Corporate Social Responsibility and its Macroeconomic Implications

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Abstract

One of main concern of policy makers is pollution and hence the improvement of the environmental quality. The implementation of environment policies aims at improving life and product quality in order to replace those obtained by high polluting processes by less polluting ones. Countries having more strict environmental regulations are likely to suffer from a significant increase of their production costs. As a consequence these countries become less competitive on the international market and may lose their market share. In this context, an increasing attention was granted to the impact of environment policies on foreign trade. Our purpose in this paper is to investigate whether Corporate social responsibility introduced into Eastern European countries have led or not to a decline of exports towards the European Union (EU), and if so how much? This question is important since it is related to the preoccupation of EU new members to increase their exports and the quality of their products. Our econometric methodology based on recent developments of panel data techniques allow us to control for unobservable heterogeneity and hence to get robust empirical robust. Our results highlight a moderated impact of environmental regulations on foreign trade.

Keywords: *environmental regulations, trade policy, gravity equation, competitiveness*

JEL classification: C23, F13, F15, Q28

Introduction

Corporate social responsibility is essentially a concept whereby companies decide to integrate social and environmental concerns in their business operations and in their interaction with their stakeholders on a voluntary basis. Being socially responsible means not only fulfilling legislation concerning social rights or environmental standards, but also going beyond compliance and investing 'more' into human capital, the environment and the relations with stakeholders. Even if the prime responsibility of a company is generating profits these should nevertheless integrate corporate social responsibility as a strategic investment into their core business strategy, their management instruments and their operations. Moreover the business practices transparency due to the internet, the news media and the information revolution, means that for many companies, CSR, is no longer a luxury but a requirement. One of the factors that are driving this move towards corporate social responsibility is the increased concern from citizens, consumers, public authorities and investors in the context of globalization about the damage caused by economic activity to the environment. Even if in traditionally view, environmental protection has been considered to be "in the public interest" and external to private life, today the private sector becoming an active partner in environmental protection. An earlier emphasis on strict governmental regulations has ceded ground to corporate self-regulation and voluntary initiatives. As a result the environmental aspect of CSR is defined as the duty to cover the environmental implications of the company's operations, products and facilities. Many governments and businesses are now realizing that implement and manage corporate environmental responsibility can increase competitiveness.

In this paper we examine corporate social responsibility and investigate whether relatively strict environmental regulations introduced into Eastern European countries have led or not to a decline of competitiveness proxy by exports towards the European Union (EU), in the specifics conditions of Romanian economy as UE member country.

The remainder of the paper is organized as follows. Section 2 presents an overview of the main features of analyses of the environmental regulation impact on bilateral trade flows. Section 3 briefly recalls the theoretical foundations of the gravity model and the panel data methodology. Section 4 reports the empirical investigation as well as the econometric results. Section 5 finally concludes.

1. Theoretical background

The debate on the relationships between environmental regulation and competitiveness has a interesting topic of debate for long time. On the one hand, according to the classical assumption, if regulatory regimes are not able to design stringent and at same time efficient environmental regulation (e.g. historically strong emphasis on command-and-control regulation in many countries), it expected that the proportion of environmental costs to the production cost increase, and so the environmental regulations may have hardly effect on comparative advantage patterns and thus on commercial competitiveness. On the other hand the "soft" version of the "Porter hypothesis" argues that environmental progress, due the strict but efficient environmental regulations, can achieved without sacrificing competitiveness (Porter and Van der Linde, 1995). Furthermore, the "hard" version of this hypothesis emphasize that countries with forward-leaning environmental policies and programs, that suppose strict but efficient environmental regulations, actually will enhance their commercial competitiveness creating win-win situations. According to this hypothesis, strict environmental regulation (under the condition that it is efficient) triggers the discovery and introduction of cleaner technologies and environmental improvements, the innovation effect, making production processes and products more efficient. The cost savings that can be achieved are sufficient to overcompensate for both the compliance costs directly attributed to new regulations and the innovation costs.

