

## Article

# Environmental, Social and Governance Credentials of Agricultural Companies—The Interplay with Company Size

Mirela Cristea <sup>1</sup>, Grațiela Georgiana Noja <sup>2,\*</sup>, Eleftherios Thalassinos <sup>3</sup>, Daniel Cîrciumaru <sup>1</sup>, Constantin Ștefan Ponea <sup>4</sup> and Carmen Claudia Durău <sup>5</sup>

<sup>1</sup> Department of Finance, Banking and Economic Analysis, Faculty of Economics and Business Administration, University of Craiova, 13 A I Cuza Street, 200585 Craiova, Romania; simona.cristea@edu.ucv.ro (M.C.); daniel.circiumaru@edu.ucv.ro (D.C.)

<sup>2</sup> Department of Marketing and International Economic Relations, Faculty of Economics and Business Administration, West University of Timisoara, 16 Pestalozzi Street, 300115 Timisoara, Romania

<sup>3</sup> Faculty of Maritime and Industrial Studies, University of Piraeus, 185-33 Piraeus, Greece; thalassinos@ersj.eu

<sup>4</sup> Department of Economics, Faculty of Legal, Economic and Administrative Sciences, Craiova, Spiru Haret University, 4 Vasile Conta Street, 200580 Craiova, Romania; ponea.stefan@yahoo.com

<sup>5</sup> Faculty of Agriculture, Veterinary Medicine “King Michael I of Romania”, Banat’s University of Agricultural Sciences, Calea Aradului No. 119, 300641 Timisoara, Romania; sch\_carmen\_1999@yahoo.com

\* Correspondence: gratiela.noja@e-uvt.ro

**Abstract:** Based on the significance of the corporate social responsibility (CSR) activities, respectively, the Environmental, Social and Governance (ESG) measures, for companies’ advancement in the fields of agriculture, the purpose of our study is to appraise how the ESG measures influence the size of public companies from the agricultural sectors, with particular attention on the environmental pillar. The research methodology consists in applying two econometric procedures to assess the direct effects of the ESG activities on the size of public agricultural firms by models of robust regression (RREG) and to appraise global implications of ESG measures on companies’ dimension by models of structural equations (SEM). Data encloses the ESG indicators, focusing on environmental indicators and agricultural companies’ size (proxied by total assets), extracted from the Thomson Reuters Refinitiv Eikon database for the fiscal year 2020. Main results reveal that several components of the ESG measures, especially the environmental ones, may influence the size of the agricultural companies, given the significant companies’ strengths in implementing CSR actions to ensure sustainable resource management. We propose adequate strategies for companies to provide robust resource management and proper integration of the environmental credentials.

**Keywords:** agricultural companies; environmental; social; and governance measures; resource management; the size of the companies



**Citation:** Cristea, M.; Noja, G.G.; Thalassinos, E.; Cîrciumaru, D.; Ponea, C.Ș.; Durău, C.C. Environmental, Social and Governance Credentials of Agricultural Companies—The Interplay with Company Size. *Resources* **2022**, *11*, 30. <https://doi.org/10.3390/resources11030030>

Academic Editor: Elena Tamburini

Received: 7 February 2022

Accepted: 7 March 2022

Published: 11 March 2022

**Publisher’s Note:** MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



**Copyright:** © 2022 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

## 1. Introduction

The complexity that arises between the resources used in agriculture (mainly natural resources, such as water, oil, coal, natural gas, pasture, etc.) and the products generated by the agricultural sectors (food, textiles, leather goods, and others) leads to several controversies regarding sustainable resource management and environment protection [1,2]. On the one hand, the use of natural resources brings to their decrease, which leads to solutions that ensure their sustainability, and, on the other hand, through the consumption of fossil fuels (as coal, crude oil, and natural gas), it brings a degradation of the environment by increasing CO<sub>2</sub> emissions into the atmosphere [3–5]. Without coherent agricultural strategies, focused on the environmental and governance components, but also considering the human resources involved, these controversies would be amplified and challenging to control [6,7].

Thus, the synergy between agricultural sectors and corporate social responsibility (CSR) activities is crucial, which leads a company “to develop its economic activities effectively and responsibly towards society and the environment, taking into account the interests of all stakeholders” [8] (p. 263), ensuring food safety, water and waste management, chemicals or pesticides controls and other negative externalities. Therefore, as primary drivers of CSR activities, the Environmental, Social, and Governance (ESG) should be considered and implemented by managers of agricultural companies, both for the headway to sustainable development and as a promoter of financial profitability [7,9].

Starting from the evidence provided by the literature that the size of the company has a paramount influence on CSR activities [10], the research objective of this paper is to appraise the reversed way in which the ESG measures influences the size of public companies from the agricultural sectors, with particular attention on the environmental component. Withal, our research objective accounts for a continuation of our previous research (drawn as future research direction) on the implications of the ESG measures on the financial performance of the companies [6], on the same sample of the agricultural companies (a total number of 412 companies that offer public information, namely “public companies”) with data recorded in the Thomson Reuters Refinitiv Eikon (TRRE) database [11]. The results will reveal several components of the ESG measures, especially the environmental ones, that may influence the size of the agricultural companies, both as strength and concerns/risks, given the robustness of large companies in implementing CSR actions for ensuring sustainable resource management.

Data encloses the ESG indicators, with a specific focus on the environmental pillar, on the one hand, and agricultural companies’ size, on the other hand, extracted for the fiscal year 2020. The size of the companies is followed using the total assets of companies from the agricultural fields. The research methodology is aimed at applying two econometric procedures, namely, to assess direct effects of the ESG activities on the size of public agricultural firms by models of robust regression (RREG), and to appraise global implications of ESG measures on companies’ dimension by models of structural equations (SEM).

