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Emerging Market Queries in Finance and Business

Is There a Connection Among Environmental and Financial Performance of a Company in Developing Countries? Evidence from Romania.

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Abstract

This paper analyzes the existence of a connection among corporate environmental performance and financial position and performance of a company in developing countries such as Romania. This paper mainly aims at assessing if obtaining environmental performance influences the costs, the revenues and the profitability of a company. Does better environmental performance increase the profitability or the rates of return of the company? Does better environmental performance determine the growth of revenues or the decrease of costs? In order to respond to the above questions we used a panel of Romanian economic entities for a time period of 6 years starting from 2005 until 2010. The results show we can't establish a significant link between the two dimensions studied. The result of the study is confirmed by the literature review, which revealed that in developing countries were not demonstrated significant links between studied indicators unlike mature economies where was evidenced a positive or a negative correlation.

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1. Introduction

Both environmental and financial performances are issues that had a lot of attention as it can be seen through a great number of researches on this topic. In the last years the link between the two types of performance has become of a great interest for many researchers. Obtaining environmental performance is important for an economic entity if we consider the benefits it can bring to the evolution of the entity's financial

results. Thus, a large number of analyzes and empirical studies analyzing the consequences of environmental performance on financial performance Lanoie et al., 1998; Khanna and Damon, 1999; Konar and Cohen, 2001; Lundregren and Olsson, 2010 and results indicate either positive (Florida and Davison, 2001; Melnyk et al., 2002; Rosen, 2001; Miles and Covin, 2000 or negative connection Lopez-Rodriguez, 2009 by outlining the fact that environmental commercial activities involve market risks. O more recent study developed by Tommy Lundgren and Rickard Olsson in 2010 analyzes if bad news in the form of environmental incidents affect firm value negatively an a sample of European entities. The results show that environmental incidents are associated with loss of value. Most of the studies conducted on this topic are related to developed economies such as USA and Europe, where the environmental awareness is at high level. Regarding developing countries, such as Romania, there are a few studies conducted because the environmental awareness in some cases it doesn't exist or is at a very low level and there isn't an environmental culture among the national companies.

The question we rise in this paper refers to the existence or not of an association between environmental performance and the financial performance in Romania or if becoming green has a positive impact on profits.

2. Literature review

In the traditional perspective companies associate environmental issues with cost that determines the erosion of the company's competitiveness. But during the last two decades this perspective was dissolved by a large number of studies Porter, 1991; Hart and Ahuja, 1994; Cohen et al., 1995; Khanna and Damon, 1999; Konar and Cohen, 2001; Earnhart and Lizal, 2007, Lundregren and Olsson, 2010 that examined the connection among corporate environmental performance and financial position and performance of a company. The conventional view of the environmental aspects as "cost" is outdated according to different studies conducted that show the existence of a clear link between environmental performance and corporate profitability. A great number of studies that demonstrate the impact of environmental management on a company' profitability such as: Earnhart and Lizal, 2010, Konar and Cohen, 2001, Repetto and Austin, 2001, Christmann, 2000, Dowel et al, 2000, Khanna and Damon, 1999, Gottsman and Kessler, 1998, Stanwick and Stanwick, 1998, Blacconiere and Northcut, 1997, Feldman et al., 1997, Russo and Fouts, 1997, Cohen et al. 1995, Hart and Ahuja, 1994 and others.

Konar and Cohen, 2001 have shown that good environmental performance, assessed by toxic emissions, has a positive consequence on the value of intangible assets of the economic entity. Austin et al., 1999 demonstrated a similar conclusion, that financial return is positively influenced by good environmental performance, expressed through various measures (toxic emissions). In accordance with the aforementioned research, Hart and Ahuja, 1996 showed that better financial performance can be obtained through emission reduction, their study being based on accounting information for a period of two years. Similar conclusions were obtained by Filbeck and Gorman in 2004, by comparing for a period of three years the size of environmental receipts fines and penalties that evidenced a positive connection among financial and environmental performance. Also, in a study from the Czech Republic conducted by Earnhart and Lizal in 2007 authors demonstrated that improving profitability can be determinate by better environmental performance by lowering costs faster than revenues. In 2009 Moneva and Ortas conducted a study on a sample of European entities from different countries using a multidimensional perspective and their findings reveal a positive and suggestive relationship among environmental and financial performance, like many of the findings of previous researchers Karpoff and Lott, 1993; Klassen and McLaughlin, 1996, Kumar et al., 2002; Schnietz and Epstein, 2005; Elsayed and Paton, 2005; van Beurden and Gossling, 2008.

Murphy, 2002:14 concluded that "empirical research on the environmental and financial performance relationship has (1) tested a wide variety of environmental performance indicators against a range of financial measures and (2) found that positive environmental performance is linked with positive financial results and that negative environmental performance leads to negative results."