The pivotal issue at stake is whether domestic environmental regulation impairs the competitiveness of domestic industries, especially the pollution-intensive industries. The general conclusion emerging from the literature on this topic seems to be rather uniform. Initially, in their early comprehensive account of the empirical literature, Jaffe et al. (1995, p. 157) conclude that "… overall, there is relatively little evidence to support the hypothesis that environmental regulation has a large adverse effect on competitiveness.." Evidence from recent studies suggests this conclusion should be taken with care. Recent studies do occasionally find a negative correlation between trade and environmental stringency, although the findings do not seem to be particularly robust. Recent reviews therefore continue to be cautious: "… the costs imposed by tighter pollution regulation may not be a major determinant of trade patterns" (Copeland and Taylor, 2003, p. 220; see also Mulatu, Florax and Withagen 2003).

2. Econometric approach

In the framework of this article we develop an empirical model for the analysis of the impact of formal and informal pressure on comparative advantage patterns and thus on foreign trade. We estimate this pressure by a proxy variable, the existence of important environmental pressure. In this case this variable can take two values. Therefore, the variable takes value 1 if the pressure is significant for the industry sector and it takes value 0 otherwise. It is commonly belief that the pollution-intensive industries of Romania it was the most concerned with the stringent environmental regulation.

The empirical specification is inspired by the gravity framework, previously used in cross-country studies of trade in pollution-intensive activities. An advantage of the gravity model over the earlier standard factor endowment-based studies (e.g. Tobey (1990), is that it exploits the large amount of information contained in bilateral trade flows. It was first applied by van Beers and van den Bergh (1997) on a cross section of OECD countries. This initial approach has been extended in a number of directions, including the panel dimension (Harris et al (2001)), developing countries (Cagatay and Mihci (2003) and Grether and de Melo (2004)) the role of product differentiation (Jug and Mirza (2005)) or of regional free trade agreements (Kahn and Yoshino (2004)), while the endogeneity of environmental policy has been examined in Mantovani and Vancauteren (2005).

2. 1 The gravity model (overview)

Inspired initially by the law of physics (Newton), the gravity model has become an essential tool in the simulations of international trade flows. The first applications were rather intuitive without substantial theoretical claims. These applications were the object of criticisms concerning the lack of robust theoretical foundations. Among the first studies which have used the gravity model in economic analysis we can note those by Beckerman (1956), Tinbergen (1962), Poyhonen (1963), and Linnemann (1966).

Linnemann explains trade flows between countries ***i*** and ***j*** and then defines it as a combination of three basic factors: the offer of the exporter country ***i***, the demand of the importer country ***j*** and the resistance of trade between countries ***i*** and ***j***. The potential offer of the exporter is a positive function of the income level of the exporter country which can be interpreted as a proxy of available good varieties. The potential demand of the importer country also depends positively on the income level of the importer country. The resistance of trade was approximated by geographical distance between countries ***i*** and ***j*** (proxy for the transaction costs).

Gravity models have received theoretical foundations due to the development of new international trade theories with imperfect competition. Helpman and Krugman (1985) propose a formalization of the gravity equation in which the intra-trade and inter-trade approaches are reconciled.

Bergstrand (1989) model represents an extension of Helpman and Krugman model, taking into account the offer and the demand functions in explaining trade flows. The model also includes a variable of income per capita representing the capital intensity of the exporter country and of the importer country, reflecting a relative factor endowment in terms of GDP per capita. For author, this variable is an indicator of demand sophistication. Thus, Bergstrand proposes the most complete version of the gravity model using for instance, variables like GDP, GDP per capita, distance, and monetary variables.

2.2 Econometric methodology

Most studies estimating a gravity model were carried out on cross-section data[1]. Recently several papers have argued that standard cross-section methods lead to biased results because they do not control heterogeneous trading relationships. For instance, the impacts of historical, cultural and linguistic links in trade flows are difficult to observe and to quantify, the presence of minorities, or past memberships in a common trade area can also lead to biased estimates. Panel data regressions allow to correct such effects. The use of panel data is preferred in our analysis because it allows to control specific effects. The source of potential endogeneity bias in gravity model estimations is the unobserved individual heterogeneity.

[1] See Baldwin (1994), Gros and Gonciarz (1996), Wei and Frankel (1998), Sapir (2001)

Matyas (1997) argues that the cross-section approach is affected by a problem of misspecification and consider that a correct econometric specification of gravity model is a "*three – way*" model with exporter, importer and time effects.

