THE EMPIRICAL ANALYSIS OF THE NUMBER OF CORPORATE INSOLVENCIES DYNAMICS IN THE CENTRAL AND EASTERN EUROPEAN COUNTRIES

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Abstract: *The success of a company depends on how well the company adapts to changes in the business environment. Insolvency is one of the most important problems in achieving an efficient management of the company. Despite a large number of scientific papers in this field, some practical problems remain unresolved. In Central and Eastern Europe, corporate insolvencies began to be studied only in the 1990s. These became a pressing issue, especially during the COVID 19 pandemic, when a large number of companies were forced to cease operations. Therefore, the purpose of this article is to try to identify the extent of bankruptcy proceedings and to analyse the dynamics of the number of corporate insolvencies in the countries of Central and Eastern Europe. These states were chosen because of their common geopolitical situation and history. The study was conducted in a sample of 15 countries in the period 2013-2020 based on data taken from the reports of Euler Hermes, Allianz Research and Creditreform. The methods used in this paper were: data collection, data processing, estimation of trend patterns in time series and descriptive analysis.*

Key words**:** *Corporate insolvencies, dynamics, time series, Central and Eastern Europe*

Coduri JEL: O11, O56

Introduction

Insufficient analysis of economic policies contributed to insolvencies of many large entities both worldwide and in Central and Eastern Europe. The elaboration of different models for forecasting the financial crises in the corporate sector, is a subject analysed in different scientific papers, having its roots at the beginning of the 20th century. The problem and the necessity to develop and elaborate such models arose as a result of (a) the bankruptcies of large entities during the Great Depression (1929 - 1933) and (b) the significant number of bankruptcies registered in the USA largely after the Second World War.

The first attempts to predict the financial crises of the entities was in 1920, the results of which were insignificant. However, since the 1960s, as a result of the development of IT technologies, the first complex models for predicting the bankruptcy of entities have been developed, which were based on multifactorial statistical analysis.

More than it, the interest to the corporate insolvencies dynamics increased especially during the COVID 19 pandemic period, when a big number of firms were forced to cease their economic activities. According to Euler Hermes, Allianz Research, 2021, the state intervention has helped to prevent one in two insolvencies in Western Europe and one in three in the US, representing an

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DOI: 10.29302/oeconomica.2022.24.2.6

overall decrease of (-12%) in 2020. As a result, the level of business insolvencies rest low in most countries until the end of 2021, the normalization being delayed until 2022.

Therefore, the ability to analyse the dynamics of number of corporate insolvencies of a country is a benefit for all type of external and internal users. Thus, the main goal of this paper is to try to analyse the dynamics of the number of corporate insolvencies in the countries of Central and Eastern Europe. These states were chosen because of their common geopolitical situation and history. The study was conducted in a sample of 15 countries during the period 2013-2020. The data were collected from the reports of Euler Hermes, Allianz Research and Creditreform. The research methods used in this paper are: data collection, data processing, estimation of trend patterns in time series and descriptive analysis. The trend examination permits to identify and analyse the main trends appearing within the analysed phenomenon. In majority of cases, the level of the models fitting to the empirical data indicate their high practical utility. The obtained econometric instruments may be used to forecast the examined variables.

The results show that the developed countries with high income, situated in the Central and Eastern Europe, are characterized by almost the same directions of modification of number of corporate insolvencies. On the other hand, the developing countries with upper middle income are characterized by an increase until 2017 of number of insolvencies. More, chain indices indicate similarities and significant decreases in 2020 for almost all the analysed countries. The 2020 year was one of the most unexpected because of the pandemic COVID-19 shock. During 2020, the business environment was deteriorated. As a result, almost all national governments tried to support and provide extensive aid to firms and affected branches. That is why; the number of corporate insolvencies in Europe does not reflect the realty.