3. Theoretical framework

In this study we try to demonstrate if there is a connection among the financial performance and the environmental performance in the Romanian business environment. The majority of the studies conducted on regarding this theme are on mature market economies. We only found one on a transition economy, a study conducted by Dietrich Earnhart and Lubomir Lizal in 2007 regarding of Czech Republic economy for a time period of 2 years starting in 1996 until 1998. Our focus on the air pollutant emissions as measure of the environmental performance can be explained through three reasons: (1) Lack of information regarding the environmental performance; (2) The collapse of communism revealed prominent environmental issues in Romania and (3) The Romanian government need to meet the requirement regarding the reduction of air pollutant emissions in the process of qualifying for EU membership.

In our study we compared two time periods: the period 2005-2007 before the financial crisis and the period 2008-2010 as the period of the crisis. The data used was obtained from the site of BSE (Bucharest Stock Exchange) and The National Pollutant Release and Transfer Register. Due to the shortcoming information from the website of the pollutants register we managed to select only 14 of the companies that reported their emissions. The numbers of the companies that reported the greenhouse gas emissions varied from one year to another so in 2005 there were 83 companies and in 2010 the number increased at 133. For assessing the environmental performance we used as indicator the CO₂ emissions as a part of greenhouse gas emissions due to the shortcoming information, although according to the literature the used indicator is the total amount of greenhouse gas emissions Earnhart and Lizal, 2007; Konar and Cohen, 1997; Stanwick and Stanwick, 1998.

Regarding the indicators used to evaluate the financial performance of economic entities the starting point of our study was the research of Earnhart and Lizal from 2007. We selected the financial indicators base on what we previously mentioned (environmental performance affects both revenues and costs). The key financial indicators used in our study are: total income Frydman et al, 1999 or Earnhart and Lizal, 2007, profit Kocenda and Svejnar, 2002 or Stanwick and Stanwick, 1998, operating profit Earnhart and Lizal, 2007 and total expenditures Earnhart and Lizal, 2007. For the financial position of the companies the chosen indicator was total assets. To these indicators were added other indicators used in other studies, amely rates of return: ROA Cohen et al., 1995; Hart and Ahuja, 1996; Russo and Fouts, 1997 and ROE Stanwick and Stanwick, 1998; Russo and Fouts, 1997; Hart and Ahuja, 1996; Cohen et al., 1995. To all these indicators studied Earnhart and Lizal added in their research from 2007 as control variable an indicator that reflects the size of the company, namely equity. In the present study we followed financial performance indicators (36.4%), indicators of firm size (36.4%), environmental performance indicators (9.1%) and rates of return (18.2%).

4. Econometric Framework

Panel models have important role in achieving cross-sectional and transversal analysis, being able to correctly measure data by unobservable factors. Panel regressions that appear in the model differ from the other types of regressions by having a double subscript on its variables, and the equation is:

$$D_{jt} = \omega_j + E_{jp} \times \rho + V_{jp}, \quad j=1, \dots, J; p=1, \dots, P \quad (1)$$

where “j” are the entities studied and “p” is time. Panel data models are either fixed effects (FE) or random effects (RE) models. In models with fixed effects, ω_j error component can be correlated with regressors E_{jp} and research hypothesis states no correlation between regressors and random error component ε_{it} . RE models assume that ω_j is a totally random error, and the assumption is that the error does not correlate with regressors Baum, 2001 or Baltagi, 2008. Panel analysis begins with determining the type of regression needed for the

study, more precisely if it takes the usual regression or the panel one. To carry out this decision, it will be tested if there are individual effects (FE model). In FE model Aparaschivei, 2012 the most common estimator is "within", which implies the method of least squares (OLS). The analysis presumes that the model is obtained by removing the individual averages (variables that do not change over time, like FE). In the case of models with random effects (RE), the term ω_j is included into the error indicator. So, ω_j is not correlated with the research variables in each time interval Naudé, W., Saayman, A., 2005 In this model, the presence of heteroscedasticity is tested. The next step was to apply the Wald test where the null hypothesis states that there is no first order autocorrelation.

From the statistical calculations for determining the studied indicators behavior studies on 84 observations results that the standard deviation is 0, so there are differences between the time periods studied and the study is strongly balanced.