The structure of the paper comprises an overall framework with regards to the necessity, objective, and novelty of this research, revealed by the Introduction part. Then, we summarize the relevant findings in the literature regarding the CSR/ESG significance for the agricultural sector and the relationships with the size of the agricultural companies. The considered data and methodology applied are presented further, concerning a two-fold analysis, namely direct and global implications of CSR actions on companies’ size. The results with discussions and main proposed strategies bring practical relevance to our research.

## 2. Literature Review

Making an investigation on the approach and inclusion of the concept of corporate social responsibility (CSR), Carroll [12] pointed out that, even since the 1950s, actions have paved the way for the CSR concept in its modern form. Thus, CSR emphasizes the obligations of the businessman to continuously adjust the company’s policies or strategies, which should be about social relationships. The actions/measures through which CSR is applied are the ESG dimensions, such as “ESG tends to be a more expansive terminology than CSR” [13] (p. 2).

The paramount role of the CSR actions on achieving sustainable development goals (SDGs) is recognized by the relevant literature [14,15], hence transposing the CSR concept in agriculture has become crucial for this field as an effective tool for attaining the “sustainable agricultural production, which is environmentally friendly, the welfare of farmed animals, food security as well as job creation, and the continuous development of employees” [16] (p. 21). Therefore, CSR contributes to mitigating the negative externalities in agriculture, such as genetically modified organisms, pollution, the presence of pesticide residues, greenhouse gas emissions or casualty of biodiversity [17–19].

The significance of the CSR actions, respectively, the ESG measures, on the progress of the activity of the companies accounts for an increasingly debated subject in the literature, the most research being focused on the implications on the financial performance [13,20–22], with a distinctive focus for the fields of agriculture [1,5,23]. The synergy between the size of the company and the CSR activities has been less considered in the literature so far, with some evidence for the distinctive category of companies according to their dimensions (small, medium, and large companies), regardless of their field of activity [24], or specific sectors, such as clothing business [25] in Norway, for instance. However, the companies' dimension is acknowledged as crucial and poorly explored in the literature [10,26]. As regards the measures used for the companies' size, there are many determinants, the common ones being the level of total assets, number of employees, sales, or market values [27,28].

On the direction from the size of the company's influence on CSR activities, Udayasankar [10] evidenced that large agricultural companies are more motivated to involve in such activities due to their higher financial strengths and social impact than the smaller firms. As regards CSR measures applied in agricultural sectors, the size of the companies exerts a positive influence on their CSR reporting [29], due to their interest to become involved in social, voluntary, and transparent actions, acknowledging that the final consequences of implementing of CSR actions will improve their overall performance.

The implications of ESG pillars on the value and profitability of listed agri-food companies from Europe evidenced positive impacts on profitability as regards the environmental and social measures, on the one hand, and adverse consequence of governance pillar of ESG on the value of agri-food companies, on the other hand [30].

The board governance and the activity of large agriculture companies have been studied in terms of the implications of the board models typology (traditional, management, and corporation models) on companies' performance, being evidenced that, in the case of agricultural companies from the Netherlands, companies with "corporation model have the highest asset, sales, and employee growth" [31] (p. 20). The corporation model of corporate governance is based on the fact that the board of directors also represents the supervisory committee, with a net advantage on the line of more autonomy for the management, but with the risk of favoring some parties' interests against others. That is why board governance is included in CSR actions, respectively, as ESG pillar, on the line of the following dimensions: compensation committee of human capital (employees and board), number of meetings, board gender diversity, bribery and corruption, fraud, transparency [32].

As regards the gender gap in the fields of agriculture, there are literature underpinnings that foreground the essential and manifold contributions of women in these sectors [33], along with „their unequal access to productive resources and opportunities relative to men, and the gains that could be achieved by closing the gender gap in agriculture" [34] (p. 3).

As a summary of the literature review, we bring to the fore that: the subject of the relation between ESG measures and size of the agricultural companies has been less considered for this field, thus representing a niche for deepening the research in this area; the previous studies were focused on the direction from the size of the companies to the CSR actions; there are several determinants of company size, the most used being the level of total assets; each ESG pillar may bring distinctive implications on the value of the companies, and that is why in-depth investigations on each pillar are required for further debates; the governance applied by the large agriculture companies is of a significant impact on the value of the companies (with evidence of negative implications); gender gap in agriculture is conceptualized as a paramount being highlighted "the importance of both women and men and the interplay between the two in agriculture" [34] (p. 3).

### 3. Data and Methodology

Data were extracted from the *TRRE* database [11] for one fiscal year (2020), mainly targeting ESG indicators (scoring and reporting). To measure the size of the agricultural

companies, we used total assets value, according to Hart [27] and Smyth, Boyes and Peseau [28].

The *statistical population (sample)* is set up on public companies (trading and reporting on the public market) operating in the following fields of agriculture: “agricultural chemicals; brewers; consumer goods conglomerates; department stores; distillers and wineries; environmental services and equipment; fishing and farming; food processing; food retail and distribution; forest and wood products; non-alcoholic beverages; renewable energy equipment and services; renewable fuels; restaurants and bars; tobacco; textiles and leather goods; water and related utilities” [7] (p. 482). The total number of agricultural companies that reported indicators on ESG actions is 412, with head offices in the following regions: Europe (with 330 companies from the United Kingdom, France, Germany, Denmark, Italy, and Spain); Eurasia (with 50 companies from Russia); and Africa (with 32 companies in South Africa).