Literature review

Analysing several meanings regarding insolvency, the authors concluded that most studies use a purely legislative definition of insolvency. According to Roman law, (200-1600) insolvency is a procedure in which a company ceases, confiscates or sells its goods. More than it, insolvent traders were considered criminals, often being sold or even killed for failing to meet their obligations (Costin M., 2001). The economic and financial dictionary stipulates that insolvency suppose "the deficient economic situation of a debtor, who is unable to meet his commercial obligations (to creditors); insolvency of the debtor established by the court based on the declaration of bankruptcy or a several creditors (Shumway T., 2001). Beaver (1966) considers that insolvency represents the inability of a firm to pay its financial obligations. From the operational point of view, a firm is considered to become bankrupt when any of the following events occurred: insolvency, non-payment of bonds, overdue bank account or non-payment of a preferred stock dividend. Altman (1968) believes that insolvency corresponds to the companies that are in a state of legal bankruptcy and that are placed in debt or have received the right to be reorganized in accordance with the provisions of the National Bankruptcy Law. Ohlson (1980) believes that the definition of failed companies is purely legalistic. Failing firms must have filed for insolvency or another notice of bankruptcy. According to Shumway (2001) companies that have filed for bankruptcy are considered insolvent.

Thus, in recent decades, an increasing number of scientists have turned their attention to the concept of insolvency. These analytical efforts have been reflected in a significant number of papers, both theoretical and empirical, on firm failure prediction (Scott 1981, Zavgren 1983, Altman 1968). However, classical studies, which are usually referred to in the literature, are not always sufficiently adapted to the economic, financial, social and environmental context, to the institutional environment of specific firms. Therefore, the dynamics of the business environment, the severity of the environmental consequences of bankruptcy and other circumstances require periodic revision of the instruments for assessing and managing corporate insolvencies. (Adnan and Humayon, 2006, Anghel, 2002, Cîrciumaru, 2013, Muntean, 2019).

Materials and methods

The corporate insolvencies phenomena cannot be considered as a chaotic phenomenon, it happens frequently, and not suddenly, that is why it should be treated as a relevant phenomenon.

In this paper, we intend to analyse in dynamics the evolution of number of corporate insolvencies in 15 countries situated in Central and Eastern Europe during the period 2013-2020. The initial data was collected from the Creditreform reports (see Table 1).

The dynamic analysis of the number of corporate insolvencies in the 15 Central and Eastern Europe countries was performed with the help of the chain indices. A chain index shows the modification of the individual number in comparison with previous year:

$$I_{\frac{t}{t}-1} = \frac{I_t}{I_{t-1}} \bullet 100,$$

where: *yt* – the number of corporate insolvencies in the period under consideration;
where *yt*–1 – the number of corporate insolvencies in the previous year.

The calculation results can be seen in the table 2.

After the first stage of dynamic analysis, we tried to perform the econometric trend models (Davidson, 2000) for two countries: Republic of Moldova and Romania. The dependent variable represent the number of insolvencies of these 2 countries.

In order to perform the economic trend models the polynomial trend models of the r level were estimated. Their form is as follows:

$$Y_t = \sum_{j=0}^{r} a_j t^j + n_t$$

where: t represent the time variable *t = 1, 2, ..., n*;

r – level of the time variable polynomial trend.

The polynomial trend was used as a result of the F test for equation of two variances (Greene, 2008). Thus, using the classic least-squares method, the following models were elaborated (Maddala & Lahiri, 2009) describing the trend of corporate insolvencies in these 2 countries. The results can be seen in Tables 3–4.

DISCUSSIONS

Table 1. The number of the corporate insolvencies in the Central and Eastern Europe countries during 2013–2020

years	Bulgaria	Croatia	Czech Rep	Estonia	Hungary	Latvia	Lithuania	North Macedonia	Poland	Romania	Serbia	Slovakia	Slovenia	Ukraine	RM
2013	1232	6220	6021	469	13420	818	1561	n.s.	926	27924	n.s.	880	941	8811	2808
2014	1031	2641	3563	428	17327	964	1594	n.s.	864	20696	2062	831	1302	13198	2770
2015	1083	19543	3004	376	9545	802	2012	n.s.	770	10269	2072	715	1154	13696	3905
2016	871	18811	2438	335	7528	731	2560	182	616	8053	2104	692	1376	19853	4055
2017	859	10744	1803	343	6579	587	2865	142	593	8256	2113	584	1439	19975	8540
2018	1112	11881	1039	273	5692	591	2219	916	646	8304	2080	230	1497	20146	7847
2019	996	11909	926	148	5176	560	2574	1233	645	6384	2075	249	1294	20076	3038
2020	1327	11644	1091	150	4293	374	944	73	576	5564	1828	167	1125	19875	2762