Egger and Pfaffermayr (2003) indicate that the omission of specific effects per country pair can bias the estimated coefficients. Thus, they propose "*two-way*" gravity model specification with time and country pairs effect when the countries are alternately importer or exporter *i.e.* $\alpha ij \neq \alpha ji$.

To control specific effects a solution is to use an estimator like in a fixed effect model (FEM) or in a random effect model (REM). However, fixed effect models (FEM) allow for unobserved or misspecified factors that simultaneously explain the trade volume between two countries and lead to unbiased and efficient results[1].

The choice of the method (FEM or REM) depends on two important things, its economic and econometric relevance. From an economic point of view there are unobservable time invariant random variables, difficult to be quantified, which may simultaneously influence some explanatory variables and trade volume. From an econometric point of view, in the gravity model explaining trade flows, the inclusion of fixed effects is preferable to random effects because the rejection of the null assumption of uncorrelation of the unobservable characteristics with some explanatory variables is less plausible (see Baier and Bergstrand 2005).

Recently Plümper and Troeger (2004) have proposed a more efficient method called "the fixed effect vector decomposition (FEVD)" to accommodate time-invariant variables. Using Monte Carlo simulations they compared the performances of the FEVD method to some other existing techniques, such as the fixed effects, or random effects, or Hausman-Taylor method. Their results indicate that the most reliable technique is the FEVD if time-invariant variables and the other variables are correlated with specific effects, which is likely to be the case in our study.

We now briefly present the panel data econometric methods used in our paper to estimate the possible various specifications of our models: within estimator (FEM), random effect estimator (REM), and fixed effect vector decomposition (FEVD).

2.2.1 Within estimator and random estimator (FEM and REM)

In the presence of correlation of the unobserved characteristics with some explanatory variables the random effect estimator leads to biased and inconsistent estimates of the parameters. To eliminate this correlation it is possible to use a traditional method called "within estimator or fixed effect estimator" which consists in transforming the data into deviations from individual means. In this case, even if a correlation between unobserved characteristics and some

[1] See for instance Matyas 1997, Festoc 1997, Egger 2002, Peridy 2006, Cheng and Wall 2005, Baier and Bergstrand (2005), Ghosh-Yamarick (2004), Carrère C. (2006), Rose (2000), Glick and Rose 2001.

explanatory variables exists, the within estimator may provide unbiased and consistent results.

The fixed effect model can be written as

$$y_{it} = \sum_{k=1}^{K} \beta_k x_{itk} + \alpha_i + u_{it}, \text{ t = 1, 2,…,T, k=1, 2,,K regressors, i=1, 2, N individuals} \quad (2)$$

where $á_i$ denotes individual effects fixed over time and u_{it} is the disturbance terms.

$$y_{it} - \bar{y}_i = \sum_{k=1}^{K} \beta_k (x_{itk} - \bar{x}_{ik}) + (u_{it} - \bar{u}_i) \quad (3)$$

In the fixed effect transformation, the unobserved effect, $á_i$, disappears and may lead to unbiased and consistent results.

The random model has the same form as before,

$$Y_{it} = â_0 + â_1 x_{it1} + â_2 x_{it2} \dots\dots\dots\dots\dots.. + â_k x_{itk} + á_i + u_{it} \quad (4)$$

where an intercept is included so that the unobserved effect, $á_i$, has a zero mean. Equation becomes a random effect model when we assume that the unobserved effect $á_i$ is uncorrelated with each explanatory variable:

$$\text{Cov}(x_{itk}, á_i) = 0, \ t = 1,2,\dots, T; \ j = 1,2,\dots, k. \quad (5)$$

The hypothesis mentioned above is actually less plausible and the GLS estimator may lead to biased results.

The Hausman (chi^2) test consists in testing the null hypothesis of no correlation between unobserved characteristics and some explanatory variables and allows us to make a choice between random estimator and within estimator.

The within estimator has however two important limits:

- it may not estimate the time invariant variables that are eliminated by data transformation;
- the fixed effect estimator ignores variations across individuals. The individual's specificities can be correlated or not with the explanatory variable. In traditional methods these correlated variables are replaced with instrumental variables uncorrelated to unobservable characteristics.

