Stable	110
	Negative	115
BBB	Positive	120
	Stable	125
	Negative	130
BBB-	Positive	135
	Stable	140
	Negative	145
BB+	Positive	150
	Stable	155
	Negative	160
BB	Positive	165
	Stable	170
	Negative	175
BB-	Positive	180
	Stable	185
	Negative	190
B+	Positive	195
	Stable	200
	Negative	205
B	Positive	210
	Stable	215
	Negative	220
B-	Positive	225
	Stable	230
	Negative	235
CCC+	Positive	240
	Stable	245
	Negative	250
CCC	Positive	255
	Stable	260
	Negative	265
CCC-	Positive	270
	Stable	275
	Negative	280
CC	Positive	285
	Stable	290
	Negative	295
C	Positive	300
	Stable	305
	Negative	310
DDD	Positive	315
	Stable	320
	Negative	325
DD	Positive	330
	Stable	335
	Negative	340
D	Positive	345
	Stable	350
	Negative	355

Beginning with this numerical transformation, we have calculated an annual average rating as a simple arithmetical mean of the values of the rating qualification registered along the year. Statistical data referring to rating have been taken from the rating agency website of Fitch, and those referring to the increase of the gross domestic product have been taken from the World Bank website. We consider sovereign credit ratings produced by Fitch on a total of 10 emerging market countries from Eastern Europe for the period 1996 to 2010. The used method of analysis is that of econometric modelling with EViews 7.0. programme. This software allows the analysis of data into a panel type system, involving a mix of periods of time and series of data for different entities.

IV. EMPIRICAL MODEL

Central and Eastern Europe countries have known high volatility of the sovereign risk qualification, associated with uncertainties inherent to the transition to the market economy and accession to the European Union and with higher financing needs as compared with the financial availabilities[3]. The evolution of the sovereign risk into these countries for the period 1995 – 2010 is shown below:
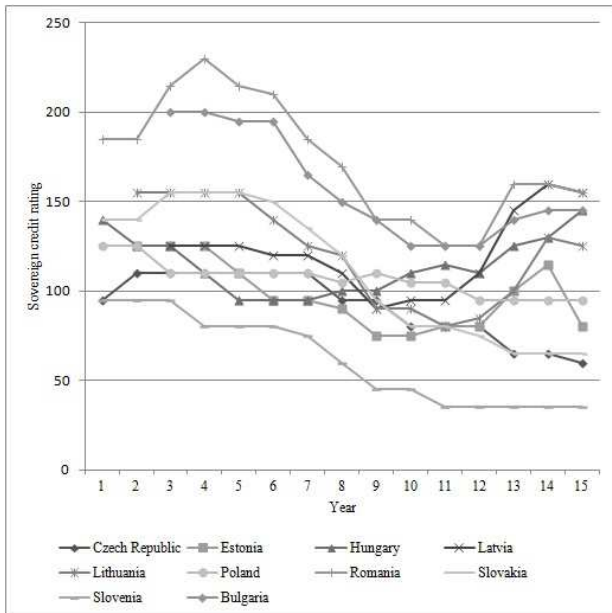

Fig. 1 Sovereign credit rating in Central and Eastern Europe, 1996 - 2010

Source: Fitchratings, 2011

The transition was associated with a descending trend of risk beginning with 1996-1997 and up to 2003-2004. The chart above shows that during the reviewed period, only three countries, Czech, Poland and less Estonia bring in a descending trend of risk after 2004, whereas, all the other countries are characterized by an ascending trend of risk.

For a deeper analysis, we have appealed to econometric modelling, more exactly to a panel type system that includes all ten countries during 1996-2010. We have performed the analysis for a number of 10 countries: Bulgaria, Czech, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia generating a number of 150 observations.

