UNIVERSITÀ DEGLI STUDI DI PADOVA

DIPARTIMENTO DI SCIENZE ECONOMICHE E AZIENDALI "MARCO FANNO"

The impact of ESG Score on Financial Performance and Risk: an Italian scenario

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Master's Degree in
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Introduction of the Topic

Centrality of the Sustainability topics among the economy and our lives

Italy and NextGenerationEu

General Benefits of pursuing Sustainable Goals

Effects of Sustainable Business on Firms' Financial Structure

Research Questions

- **Hypothesis 1:** Corporate Sustainability (measured with ESG Score) has a positive effect on firms' Financial Risk.

- **Hypothesis 2:** Corporate Sustainability (measured with ESG Score) has a positive effect on firms' Financial Performance.

- **Further Focus:** The impact of the single components of ESG Score (namely Environmental, Social and Governance Score) to the dependent variables

Literature Review

Authors' Name	Year	Focus	Results
Piers Weston; Matthias Nnadi	2021	*Evaluation of strategic and financial variables of corporate sustainability and ESG policies on corporate finance performance*	No inherent financial benefits (=)
Sang Kim; Zhichuan (Frank) Li	2021	*Understanding the Impact of ESG Practices in Corporate Finance*	ESG – Profitability: ESG-Score (+) and G-Score (+) ESG – Credit Risk: ESG-Score (+), S-Score (+) and G-Score (+). E-Score (-)
Indarawati Tarmuji; Ruhanita Maelah; Nor Habibah Tarmuji	2016	*The Impact of ESG Practices on Economic Performance: Evidence from ESG Score*	ESG – Profitability: ESG-Score (+) and S-Score (+)
Aslan, A.; Poppe, L.; Posch	2021	*Are Sustainable Companies More Likely to Default? Evidence from the Dynamics between Credit and ESG Ratings*	ESG – Risk: ESG-Score (+), S-Score (+)
Sassen R.; Hinze A.K.; Hardeck I.	2016	*Impact of ESG factors on firm risk in Europe*	ESG – Risk: ESG-Score (+)
Devalle A.; Fiandrino S.; Cantino V.	2017	*The Linkage between ESG Performance and Credit Ratings: A Firm-Level Perspective Analysis*	ESG – Credit Ratings: ESG-Score (+)
Chodnicka-Jaworska, Patrycja	2021	*ESG as a Measure of Credit Ratings*	ESG – Credit Ratings: ESG-Score (+), E-Score (+)
Attig N.; El Ghoul S.; Guedhami O.; Suh J.	2013	*Corporate Social Responsibility and Credit Ratings*	CSR – Credit Ratings (+)
Ziegler A.; Rennings K.; Schroder M.	2021	*The Effect of Environmental and Social Performance on the Shareholder Value of European Stock Corporations*	ESG – Stock Returns: E-Score (+), S-Score (-)

Sample Selection

Data Sample:

- FTSE MIB – 40 leading firms of the Italian Stock Market
- 7-years Time Window: from 2015 to 2021
- Yearly Data

Data Source:

Refinitiv Eikon – Thomson Reuters:

- Asset 4 → ESG Data
- Credit Ratings
- Accounting Data → Financial Statement
- Ratio → Financial Statement and Key Ratios Metrics

Variables

DEPENDENT VARIABLES	INDEPENDENT VARIABLES	CONTROL VARIABLES
❖ Credit Rating (Financial Risk) ❖ ROA (Financial Performance)	❖ ESG Score ❖ Environmental Score ❖ Social Score ❖ Governance Score	❖ Size ❖ Total Equity ❖ Total Revenue ❖ Debt/Equity Ratio ❖ Quick Ratio

Dataset

- Removing financials companies

- Address to the lack of data

- Conversion of Credit Rating

- 1-year lag of ESG data

- Framework (Order of Dataset, Software)