We grouped the indicators extracted for the empirical analysis in 3 categories, as follows:

1. companies' size (mean): total assets (*assets*) (USD, millions);
2. ESG measures on environmental pillar (scores 1–100): total CO<sub>2</sub> equivalent emissions to revenues (*co2\_em*); targets emissions score (*targets\_em\_score*); policy emissions score (*policy\_em\_score*); environmental products score (*env\_prod\_score*); resource reduction policy score (*res\_red\_pol*);
3. governance and social pillars (employees indicators): targets diversity and opportunity score (*targets\_div\_op\_sc*) (scores 1–100); CSR strategy score (*csr\_strategy\_score*) (scores 1–100); CSR sustainability external audit score (*csr\_sust\_audit\_score*) (scores 1–100); ESG score (*esg\_score*) (scores 1–100); board size (*board\_size*) (number); board gender diversity (*board\_gender\_div*) (percent score); compensation committee independence score (*compens\_com\_indep\_score*) (scores 1–100); policy bribery and corruption score (*brib\_corrupt\_score*); CSR sustainability reporting score (*csr\_sust\_rep\_score*); bribery, corruption and fraud controversies score (*brib\_corrupt\_fraud\_score*); turnover of employees (*turnov\_empl*) (%); number of employees (*no\_empl*) (number).

Descriptive statistics of the variables included in the empirical analysis are presented in Table 1, revealing that the mean value of assets is much closer to their minimum value than the maximum one. Therefore, this research will evidence the implications of ESG measures applied on the size of the agricultural companies, with beneficial and proper solutions for sustaining the synergy between CSR-large companies, as Udayasankar [10] underlined. As regards the ESG score reported by the agricultural companies, the mean value (up to the median value) and the low standard deviation (a value of 18.38, much closer to the minimum value than the maximum one) indicates that most companies reported an average score of the ESG, which is a good starting initiative on CSR actions by the agricultural companies. On the environmental pillar, the mean of the ecology products score (28.58) is under the median band of the minimum and medium values, suggesting few initiatives implemented by the agricultural companies on this measure. The average CO<sub>2</sub> equivalent emissions to revenues is on the upper lane between the minimum and maximum values and the policy and target emissions, which would disclose good CSR strategies on this measure. Moreover, the policy for resource reduction is very well implemented, with a mean score (71.48) up to the maximum value (75.81).

The research methodology consists in applying two econometric procedures, for measuring: on the one hand, the direct impact of ESG measures undertaken on the size of public agricultural companies by applying models of robust regression (RREG); and, on the other hand, by using models of structural equations (SEM), to assess the global interlinkages (total, direct and indirect) of ESG dimensions on the size of companies in the fields associated with agriculture.

**Table 1.** Summary statistics of the indicators from the agricultural sectors.

Variables	N	Mean	Standard Deviation	Minimum	Maximum
<i>assets</i>	360	4074.23	15,328.24	0.09	188,263.10
<i>co2_em</i>	95	50.58	30.97	0.84	98.88
<i>targets_em_score</i>	117	53.44	38.17	0	89.39
<i>policy_em_score</i>	117	58.88	19.74	0	77.27
<i>res_red_pol</i>	115	71.48	12.48	6.01	75.81
<i>env_prod_score</i>	117	28.58	37.87	0	90.75
<i>targets_div_op_sc</i>	105	26.79	41.61	0	96.96
<i>brib_corrupt_score</i>	117	54.66	22.15	0	70.58
<i>csr_sust_rep_score</i>	117	53.74	15.04	0	76.97
<i>brib_corrupt_fraud_score</i>	117	50.35	24.31	0.06	62.93
<i>csr_strategy_score</i>	117	50.60	25.84	0	97.26
<i>csr_sust_audit_score</i>	70	59.84	29.21	0	86.44
<i>esg_score</i>	117	55.15	18.38	5.82	90.83
<i>board_size</i>	118	10.07	3.63	3	21
<i>board_gender_div</i>	117	46.33	28.35	1.26	95.55
<i>compens_com_indep_score</i>	101	45.97	26.86	0.35	92.68
<i>turnov_empl</i>	54	16.25	14.42	2.01	81
<i>no_empl</i>	353	18,113.73	61,025.58	0	548,143
N total	412				

Source: authors' process of data in Stata 16.

The two methods are advanced within this research endeavor firstly because they provide robust estimates considering the sample extracted, and second since they allow for adequate identification and analysis of the interlinkages among all considered variables, by controlling for other inferences in the model. Robust regression detects influential observations and corrects the outliers in the sample through two types of iterations (Huber and biweight), while the identified cases with large absolute residuals are afterward down-weighted, considering the main focus of this research and the variations within sample [35]. Furthermore, structural equation modeling (SEM) embeds a measurement model and is applied to analyze the structural relationships between considered measured variables. SEM offers the advantage to assess multiple and interrelated dependencies between the variables/indicators in a single analysis, thus providing consistency and comprehensive evaluation [36].