Source: Own calculations on the basis of Creditreform data

Table 2. The chain indices of the corporate insolvencies in the Central and Eastern Europe countries during 2013–2020

years	Bulgaria	Croatia	Czech Rep	Estonia	Hungary	Latvia	Lithuania	North Macedonia	Poland	Romania	Serbia	Slovakia	Slovenia	Ukraine	RM
2014/2013	83,69	42,46	59,18	91,26	129,11	117,85	102,11	-	93,30	74,12	-	94,43	138,36	149,79	98,65
2015/2014	105,04	739,98	84,31	87,85	55,09	83,20	126,22	-	89,12	49,62	100,48	86,04	88,63	103,77	140,97
2016/2015	80,42	96,25	81,16	89,10	78,87	91,15	127,24	-	80,00	78,42	101,54	96,78	119,24	144,95	103,84
2017/2016	98,62	57,12	73,95	102,39	87,39	80,30	111,91	78,02	96,27	102,52	100,43	84,39	104,58	100,61	210,60
2018/2017	129,45	110,58	57,63	79,59	86,52	100,68	77,45	645,07	108,94	100,58	98,44	39,38	104,03	100,86	91,89
2019/2018	89,57	100,24	89,12	54,21	90,93	94,75	116,00	134,61	99,85	76,88	99,76	108,26	86,44	99,65	38,72
2020/2019	133,23	97,77	117,82	101,35	82,94	66,79	36,67	5,92	89,30	87,16	88,10	67,07	86,94	99,00	90,92

Source: Own calculations

The performed dynamic analysis in the base of chain indices shows that the developed countries with high income, situated in the Central and Eastern Europe, are characterized by almost the same directions of modification of number of corporate insolvencies. These 8 countries achieved the highest rise in the number of corporate insolvencies from 2015 till 2018. On the other hand, the developing countries with upper middle income are characterized by an increase until 2017 of number of insolvencies, and a decrease in last years. The highest rise of the number of corporate insolvencies were observed in Republic of Moldova in 2017. Lack of economic growth and implementation of reforms, slow recovery of money from bank fraud, attempts to promote dubious laws, lack of major investments and development of a competitive business environment, but also energy dependence on the Russian Federation were the main economic problems of RM in those period.

In addition, a huge rise was recorded by Croatia in 2015. This fact was caused because in 2014 Croatia had a range of problems including the lowest employment rates in the EU, declining export performance, large external liabilities, and highly leveraged firms. It also should be mentioned that state owned companies just began to be restructured, and that the business environment ranked in those period below the average of all the EU's post-communist states.

Chain indices indicate similarities and significant decreases in 2020 for almost all the analysed countries. The 2020 year was one of the most unexpected and unusual years in European economic history. Approximatively, the hall year, the European economy suffered from the pandemic COVID-19 shock. The situation of economy in all the European countries was characterized by the ceasing of activities, by lockdowns, by the massive uncertainties. During 2020, the business environment was deteriorated. As a result, almost all national governments tried to support and provide extensive aid to firms and affected branches. Consequently, government implemented different measures related to the insolvency law in order to prevent the insolvencies. That is why; the number of corporate insolvencies in Europe does not reflect the realty. More than it, the real impact of the pandemic COVID-19 shock will probably appear only in the years to come.

Table 3: The trend model of the corporate insolvencies in Romania (2013–2020)

Dependent Variable: Y_ROMANIA
Method: Least Squares
Date: 04/01/22 Time: 16:44
Sample: 2013 2020
Included observations: 8

Variable	Coefficient	Std. Error	t-Statistic	Prob.