Companies	Variables
Firm 1 - 2015	Variables
…	…
Firm 1 - 2021	Variables
…	
…	
Firm 28 - 2015	Variables
…	…
Firm 28 - 2021	Variables

Methodology – Econometric Models

Panel Data Analysis:

- Advantages:
  - Larger capacity to reflect the complexity of entities behavior
  - Entities observed across time
  - Smoother statistical calculation and inference

- Disadvantages:
  - Autocorrelation
  - Endogeneity
  - Temporal Independencies
  - Resources Intensive
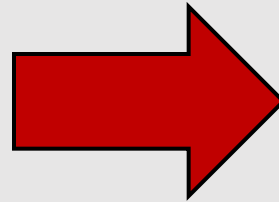
Models Implied:

- ❖ **Pooled OLS**
- ❖ **Random Effects Model**
- ❖ **Fixed Effects Model**

Methodology – Pooled OLS Regressions

Risk Regression:

I. $Credit\ Rating_{it} = \beta_0 + \boldsymbol{\beta_1 ESG - Score_{it}} + \beta_2 ROA_{it} + \beta_3 Quick\ Ratio_{it} + \beta_4 Debt\ Ratio_{it} + \beta_5 Tot.Equity_{it} + \beta_6 Size_{it} + \beta_7 Tot.Revenue_{it} + \beta_t Year_t + u_{it}$

Performance Regression:

II. $ROA_{it} = \beta_0 + \boldsymbol{\beta_1 ESG - Score_{it}} + \beta_2 Quick\ Ratio_{it} + \beta_3 Debt\ Ratio_{it} + \beta_4 Tot.Equity_{it} + \beta_5 Size_{it} + \beta_6 Tot.Revenue_{it} + \beta_t Year_t + u_{it}$

Where:
- β_0 is the constant term
- $\beta_1 \dots \beta_k$ (k = 1 … 6/7/8/9) are the coefficients of the Independent Variables
- $Year_t$ is the dummy variable for Year t
- β_t is the coefficient for the dummy variable for Year t
- $i = 1, \dots 28$
- $t = 2015, \dots 2021$
- u_{it} is the error term

Methodology – Random Effects Regressions

Risk Regression:

I. $\boldsymbol{Credit\ Rating_{it}} = \boldsymbol{\beta_1 ESG-Score_{it}} + \beta_2 ROA_{it} + \beta_3 Quick\ Ratio_{it} + \beta_4 Debt\ Ratio_{it} + \beta_5 Tot.Equity_{it} + \beta_6 Size_{it} + \beta_7 Tot.Revenue_{it} + \beta_t Year_t + u_i + \varepsilon_{it}$

Performance Regression:

II. $\boldsymbol{ROA_{it}} = \boldsymbol{\beta_1 ESG-Score_{it}} + \beta_2 Quick\ Ratio_{it} + \beta_3 Debt\ Ratio_{it} + \beta_4 Tot.Equity_{it} + \beta_5 Size_{it} + \beta_6 Tot.Revenue_{it} + \beta_t Year_t + u_i + \varepsilon_{it}$

Where:
- $\beta_1 \ldots \beta_k$ (k = 1 … 6/7/8/9) are the coefficients of the Independent Variables
- $Year_t$ is the dummy variable for Year t
- β_t is the coefficient for the dummy variable for Year t
- $i = 1, \ldots 28$
- $t = 2015, \ldots 2021$
- ε_{it} is the balance amount of error from all other sources introduced for unit i at time period t.
- u_i is the variance introduced by the unit-specific effect for unit i. Notice that it lacks the time subscript t as it is assumed to be constant across all time periods in the data panel (a.k.a. time invariant)

Methodology – Fixed Effects Regressions

Risk Regression:

I. $\boldsymbol{Credit\ Rating_{it}} = \boldsymbol{\beta_1 ESG - Score_{it}} + \beta_2 ROA_{it} + \beta_3 Quick\ Ratio_{it} + \beta_4 Debt\ Ratio_{it} + \beta_5 Tot.Equity_{it} + \beta_6 Size_{it} + \beta_7 Tot.Revenue_{it} + \beta_t Year_t + \alpha_i + u_{it}$

Performance Regression:

II. $\boldsymbol{ROA_{it}} = \boldsymbol{\beta_1 ESG - Score_{it}} + \beta_2 Quick\ Ratio_{it} + \beta_3 Debt\ Ratio_{it} + \beta_4 Tot.Equity_{it} + \beta_5 Size_{it} + \beta_6 Tot.Revenue_{it} + \beta_t Year_t + \alpha_i + u_{it}$

Where:
- $\beta_1 \dots \beta_k$ (k = 1 … 6/7/8/9) are the coefficients of the Independent Variables
- $Year_t$ is the dummy variable for Year t
- β_t is the coefficient for the dummy variable for Year t
- $i = 1, \dots 28$
- $t = 2015, \dots 2021$
- α_i is the unknown intercept for each entity
- u_{it} is the error term

Results – Financial Risk Regression (ESG Score)

Variables	Dependent Variable: Credit Rating		
	Pooled OLS	**Random Effects**	**Fixed Effects**
ESG – Score	0.1115 (0.0701)	0.0618 (0.0868)	0.0677 (0.0979)
ROA	0.4133 *** (0.0698)	0.1723 ** (0.0858)	0.1134 ** (0.0549)
Debt/Eq. Ratio	-0.0385 (0.0678)	-0.0057 ** (0.0028)	-0.0244 ** (0.0122)
Quick Ratio	0.2582 *** (0.0572)	0.6932 (0.8107)	0.0272 (0.0277)
Tot. Revenue	-0.2284 (0.0947)	0.0816 (0.1718)	0.0914 (0.2611)
Size	-0.3157 *** (0.1180)	-0.7731 *** (0.1641)	-1.1664 *** (0.2370)
Tot. Equity	0.3281 *** (0.1026)	0.3646 *** (0.1428)	0.3783 *** (0.1680)

Main Findings:

- ESG-Score positive effects but not significant
- ROA (+)
- Total Equity (+)
- Size (-)
- Debt/Equity (-) – RE and FE
- Quick Ratio (+) – OLS

Results – Financial Risk Regression (E, S, G Scores)

Variables	Dependent Variable: Credit Rating		
	Pooled OLS	**Random Effects**	**Fixed Effects**
E – Score	-0.2042 ** (0.0949)	-0.0915 (0.1158)	-0.1158 (0.1330)
S – Score	0.1222 (0.0954)	0.1273 ** (0.0637)	0.1198 (0.0908)
G – Score	-0.0879 (0.0627)	0.0001 (0.0476)	0.0386 (0.0627)
ROA	0.4324 *** (0.0703)	0.1721 ** (0.0861)	0.3141 *** (0.0510)
Debt/Eq. Ratio	-0.0529 * (0.0679)	0.0025 (0.0590)	-0.0247 *** (0.0053)
Quick Ratio	-0.2611 (0.0569)	-0.0494 (0.0541)	-0.0194 (0.0572)
Tot. Revenue	-0.2321 (0.0948)	-0.0878 (0.1749)	-0.1047 (0.2618)
Size	-0.23430 * (0.1244)	-0.7368 *** (0.1721)	-1.1477 *** (0.2488)
Tot. Equity	0.2782 *** (0.1077)	0.3537 *** (0.1443)	0.3741 ** (0.1683)

Main Findings:

- S-Score (+) – RE
- E-Score (-) – OLS
- ROA (+)
- Total Equity (+)
- Size (-)
- Debt/Equity (-) – OLS and FE

Results – Financial Performance Regression (ESG Scores)