In what follows we apply the model:

$$Y_{it} = b_0 + b_{it} X_{it} + e \quad (2)$$

where: Y = environmental performance/rating; b_0 = constant variable; X_1 = expenditure; X_2 =incomes; X_3 =profit; X_4 = total assets; X_5 =equity; X_6 =Return on equity (ROE); X_7 = return on assets (ROA); e = standard errors. The elements of our model have been also analysed in research studies by Moneva and Ortas, 2008 or Murphy, 2002. The present theoretical framework has been largely used for determining company financial performances for instance, Scholtens and Zhou, 2008. Similar research practice has been applied by Wagner, 2005. Econometric techniques used to estimate the model requires as a first step to test the null hypothesis of a single constant for all firms. Based on different data, our research starts from a similar hypothesis with Wagner, which implies that there are no differences between companies in terms of the relationship between dependent variable and independent variables if the null hypothesis is accepted. Consequently, the estimation will be made through pool OLS. If the hypothesis is rejected, the Hausman test is applied, which will indicate what type of estimation is more appropriate: random effects or fixed effects - Fixed-Effects Model.¹ OLS regression model developed in this study is not validated because $F = 0.36$ and $p = 0.92$, which means that none of the Romanian companies surveyed show a better association between environmental performance and financial performance indicators, company size and profitability. A similar result was obtained by Ho, Choy, Lam, Wong, David 2012 whose research tested the possibility of associating some of these parameters for Hong Kong companies. So, there is no difference between the effects / interactions between indicators taken in the study between companies. This conclusion emerged from the fact that Kohler, Ulrich, Kreuter, Frauke 2009 argues that fixed effects models are designed to study the causes of changes in the subjects studied. All variables studied are 0 ($T = 4.16$ $p = 0.000$). Least squares dummy variable model used by Monsuru, 2012 allowed obtaining the result that $F = 21.33$, $p = 0.000$, $R^2 = 0.871$, so there are companies in which the dependent variable variation is explained by the variation of values of the independent variables such Company 2 ($T = -2.27$, $p = 0.0026$), Company 3 ($T = -2.31$, $p = 0.0024$), Company 6 ($T = -2.38$, $p = 0.02$), Company 7 ($T = -2.16$, $p = 0.04$), Company 9 ($T = -2.51$, $p = 0.015$) and Company 11 ($t = -2.11$, $p = .04$).

So, the pattern of data carried out in order to study the variation of carbon dioxide shows that intra-firm variations exist in terms of the association between the dependent variable and the independent variable of the model developed in this paper. The results obtained by running the "Probability" test that imposed the running of OLS regressions depending on the time and companies panel data aren't pool able. Invalidation of fixed effects model is justified by the fact that companies have their own policies regarding the attitude towards gas emissions, this being possible because there is no framework clearly linked and strictly enforced in this

¹ This method is fully presented in Anderson, 2013.

direction in Romania. Next, we examined the relationship over time among environmental performance and financial performance, company size and profitability and the results show it remains unchanged over time ($F = 0.36$, $p = 0.971$). The analysis continued with the random effects model, this method assumes that the variation between entities is assumed to be random and uncorrelated with the independent variables. The random error model implies that the term entity error does not correlate with predictors and allows the time variable to be considered exploratory. The test result of Wald are $\chi^2(7) = 38.19$, $p = 0.000$, Correlation Coefficient: $R^2 = 0.000 < 1$, so we have a linear relationship. Consequently, the mean effect of the independent variables when these change by one unit on the dependent variable both in time and between companies is:

Table 1. Result of Random effects model by generate with Stata (Adkins, L. C., Hill, R.C., 2008)

CarbonDioxide	Coef.	Std. Err.	z	P>z	[95% Conf.	Interval]
Expenditure	-.010801	.0131771	-0.82	0.412	-.0366276	.0150256
Income	.0840606	.5742301	0.15	0.884	-1.04141	1.209531
Profit	.0533234	.825189	0.06	0.948	-1.564017	1670664
Equity	-9680000	14800000	-0.65	0.514	-3880000	19400000
ROE	-1480000	39900000	-0.37	0.710	-9300000	63300000
ROA	-697741.8	314206.7	-2.22	0.026	-1313576	-81907.89
Total assets	-.0437798	.0240559	-1.82	0.069	-.0909285	.003369
_cons	13700000	5.350000	2.56	0.011	31900000	24200000
sigma_u 15670000	sigma_e 72330000	Rho .82433174	(fraction of variance due to u_i)			

Source: own processing Stata Software Results (Adkins, Hill, 2008)

In this case the null hypothesis is that all coefficients of the independent variables are different from zero, which is obtained in this case, so the independent variables affect the dependent variable. The result is justified by the fact that for some of the companies studied dependent variable may be associated with most of the independent variables, except ROA. In addition, to those firms time will maintain during the existence of the relationship between the variables studied.