2.2.2 Fixed effect vector decomposition (FEVD)

Plümper and Troeger (2004) suggests an alternative to the estimation of time-invariant individual variables in the presence of unit effects. The alternative is a developed model discussed in Hsiao (2003: 52). It is known that unit fixed effects are a vector of the mean effect of omitted variables, including the effect of time-invariant variables. So, the unit effects of the FEM contain the vector of time-invariant variables. It is therefore possible to regress the unit effects on the time-invariant variables to obtain approximate estimates for invariant variables. Plümper uses a three stage estimator, where the second stage only aims at the identification of the unobserved parts of the unit effects, and then uses the unexplained part to obtain unbiased POLS estimates of the time-varying and time-invariant variables only at third stage. The unit effect vector is broken into two parts; a part explained by time-invariant variables and an error-term. The model proposed by Plümper and Troeger leads to unbiased and consistent estimates of the effect of time-varying variable and unbiased for time-invariant variables if the unexplained part of unit effects is uncorrelated with time-invariant variables. The estimates of time-invariant variables are consistent only if N is large. With N being small, the evaluation of stage 2 is inconsistent. This model adopts the robustness of fixed effect model and allows for the correlation between the time-variant explanatory variables with variables and unobserved individual effects. In brief, the technique fixed effect vector decomposition (FEVD) proposed by Plümper and Troeger can be summarized by the three following steps:

- estimation of the unit fixed effects by the FEM excluding the time – invariant explanatory variables;
- regression of the fixed effect vector on the time-invariant variables of the original model (by OLS);
- estimation of a pooled OLS (POLS) model by including all time-variant explanatory variables, time-invariant variables and the unexplained part of the fixed effect vector. This stage is required to control the multicolinearity and to adjust the degrees of freedom.

At least in theory this method has three obvious advantages (Plümper and Troeger, 2004):

a) the fixed effect vector decomposition does not require prior knowledge of the correlation between time-variant explanatory variables and unit specific effects,

b) the estimator relies on the robustness of the within-transformation and does not need to meet the orthogonality assumptions (for time-variant variables) of random effects,

c) *FEVD* estimator maintains the efficiency of OLS.

The FEVD is not a perfect estimator, but one of the best available. It produces unbiased estimates of time-varying variables regardless whether they are correlated with unit effects or not and unbiased estimates of time-invariant variables that are not correlated. The estimated coefficients of the time-invariable variables correlated with unit effects, however, suffer from omitted variable bias. To summarize, the FEVD produces less biased and more efficient coefficients. The main advantages of the FEVD come from its lack of bias in estimating the coefficients of time-variant variables that are correlated with unit-effects.

3. Model specification

We carry out several panel data estimations in order to compare the results across specifications and to identify the most robust one. We first make a test for individual effects and if this confirms their presence, then to control the individual effects we carry out an REM and FEM estimate. To eliminate the unobservable heterogeneity due to bilateral specific effects and avoid the potential bias of the estimators taking the invariant time variables into account it is advisable to use FEVD estimator. Hausman test indicates by the value of chi^2 whether the specific effects are correlated or not with the explanatory variables.

The specification retained here to characterize the trade between Romania and EU-15 countries can be written as follows:

$$X_{ijst} = e^{a_0} GDP_{it}^{a_1} GDP_{jt}^{a_2} Dist_{ij}^{a_3} Tchr_{ijt}^{a_4} e^{a_5 Pol_{is}} e^{u_{ij}} e^{\varepsilon_{ijt}} \qquad (12)$$

where:

X_{ijst} denotes the export of country ***i*** (Romania) from industry sector ***s*** to country ***j*** at time ***t*** with i # j (CHELEM – CEPII French data base);

GDP_{it}, GDP_{jt} represents the Gross Domestic Product of country ***i*** and country ***j*** (CHELEM CEPII – data base)

$Dist_{ij}$ represents the distance between two countries, (CEPII data base);

$Tchr_{ijt}$ is the real exchange rate which indicates the competitiveness of price;

$$Tchr_{ijt} = Tcn_{ijt} \times P_{it} / P_{jt} \qquad (14)$$

where: Tcn_{ijt} is the real exchange rate (CHELEM CEPII data base)

$P_{i(j)}$ is consumer price index (WORLD BANK – World Tables)

Pol_{is} is a dummy variable that equals 1 if the industry sector is pollutant and so it was a stringent environmental regulation as a consequence of Corporate social responsibility adoption and 0 otherwise;

a_o is the intercept;

u_{ij} individual effect;

ε_{ijt} is the error term.