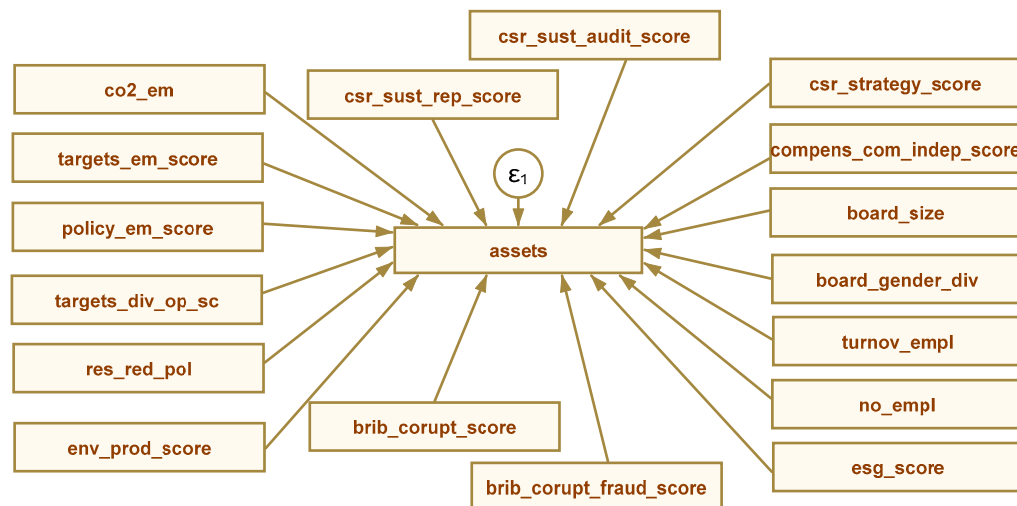
The configuration of the robust regression models is highlighted in equation 1, in which we considered as dependent variable the indicator that reveals the size of companies (total assets).

$$\begin{aligned}
 assets = & \alpha_0 + \alpha_1 co2\_em + \alpha_2 targets\_em\_score + \alpha_3 policy\_em\_score + \alpha_4 targets\_div\_op\_sc + \\
 & + \alpha_5 res\_red\_pol + \alpha_6 env\_prod\_score + \alpha_7 csr\_sust\_rep\_score + \alpha_8 csr\_sus\_audit\_score + \\
 & + \alpha_9 brib\_corrupt\_score + \alpha_{10} brib\_corrupt\_fraud\_score + \alpha_{11} compens\_com\_indep\_score + \\
 & + \alpha_{12} csr\_strategy\_score + \alpha_{13} board\_size + \alpha_{14} board\_gender\_div + \alpha_{15} turnov\_empl + \\
 & + \alpha_{16} no\_empl + \alpha_{17} esg\_score + \theta_i + \varepsilon
 \end{aligned}
 \tag{1}$$

where: "*assets*—total assets of the company; *co2\_em*—total CO<sub>2</sub> equivalent emissions to revenues; *targets\_em\_score*—targets emissions score; *policy\_em\_score*—policy emissions score; *targets\_div\_op\_sc*—targets diversity and opportunity score; *res\_red\_pol*—resource reduction policy score; *env\_prod\_score*—environmental products score; *csr\_sust\_rep\_score*—CSR sustainability reporting score; *csr\_sus\_audit\_score*—CSR sustainability external audit score; *brib\_corrupt\_score*—policy bribery and corruption score; *brib\_corrupt\_fraud\_score*—bribery, corruption and fraud controversies score; *compens\_com\_indep\_score*—compensation committee independence score; *csr\_strategy\_score*—CSR strategy score; *board\_size*—board size; *board\_gender\_div*—board gender diversity; *turnov\_empl*—turnover of employees; *no\_empl*—

number of employees; *esg\_score*—ESG score;  $\theta_t$ —variable that captures the country effects;  $\epsilon$ —error term (residual variable)”.

Models of structural equation (SEM), processed through the maximum likelihood estimation (MLE) method, are graphically introduced in Figure 1.



**Figure 1.** General SEM configuration for measuring the interdependencies between the ESG dimensions on the size of companies in the fields associated with agriculture. Source: authors’ contribution in Stata 16.

The research hypotheses are:

**Hypothesis 1 (H1).** *There are significant direct influences of the environmental ESG actions on the size of companies in the fields of agriculture, jointly with social and governance ESG factors of influence;*

**Hypothesis 2 (H2).** *There are significant global interlinkages of the environmental ESG actions on the size of agricultural companies, jointly with social and governance ESG factors of influence.*

#### 4. Results and Discussion

For assessing the first hypothesis, H1: There are significant direct influences of the environmental ESG actions on the size of companies in the fields of agriculture, jointly with social and governance ESG factors of influence, we applied the model of robust regression (RREG) described in the Equation (1), whose results are enclosed in model 1, Table 2.

**Table 2.** Results of econometric models, robust regression (RREG), and structural equation model (SEM)—dependent variable *assets*.

Variables	RREG (Model 1)	SEM (Model 2)
<i>co2_em</i>	299.9 *** (30.75)	−161.0 (130.6)
<i>targets_em_score</i>	−57.20 * (24.11)	−45.58 (123.1)
<i>policy_em_score</i>	1637.1 *** (209.7)	−2176.7 ** (839.6)
<i>targets_div_op_sc</i>	39.16 (25.20)	−254.7 * (101.1)
<i>res_red_pol</i>	−10,179.2 ** (2189.1)	7436.8 (10,720.6)

Table 2. Cont.