The regressive model of panel type has the following form:

$$Y_{i,t} = \alpha + \beta_{i,t} x X_{i,t} + \varepsilon_{i,t} \qquad (1)$$

i=1,10

where,

Y_{it} – dependent variable (ECONOMIC_GROWTH);

- α – free term coefficient;
- β_i – independent variable coefficients (RATING);
- $X_{i,t}$ – independent variables;
- $\varepsilon_{i,t}$ – random variables;

[3] *Czech, Estonia, Latvia, Lithuania, Hungary, Poland, Romania, Bulgaria, Slovakia and Slovenia.*

- i – number of "sections" on the basis of which there is performed the regression – 10 sections (number of the member states of the Central and Eastern European Union);
- t – period of time (1996-2010)

Used data:

- economic growth (ECONOMIC_GROWTH)
- rating annual value for each country (RATING)

The model will quantify the correlation of the economic growth and the rating of each country in the manner it is taken by the rating agencies. Therefore, there could be built a regressive model of panel type in order to quantify the rating impact upon the economic growth.

In this case, the model has the following figure:

$$ECONOMIC\_GROWTH = \alpha + \beta x RATING + \varepsilon_t \qquad (2)$$

In order to perform the analysis, we applied first the Hausman test. The Hausman test is a test which helps us to understand one of the two methods of estimation: the one of the fixed effects and the one of random effects. In our case, the Hausman test points out the fact that for the analysis of the relationship economic growth - rating the most appropriate estimation method is that of fixed effects.

TABLE II
THE HAUSMAN TEST

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section and period random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.226472	1	0.6342
Period random	11.994923	1	0.0005
Cross-section and period random	6.136185	1	0.0132

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
RATING	-0.152333	-0.147286	0.000113	0.6342

TABLE III
THE REVIEWED MODEL

Sample: 1996 2010
Periods included: 15
Cross-sections included: 10
Total panel (balanced) observations: 150

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RATING	-0.094186	0.035912	-2.622700	0.0098
C	28.58031	4.234726	6.749033	0.0000

Effects Specification

Cross-section fixed (dummy variables)
Period fixed (dummy variables)

R-squared	0.705631	Mean dependent var	17.57940
Adjusted R-squared	0.649112	S.D. dependent var	12.03975
S.E. of regression	7.131847	Akaike info criterion	6.918029
Sum squared resid	6357.905	Schwarz criterion	7.419802
Log likelihood	-493.8522	Hannan-Quinn criter.	7.121883
F-statistic	12.48485	Durbin-Watson stat	0.958771
Prob(F-statistic)	0.000000		

Analyzing these results there could be noticed that:

- The estimation satisfies to an acceptable extent the stoutness conditions in terms of the Durbin-Watson test (with reduced autocorrelations between the residual variables). In order to test the autocorrelation of errors we used the Durbin-Watson Test. Through this test there could be detected the autocorrelation of errors of first order estimated through the method of the least squares. The *F* test which checks if there is at least one parameter corresponding to an explanatory non-

zero variable. Due to the fact that the level Prob F is close to 0, the model is valid.

- The adjusted R-squared value of 0,70 implies that the informational relevance of the independent variable within the description of the dynamics of the dependent variable is a powerful one;

- The model shows a counter correlation between the rating level and the economic growth level for the 10 countries.

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Equation estimation:

$$\text{ECONOMIC\_GROWTH} = -0.0941858756655 * \text{RATING} + 28.5803076381 + [\text{CX=F, PER=F}] \quad (3)$$

Resulting that to a modification of one unit of the rating value, the economic growth decreases with 0.094 units.

The economic analysis indicates, similarly to the chart analysis, a counter relationship between the sovereign rating and economic growth.

V. CONCLUSIONS AND DISCUSSIONS

The objective of this research was the examination of the negative relationship between the modification of the sovereign rating and the modification of the GDP, following the example of the countries from the Central and Eastern Europe. The panel type regressive model used to quantify the correlation betwee the two variables certifies the counter correlation for the ten countries. Also, the results certify the conclusions of the European Commission (2011) and the procyclic character of the sovereign rating emphasized by the reference literature.

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