After log linearization equation (14) becomes:

$$Ln(X_{ijst}) = a_0 + a_1 ln(GDP_{it}) + a_2 ln(GDP_{jt}) + a_3 ln(Dist_{ij}) + a_4 ln(Tchr_{ijt}) + + a_5 Pol_{is} + u_{ij} + \varepsilon_{ijt} \qquad (15)$$

The expected signs for the estimators associated with the variables are based on traditional arguments. Theoretically, we expect a positive effect of the variables like the country size, and a negative impact of the geographical distance and of the real exchange rate and environmental regulation. The more the real exchange rate index drops the more there is a depreciation of the exporter currency with respect to the currency of his partner and export competitiveness is improved. Geographical distance has always theoretically a negative impact being a proxy of transactional cost.

Our estimates are organized in a panel with Romania as exporter, EU-15 countries[1] as importers and 19 sectors (NC – combined nomenclature) and cover a 7 year period (from 1998 to 2004).

The results of FEM, REM, FEVD estimations are reported in table n^0.1 that summarizes the results of our estimations for the whole sample.

Table 1 The estimation results

VARIABLES	FEM	REM	FEVD
	(1)	(2)	(3)
	Xij	Xij	xij
GDP_{jt}	2.490	1.545	2.490
	(3.98)**	(11.16)**	(92.38)***
GDP_{it}	3.507	3.569	3.507
	(8.06)**	(12.31)**	(12.64)***
$TCHR_{ijt}$	-1.190	-0.016	-1.190
	(3.34)**	(0.10)	(33.20)***
$DIST_{ij}$	0.000	-1.969	-1.643
	(0.00)**	(5.52)**	(27.58)***
POL_{is}	0.000	-0.109	-0.153
	(0.00)**	(0.90)	(-7.60)***
Constant	-28.284	-17.304	-22.945
	(11.78)**	(8.91)**	(-15.82)***
Residuals	-	-	1.000
	-	-	(91.99)***
R-squared	0.15	0.34	0.91
Observations[2]	1728	1728	1728
Test for presence fixed effect Prob>F	33.25 (0.00)	-	-
Hausman	-	17.33 (0.00)	-
Absolute value of t-statistics in parentheses			
* significant at 5% level; ** significant at 1% level			

The FEM estimator indicates the presence of individual effects. It is an unbiased estimator but it is not appropriated for our analyse because the interest variable POL is time invariant variable and so it was excluded from the estimation. On the other hand REM estimator is biased due of the correlation between the

[1] Belgium and Luxembourg are treated together.
[2] Only 1728 observations are available from 1862 (19 sectors x 14 countries x 7 years)

individual effect and the explanatory variables (Hausman test reject the null hypothesis Ho: difference in coefficients not systematic).

In this case the FEVD is the most appropriated estimator for our analyses.

Conclusions

This paper studied the possible impact of environmental policy as a consequence of Corporate social responsibility adoption on Romanian international competitiveness and thus on the export flows. The stringency of environmental regulations was approximated by a dummy variable which take value 1 if the pressure is significant for the industry sector and it takes value 0 otherwise. It is commonly belief that the pollution-intensive industries of Romania it was the most concerned with the stringent environmental regulation.

The use of panel econometric method in empirical analysis of trade flows is convenient because it permits for controlling the individual heterogeneity to avoid biased results. As it is known, the time-series and cross-section, not controlling for heterogeneity, run the risk of obtaining biased results[1]. Furthermore, the fixed effects vector decomposition (FEVD) estimator allows us to obtain the unbiased, consistent and efficient results.

The results suggest that traditional variables of the gravity model confirm the expected results. Thus, we obtain a positive significant effect of the country size variables (attraction factors), and a negative significant impact of the geographical distance and of the real exchange rate (resistance factors). With regard to the environmental costs due the stringent environmental regulation we obtain a negative significant impact on the Romanian comparative advantage patterns and so on the export flows.

The negative sign for the environmental regulation variable indicate that the Porter hypothesis is not confirmed in Romanian case. That can be explained by the relatively short period of the analyses only seven years and also by the fact that the analyses period coincide with massive industries reorganization due the economic transition period.

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