Variables	RREG (Model 1)	SEM (Model 2)
<i>env_prod_score</i>	187.5 *** (25.13)	124.5 (100.7)
<i>csr_sust_rep_score</i>	−4042.9 *** (616.9)	1900.5 (2456.1)
<i>csr_sust_audit_score</i>	267.3 *** (34.68)	11.70 (168.3)
<i>brib_corrupt_score</i>	−1186.4 *** (212.2)	−191.6 (313.7)
<i>brib_corrupt_fraud_score</i>	168.8 ** (33.74)	−10.02 (148.3)
<i>compens_com_indep_score</i>	160.2 ** (31.82)	79.40 (155.3)
<i>csr_strategy_score</i>	120.7 * (48.99)	−328.8 (227.7)
<i>board_size</i>	−2817.0 *** (316.2)	117.7 (1272.3)
<i>board_gender_div</i>	−334.4 *** (39.13)	−113.5 (161.4)
<i>turnov_empl</i>	−902.6 *** (163.8)	−1607.3 * (661.6)
<i>no_empl</i>	0.172 *** (0.0214)	0.216 *** (0.0546)
<i>esg_score</i>	1044.8 *** (95.43)	1551.2 *** (430.3)
<i>_cons</i>	898,708.2 *** (171,176.3)	−538,788.4 (824,797.4)
<i>var(e.assets)</i>		177,295,112.8 *** (46,559,977.6)
N	26	26
R <sup>2</sup>	0.996	−

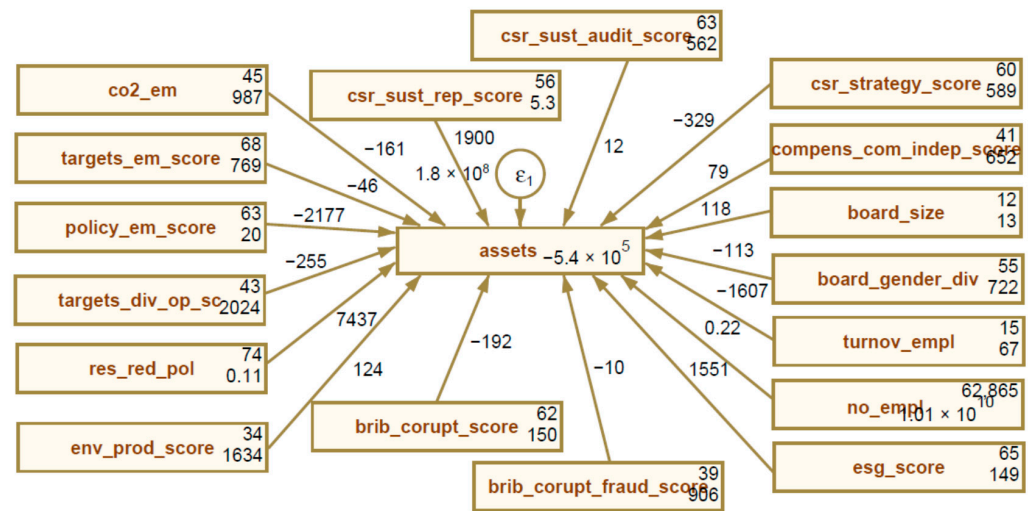
Note: Standard errors in parentheses: \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ . Source: authors' contribution

Then, we built the structural equations model (SEM) to appraise our second hypothesis, H2: There are significant global interlinkages of the environmental ESG actions on the size of agricultural companies, jointly with social and governance ESG factors of influence. SEM results are graphically represented in Figure 2 and detailed in model 2, Table 2.

The results for RREG (model 1 in Table 2) reveal a very good association among variables ( $R^2 = 0.996$ ), which suggests that the dependent variables (assets) can be explained to a considerable extent by the considered independent variables.

The structural equations (SEM) model was built using the MLE method, with missing values, as some indicators do not have values for all the agricultural companies. To validate the SEM results, we firstly applied a series of specific tests, such as: Alpha Cronbach for scale reliability (Appendix A, Table A1), which displays very good reliability (total scale value for Alpha is 0.7135), Wald test for equations ( $\chi^2 = 110.92$ ,  $p = 0.000$ ,  $df = 17$ ), and Goodness of fit tests for robustness check (Appendix A, Table A2), which comprise a very good association among variables revealed by the coefficient of determination (CD) (0.793) and the standardized root mean squared residual (SRMR = 0.000).

**The RREG results** (model 1, Table 2) evidenced that the dimension of public companies from agricultural sectors, measured by total assets, was positively and statistically significant influenced by the following environmental ESG actions and measures: CO<sub>2</sub> emissions to revenues (*co2\_em*), policy emissions implemented (*policy\_em\_score*) and the score of environmental products (*env\_prod\_score*). Unfavorable direct influences on assets were exerted by the targets emissions (*targets\_em\_score*) and the policy for resources reduction (*res\_red\_pol*).



**Figure 2.** SEM results for measuring the interdependencies between the size of the ESG measures on the size (*assets*) of companies in the fields of agriculture. Source: authors’ contribution in Stata 16.

Regarding direct influences on assets of governance ESG actions, favorable and statistically significant impacts were obtained by the following scores: CSR sustainability external audit (*csr\_sust\_audit\_score*), bribery, corruption and fraud controversies (*brib\_corrupt\_fraud\_score*), CSR strategy (*csr\_strategy\_score*), compensation committee independence (*compens\_com\_indep\_score*), and total ESG score (*esg\_score*). Unfavorable direct impacts (and statistically significant) were obtained by the CSR sustainability reporting score (*csr\_sust\_rep\_score*): policy bribery and corruption score (*brib\_corrupt\_score*), the size of the board (*board\_size*) and gender diversity of the board (*board\_gender\_div*). Compared with the results obtained in the literature, we have limited findings that evidenced that the overall impact of the governance pillar of ESG on the value of agri-food companies is negative, as Conca et al. [30] suggested. The positive impact on the assets of the agricultural board governance is given when the corporation model of corporate governance is considered, as Bijman, Hendrikse and Van Oijen [31] highlighted for the large agricultural companies from the Netherlands.

From the social pillar of ESG (employees’ indicators), the size of the agricultural companies was directly influenced by the following determinants: the number of employees (*no\_empl*), as favorable impact, and turnover of employees (*turnov\_empl*), as unfavorable impact.