Testing for random effects imposed Breusch-Pagan Lagrange multiplier test application (LM). LM test Null hypothesis is that among firms, attitude towards environmental performance indicators is zero. This means that there is no significant difference between the attitudes of firms towards environmental performance indicators. $\text{CarbonDioxide}[\text{ide},t] = Xb + w[\text{ide}] + f[\text{ide},t]$

Table 2. Projected results for the Carbon Dioxide of surveyed companies

CarbonDioxide		3.09e+18	1760000000
f		5.23e+17	7230000000
w		2.45e+18	1570000000
Test: Var(w) = 0	chi2(1) =	134.98	Prob > chi2 = 0.0000

Source: own processing, Stata Software Results (Adkins, L. C., Hill, R.C., 2008)

So, we accept the null hypothesis of the study which states that the attitude of companies towards environmental indicators is the same. Cross testing requires checking the following hypothesis: cross-sectional dimensions of the study are independent. To validate this hypothesis it is applied the CD test. The result of Pesaran's test of cross sectional independence are 6.452, $p = 0.000$; Average absolute value of the off-diagonal elements = 0.425. So, the null hypothesis of the study is rejected, more exactly there is a cross dependence

between dimensions studied. The average correlation is 0.425. The data studied satisfy heteroscedasticity conditions ($\chi^2(14) = 86842.55$, $p > \chi^2 = 0.0000$). Wooldridge test confirms the existence of serial correlation between the dependent variable and the independent variables ($F = 13.522$, $p\text{-value} = 0.002$). The conclusion is that this test can be successfully used to identify the existence of serial correlation between environmental performance and firm size ($F = 39.122$, $p\text{-value} = 0.002$). Wooldridge test also confirms the existence of serial correlation between environmental performance and profitability ($F = 6.905$, $p\text{-value} = 0.047$). The crisis has led to changes in the relationship of environmental performance and financial performance, company size and profitability. To determine if the crisis affected the indicators associations in the study we applied Differences-in-Differences model. Based on the assumption that we have a balanced panel with $T = 2$ for:

$$y_{i2} = (\beta_0 + \delta_0) + \beta_1 x_{i2} + a_i + u_{i2} \quad , t = 2 \quad (3)$$

$$y_{i1} = \beta_0 + \beta_1 x_{i1} + a_i + u_{i1} \quad , t = 1 \quad (4)$$

In the model we introduce the factor “crisis” that we assume to be constant over time. The difference is calculated:

$$(y_{i2} - y_{i1}) = \delta_0 + \beta_1 (x_{i2} - x_{i1}) + (u_{i2} - u_{i1}) \quad (5)$$

Regression model over the period 2005-2007 is not validated ($F = 1.28$, $p = 0.29$), so the relationship between environmental performance and financial performance indicators, company size and profitability doesn't exist. The regression model developed for the period 2008-2010 is not validated ($F = 0.31$, $p = 0.94$), so the relationship between environmental performance and financial performance indicators, size of company and profitability is poor. Although the result gives us the existence of a relationship between indicators study we applied the formula described above to determine the behavior of the different regression coefficients in time of financial crisis and before the crisis. The result is that the independent variables have greater values in time of crisis than in the previous period, with the exception of ROA and ROE, where the results are opposite. In the study we applied “T” test, whose result is $t = 0.86$, $p = 0.39$, so the average carbon dioxide did not differ in the two periods studied. The return due to ROE ($t = -2.1497$, $p = 0.0173$) and ROA ($t = -1.6901$, $p = 0.047$) is different between the two periods with a lower value in time of financial crisis.

The study concludes that financial performance is not associated with environmental performance. This result was also obtained on Turkish data by Al-Tuwaijri, Christensen and Hughes, 2003. The attitude of companies towards their performance is different, so we cannot sustain for sure whether or not the crisis has affected the relationship between environmental performance and the independent variables studied. Political instability and the changing of legal framework justify the firms' attitude towards environmental performance and consequently this reality it is actually drawn from the present study. Environmental performance in Romania does not take a priority focus in the companies studied.

5. Conclusions

According with the data obtained from the conducted study it is obvious that in the Romanian business environment there is no connection among the environmental and the financial performance, but the attitude regarding the environmental aspects registered a slight change during the financial crisis. We can say that maybe the companies realized the potential benefits of investing in “green” economy, such as: regaining of customers trust, positive brand name, increased financial performance and competitive advantage obtained through differentiation, benefits that on others economies were received. We consider that the lack of

transparency and credibility is an important factor that determinates the actual situation in our country regarding environmental performance that can be translated into lack of credible evidence regarding the environmental actions of the Romanian economic entities and also lack of environmental policies and local sustainability reports. The limit of our research was imposed by this factor, but there is a chance in improving this aspect due to the involvement of Green Revolution Association in Romania by measuring the environmental performance of the Romanian companies through Green Business Index, the barometer of the environmental responsibility. Our conclusions are sustained by the value of the Environmental Performance Index (EPI) that measures the impact of an organization on the natural systems registered for 2010 at 67.8, Romania ranked at 45 in the total of 163 countries analyzed.

We consider that the Romanian companies should take into consideration the medium and long term benefits of investing into environmental performance, especially in the current economic condition. Environmental performance is an important value for most successful economic entities around the world. Including the environmental aspects into their strategy assures companies' with sustainable economic success and it can be translated into the so called "sustainable management".

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