C	34054.60	3207.179	10.61824	0.0000
T	-8387.944	1472.612	-5.695964	0.0013
T^2	606.3128	143.6210	4.221615	0.0056

R-squared	0.919856	Mean dependent var	11314.78
Adjusted R-squared	0.893142	S.D. dependent var	7710.630
S.E. of regression	2520.539	Akaike info criterion	18.76353
Sum squared resid	38118703	Schwarz criterion	18.82928
Log likelihood	-81.43591	Hannan-Quinn criter.	18.62166
F-statistic	34.43285	Durbin-Watson stat	1.286536
Prob(F-statistic)	0.000515		

Source: Own calculations.

Table 4: The trend model of the corporate insolvencies in Republic of Moldova (2013–2020)

Dependent Variable: Y_MOLDOVA
Method: Least Squares
Date: 04/01/22 Time: 16:51
Sample (adjusted): 2013 2020
Included observations: 8 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1233.518	2811.030	-0.438813	0.6791
T	3068.780	1433.181	2.141236	0.0852
T^2	-318.0536	155.4503	-2.046014	0.0961

R-squared	0.480599	Mean dependent var	4465.625
Adjusted R-squared	0.272838	S.D. dependent var	2362.821
S.E. of regression	2014.867	Akaike info criterion	18.33449
Sum squared resid	20298436	Schwarz criterion	18.36428
Log likelihood	-70.33796	Hannan-Quinn criter.	18.13356
F-statistic	2.313235	Durbin-Watson stat	1.953450
Prob(F-statistic)	0.194427		

Source: Own calculations.

These two trend models can be described as being well adjusted to the empirical data. The R-squared coefficients for Romania exceeds 91%, for the Republic of Moldova this coefficient exceeds 48%. The time variables included in the models are statistically significant, because they do not exceed 3%. There is no autocorrelation of the random component in the models and the residuals have a regular distribution (Maddala & Lahiri, 2009).There is no autocorrelation because R-squared is under critical value in Quennouille (Box & Jenkins, 1983) test. This fact means that we shouldn't rejected null hypothesis. Null hypothesis shows that is no autocorrelation of the random component in the model, and speaks of the lack of this phenomenon. In addition, relatively high adjustment of the models to empirical data demonstrate the possibility to use the estimated tools in order to forecast the number of corporate insolvencies.

Conclusions

The problem of the corporate insolvencies analysis represent a complex issue and a very important subject of empirical research, confirmed by a significant number of scientific papers. The above paper contains such aspects as:

- a deep description of the importance of the studied problem;
- a critical and retrospective review of literature on this topic;
- an analyse in dynamics, by using the chain indices of dynamics, of the evolution of number of corporate insolvencies in 15 countries situated in Central and Eastern Europe during the period 2013-2020. The results of the calculations shows that the developed countries with high income, situated in the Central and Eastern Europe, are characterized by almost the same directions of modification of number of corporate insolvencies. On the other hand, the developing countries with upper middle income are characterized by an increase until 2017 of number of insolvencies. More, chain indices indicate similarities and significant decreases in 2020 for almost all the analysed countries. The 2020 year was one of the most unexpected because of the pandemic COVID-19 shock. During 2020, the business environment was deteriorated. As a result, almost all national governments tried to support and provide extensive aid to firms and affected branches. That is why; the number of corporate insolvencies in Europe does not reflect the realty.;
- a statistical analysis, by using econometric trend models estimation of the corporate insolvencies for two countries: Republic of Moldova and Romania. These two models have a relatively high adjustment to the empirical data, demonstrating the possibility of the estimated tools usage in order to forecast the number of corporate insolvencies.

However, the following aspects need to be considered:
- the extension of the number of observations examined in the analysed time series can contribute to the modification of the obtained results;
- the increase of the set of variables with other possible explanatory variables could extend and amplify the analysis especially in the cause-effect relations that appear in the field of corporate insolvencies in the examined group of countries.

Corporate insolvencies are not a mass phenomenon, they take place often enough, therefor their dynamic analysis is relevant. The corporate insolvencies statistics performed in this research paper on the base of the economies of Central and Eastern Europe countries represent a strong confirmation of this fact. More than it, this paper may provide relevant information for other research in this topic.

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