Therefore, our first hypothesis, H1: There are significant direct influences of the environmental ESG actions on the size of companies in the fields of agriculture, jointly with social and governance ESG factors of influence, is partially fulfilled, with differentiated implications of the variables.

When overall influences on assets were assessed, **the SEM results** revealed that, from the environmental ESG pillar (Figure 2 and model 2, Table 2), the single influence, significant from the statistical point of view, was exerted only by the policy emissions implemented (*policy\_em\_score*), opposite to RREG results (when the direct influence was favorable).

As regards the global influences of governance and social pillars of the ESG, assessed by SEM (Figure 2, and model 2 from Table 2), it can be observed that the size of companies from the fields of agriculture was also favorably influenced (positive and statistically significant coefficients) by the following variables: total ESG score (*esg\_score*) and the number of employees (*no\_empl*). Unfavorable implications on the size of companies in agriculture are manifested by the following factors: targets diversity and opportunity score (*targets\_div\_op\_sc*) and the output of employees revealed by the turnover obtained (*turnov\_empl*).

As such, the second hypothesis, H2: There are significant global interlinkages of the environmental ESG actions on the size of companies in agriculture, jointly with social and



governance ESG factors of influence, is partially fulfilled, with differentiated implications of the variables, which is why specific strategies are recommended.

To summarize, the size of public companies in the fields of agriculture, both in terms of their *direct implications, but also in their overall interdependence*, is associated with risks related to its impact in terms of targets set for CO<sub>2</sub> emissions, policies for resources mitigation, CSR sustainability reporting, targets diversity and opportunity, policies for bribery and corruption, the size of the board, gender diversity of the board, and turnover of employees.

## 5. Conclusions

Given the CSR support for sustainable development that embraces the three pillars of environmental protection, social responsibility, and economic development [37] and the crucial role played by the agriculture sectors for attaining the SDGs, in this paper, we have assessed the ESG implications, with a specific focus on the environmental dimensions, on the size of the agricultural companies. We have considered the necessity for strengthening the small and medium agricultural companies to support CSR actions, given the large companies' drive to implement the CSR actions for ensuring sustainable resource management, as Udayasankar [10] also evidenced. We have assessed two research hypotheses concerning direct (H1) and global influences (H2) of the environmental ESG actions on the companies' size in the fields of agriculture, jointly with social and governance ESG factors of influence.

The results obtained through the two hypotheses reveal, on the one hand, the components of the ESG measures that have acted as strength for the size of the agricultural companies, namely: total ESG score obtained; the score of environmental products; the overall CSR strategy applied; the external audit for CSR sustainability; controversies for bribery, corruption and fraud; the independence of compensation committee, and the number of employees. These factors should be further embedded in strategies developed by agricultural companies that can manage to sustain the total assets of the companies. On the other hand, based on the concerns/risks that were evidenced by negative implications of ESG measures on the total assets of agricultural companies, we propose the following strategies and policies for the agricultural companies: readjustment measures for reflected in targets set for CO<sub>2</sub> emissions, in agreement with CSR actions for environmental protection, as Juríčková et al. [2] also underlined for agricultural companies from Slovakia; adapting the policies for resources mitigation, given the role of agriculture in consumption and supply of resources with many controversies that arise, according also to Carlson et al. [1] and Juríčková et al. [2]; stating CSR reporting regulations by the policymakers "about what items should be disclosed in the annual report (...) increasing the extent of CSR reporting should be done", as Ika et al. [29] (p. 6) also highlighted for agriculture companies from Indonesia, jointly with widely applying the digital innovations for better transparency of CSR reporting, as Pirtea et al. [7] also mentioned; using policies for a better governance of the agricultural companies setting targets for diversity and opportunity, but also policies for bribery and corruption; the effectiveness of the size of the board, considering the corporation model that may "have the highest asset, sales, and employee growth" [31] (p. 20); taking into consideration the inclusion of women on the board, being revealed that the presence of women on the board could influence "better decision making process, different attitude toward risk and more diversified skills used" [32] (p. 16); increasing the turnover of employees by applying technological innovations, with the implications also on the financial performance of the companies.

The main limitations of our research consist in missing data for some indicators reported by the agricultural companies in the TRRE database also low data availability for applying the methodology for time series analysis. Future research directions are set on a specific analysis for certain regions and countries, given the cultural implications on companies' behavior and the COVID-19 outbreak inferences on the human resources (board and employees) health and life expectancy.

**Author Contributions:** Conceptualization, M.C., G.G.N. and E.T.; methodology, G.G.N.; software, G.G.N.; validation, M.C., G.G.N., E.T. and D.C.; formal analysis, G.G.N., M.C. and D.C.; investigation, M.C., G.G.N., D.C., C.S.P. and C.C.D.; resources, D.C., C.S.P. and C.C.D.; data curation, G.G.N. and M.C.; writing—original draft preparation, M.C., G.G.N., D.C., C.S.P. and C.C.D.; writing—review and editing, M.C., G.G.N. and E.T.; visualization, G.G.N., M.C. and E.T; supervision, E.T.; All authors have read and agreed to the published version of the manuscript.

**Funding:** This research received no external funding.

**Institutional Review Board Statement:** Not applicable.

**Informed Consent Statement:** Not applicable.

**Data Availability Statement:** Not applicable.

**Conflicts of Interest:** The authors declare no conflict of interest.

## Appendix A

**Table A1.** Cronbach’s alpha for the SEM (model 2).

Item	Obs	Sign	Item-Test Correlation	Item-Rest Correlation	Average Interitem Correlation	Alpha
assets	360	+	0.7353	0.6063	0.1006	0.6553
co2_em	95	+	0.3469	0.2196	0.1263	0.7108
targets_em_score	117	−	0.4871	0.3752	0.1171	0.6928
policy_em_score	117	+	−0.1998	−0.3315	0.1576	0.7608
targets_div_op_sc	105	−	0.6060	0.5108	0.1125	0.6830
res_red_pol	115	+	−0.1954	−0.3417	0.1571	0.7600
brib_corrupt_score	117	+	0.3939	0.2672	0.1237	0.7058
csr_sust_rep_score	117	+	0.3920	0.2538	0.1248	0.7080
csr_strategy_score	117	+	0.6045	0.5104	0.1111	0.6799
compens_com_indep_score	101	+	0.2674	0.1421	0.1286	0.7150
board_size	118	+	0.6017	0.5079	0.1104	0.6783
board_gender_div	117	+	0.4781	0.3679	0.1173	0.6932
turnov_empl	54	+	0.0488	−0.114	0.1321	0.7213
env_prod_score	117	+	0.3941	0.2762	0.1220	0.7026
no_empl	353	+	0.6344	0.5015	0.1088	0.6748
csr_sust_audit_score	70	−	0.3697	0.2441	0.1234	0.7053
brib_corrupt_fraud_score	117	+	0.5529	0.4559	0.1140	0.6863
esg_score	117	+	0.7892	0.7278	0.0994	0.6523
Total scale					0.1216	0.7135

Source: Authors’ contribution in Stata.

**Table A2.** Goodness-of-fit tests for the SEM (model 2).

Explanations	SEM
Likelihood ratio	
Baseline vs. saturated $\chi^2_{bs}$ (24)	45.639
$p > \chi^2$	0.000
Information criteria	
AIC (Akaike’s information criterion)	4832.509
BIC (Bayesian information criterion)	4857.121
Baseline comparison	
CFI (Comparative fit index)	1.000
Size of residuals	
CD (Coefficient of determination)	0.793
SRMR (Standardized root mean squared residual)	0.000

Source: Authors’ contribution in Stata.

## References

1. Carlson, G.A.; Zilberman, D.; Miranowski, J.A. *Agricultural and Environmental Resource Economics (No. P01 C284a)*; Oxford University Press: New York, NY, USA, 1993.
2. Juričková, Z.; Lušňáková, Z.; Hallová, M.; Horská, E.; Hudáková, M. Environmental impacts and attitudes of agricultural enterprises for environmental protection and sustainable development. *Agriculture* **2020**, *10*, 440. [CrossRef]
3. Osteen, C.; Gottlieb, J.; Vasavada, U. *Agricultural Resources and Environmental Indicators*; United States Department of Agriculture, Economic Research Service, Economic Information Bulletin No. 98; USDA: Washington, DC, USA, 2012. [CrossRef]
4. Schaller, N. The concept of agricultural sustainability. *Agric. Ecosyst. Environ.* **1993**, *46*, 89–97. [CrossRef]
5. Fortunati, S.; Morea, D.; Mosconi, E.M. Circular economy and corporate social responsibility in the agricultural system: Cases study of the Italian agri-food industry. *Agric. Econ.* **2020**, *66*, 489–498. [CrossRef]
6. Hellerstein, D.; Vilorio, D.; Ribauda, M. *Agricultural Resources and Environmental Indicators, 2019*. United States Department of Agriculture, Economic Research Service, Economic Information Bulletin No. 208. May 2019. Available online: <https://www.ers.usda.gov/webdocs/publications/93026/eib-208.pdf?v=9625> (accessed on 22 January 2022).
7. Pirtea, M.G.; Noja, G.G.; Cristea, M.; Panait, M. Interplay between environmental, social and governance coordinates and the financial performance of agricultural companies. *Agric. Econ.* **2021**, *67*, 479–490. [CrossRef]
8. Vrabcová, P.; Urbancová, H. Approaches of selected organisations in the Czech Republic to promoting the concept of sustainable development and corporate social responsibility. *Agric. Econ.* **2021**, *67*, 255–265. [CrossRef]
9. Roudaki, J. Corporate governance structures and firm performance in large agriculture companies in New Zealand. *Corp. Gov.-Int. J. Bus. Soc.* **2018**, *18*, 987–1006. [CrossRef]
10. Udayasankar, K. Corporate social responsibility and firm size. *J. Bus. Ethics* **2008**, *83*, 167–175. [CrossRef]
11. Thomson Reuters. 2020 Refinitiv Eikon Database. 2021. Available online: <https://www.refinitiv.com/en/financial-data> (accessed on 22 August 2021).
12. Carroll, A.B. Corporate social responsibility: Evolution of a definitional construct. *Bus. Soc.* **1999**, *38*, 268–295. [CrossRef]
13. Gillan, S.L.; Koch, A.; Starks, L.T. Firms and social responsibility: A review of ESG and CSR research in corporate finance. *J. Corp. Financ.* **2021**, *66*, 101889. [CrossRef]
14. Schönherr, N.; Findler, F.; Martinuzzi, A. Exploring the interface of CSR and the sustainable development goals. *Transnatl. Corp.* **2017**, *24*, 33–47. [CrossRef]
15. Moon, J. The contribution of corporate social responsibility to sustainable development. *Sustain. Dev.* **2007**, *15*, 296–306. [CrossRef]
16. Mazur-Wierzbicka, E. The application of corporate social responsibility in European agriculture. *Misc. Geogr.* **2015**, *19*, 19–23. [CrossRef]
17. Pretty, J.; Brett, C.; Gee, D.; Hine, R.; Mason, C.; Morison, J.; Rayment, M.; van der Bijl, G.; Dobbs, T. Policy challenges and priorities for internalizing the externalities of modern agriculture. *J. Environ. Plan. Manag.* **2001**, *44*, 263–283. [CrossRef]
18. Lewis, D.J.; Barham, B.L.; Zimmerer, K.S. Spatial externalities in agriculture: Empirical analysis, statistical identification, and policy implications. *World Dev.* **2008**, *36*, 1813–1829. [CrossRef]
19. de Olde, E.M.; Valentinov, V. The moral complexity of agriculture: A challenge for Corporate Social Responsibility. *J. Agric. Environ. Ethics* **2019**, *32*, 413–430. [CrossRef]
20. Noja, G.G.; Thalassinos, E.; Cristea, M.; Grecu, I.M. The interplay between board characteristics, financial performance, and risk management disclosure in the financial services sector: New empirical evidence from Europe. *J. Risk Financ. Manag.* **2021**, *14*, 79. [CrossRef]
21. Sighiea, M.; Siminica, M.; Cristea, M.; Noja, G.G.; Circiumaru, D. Materiality conditions in the interplay between environment and financial performance: A graphical modeling approach for EEA oil and gas companies. *Complexity* **2021**, *2021*, 7380759. [CrossRef]
22. Noja, G.G.; Cristea, M.; Banaduc, I.; Preda, G.; Ponea, C.S. The role of employee diversity, inclusion and development for socially responsible management strategies and financial performance of European companies. In *Decision-Making in Management, Methods and Behavioral Tools. CME 2019. Contributions to Management Science*; Nermend, K., Łatuszyńska, M., Thalassinos, E., Eds.; Springer: Cham, Switzerland, 2019; pp. 313–335. [CrossRef]
23. Weber, O.; Saunders-Hogberg, G. Corporate social responsibility, water management, and financial performance in the food and beverage industry. *Corp. Soc. Responsib. Environ. Manag.* **2020**, *27*, 1937–1946. [CrossRef]
24. Zbucnea, A.; Pinzaru, F. Tailoring CSR strategy to company size? *Manag. Dyn. Knowl. Econ.* **2017**, *5*, 415–437. [CrossRef]
25. Laudal, T. Drivers and barriers of CSR and the size and internationalization of firms. *Soc. Responsib. J.* **2011**, *7*, 234–256. [CrossRef]
26. Madden, K.; Scaife, W.; Crissman, K. How and why small to medium-size enterprises (SMEs) engage with their communities: An Australian study. *Int. J. Nonprofit Volunt. Sect. Mark.* **2006**, *11*, 49–60. [CrossRef]
27. Hart, P.E. (Ed.) Growth and the size of firm. In *Economic Studies in Profit, Business Saving and Investment in the United Kingdom 1920–1962*, 1st ed.; Routledge: London, UK, 1965; pp. 150–180. [CrossRef]
28. Smyth, D.J.; Boyes, W.J.; Peseau, D.E. The measurement of firm size: Theory and evidence for the United States and the United Kingdom. *Rev. Econ. Stat.* **1975**, *57*, 111–114. [CrossRef]
29. Ika, S.R.; Akbar, F.A.; Puspitasari, D.; Sumbodo, B.T.; Widagdo, A.K. Corporate Social Responsibility Reporting of Agriculture Companies: Evidence from Indonesia. In *Proceedings of the IOP Conference Series: Earth and Environmental Science, International Conference on Sustainable Utilization of Natural Resources, Ambon, Indonesia, 28 November 2020*. [CrossRef]

30. Conca, L.; Manta, F.; Morrone, D.; Toma, P. The impact of direct environmental, social, and governance reporting: Empirical evidence in European-listed companies in the agri-food sector. *Bus. Strateg. Environ.* **2021**, *30*, 1080–1093. [CrossRef]
31. Bijman, J.; Hendrikse, G.; van Oijen, A. Accommodating two worlds in one organisation: Changing board models in agricultural cooperatives. *Manag. Decis. Econ.* **2013**, *34*, 204–217. [CrossRef]
32. Refinitiv Eikon, February 2021. Environmental, Social and Governance Scores from Refinitiv. Available online: [https://www.refinitiv.com/content/dam/marketing/en\\_us/documents/methodology/refinitiv-esg-scores-methodology.pdf](https://www.refinitiv.com/content/dam/marketing/en_us/documents/methodology/refinitiv-esg-scores-methodology.pdf) (accessed on 15 October 2021).
33. Knežević, G.; Pavlović, V.; Bojičić, R. Does the board gender diversity impact financial performance in agriculture? Case of Serbian agriculture companies listed on stock exchange. *Custos Agronegocio Line* **2017**, *13*, 2–20.
34. Quisumbing, A.R.; Meinzen-Dick, R.; Raney, T.L.; Croppenstedt, A.; Behrman, J.A.; Peterman, A. (Eds.) Closing the knowledge gap on gender in agriculture. In *Gender in Agriculture*; Springer: Dordrecht, The Netherlands, 2014; pp. 3–27. [CrossRef]
35. Simpson, J.R.; Montgomery, D. A performance-based assessment of robust regression methods. *Com. Stat.-Simul. Comput.* **1998**, *27*, 1031–1049. [CrossRef]
36. Yuan, K.-H.; Lu, L. SEM with missing data and unknown population using two-stage ML: Theory and its application. *Multivar. Beh. Res.* **2008**, *62*, 621–652. [CrossRef]
37. White, P. Building a sustainability strategy into the business. *Corp. Gov.-Int. J. Bus. Soc.* **2009**, *9*, 386–394. [CrossRef]