	Dependent Variable: Return on Assets (ROA)		
Variables	**Pooled OLS**	**Random Effects**	**Fixed Effects**
ESG - Score	0.1237 ** (0.0624)	0.0024 *** (0.0008)	0.0018 *** (0.0003)
Debt/Eq. Ratio	-0.0089 (0.0054)	-0.2664 *** (0.0454)	-0.2834 *** (0.0386)
Quick Ratio	0.0563 (0.0604)	-0.0422 (0.0449)	-0.0484 (0.0464)
Tot. Revenue	0.2426 (0.0987)	0.4437 *** (0.1593)	0.6826 *** (0.2070)
Size	-0.9012 *** (0.1056)	-0.8539 *** (0.1382)	-0.8195 *** (0.1830)
Tot. Equity	0.1386 *** (0.1081)	0.1650 (0.1245)	0.1503 (0.1372)

Main Findings:

- ESG-Score (+)
- Total Revenue (+) – RE and FE
- Size (-) – RE and FE
- Debt/Equity (-) – RE and FE
- Total Equity (+) – OLS

Results – Financial Performance Regression (E,S,G Scores)

|	Dependent Variable: Return on Assets (ROA)		
Variables	**Pooled OLS**	**Random Effects**	**Fixed Effects**
E – Score	0.1291 * (0.0720)	0.0086 (0.1003)	0.1291 (0.0999)
S – Score	-0.1269 (0.1004)	-0.0221 * (0.0131)	-0.0130 * (0.0078)
G – Score	0.1619 *** (0.0651)	0.0196 ** (0.0098)	0.1619 *** (0.0066)
Debt/Eq. Ratio	-0.0085 * (0.0044)	-0.2655 *** (0.0456)	-0.2821 *** (0.0471)
Quick Ratio	0.0560 (0.0600)	-0.0427 (0.0452)	-0.0485 (0.0469)
Tot. Revenue	0.2573 *** (0.0984)	0.4577 *** (0.1621)	0.6850 *** (0.2086)
Size	-0.9180 *** (0.1124)	-0.8736 *** (0.1457)	-0.8307 *** (0.1938)
Tot. Equity	0.1477 (0.1133)	0.1648 (0.1256)	0.1509 (0.1381)

Main Findings:

- E-Score (+) – OLS
- S-Score (-) – RE and FE
- G-Score (+)
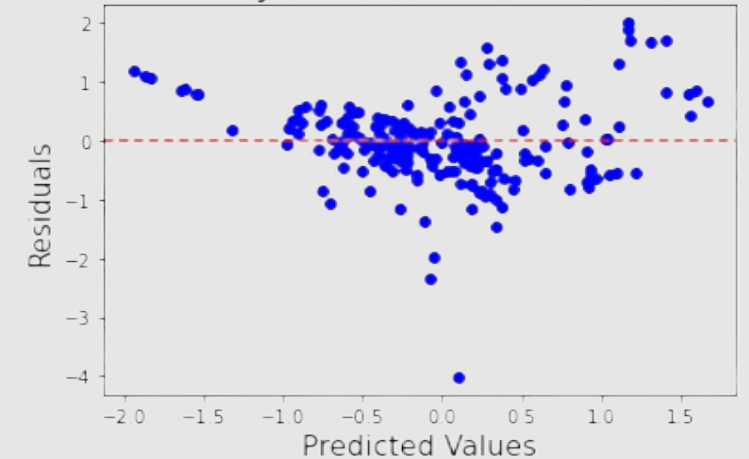- ROA (+)
- Total Revenue (+)
- Size (-)
- Debt/Equity (-)

Diagnostic – Breusch Pagan Tests

Regression	Value	P - Value
Risk Regression (ESG Score)	10.764	0.009
Risk Regression (E, S, G Scores)	18.543	0.009
Performance Regression (ESG Score)	55.860	< 0.001
Performance Regression (E, S, G Scores)	56.604	< 0.001

Homoskedasticity Test - Risk Pooled (ESG)
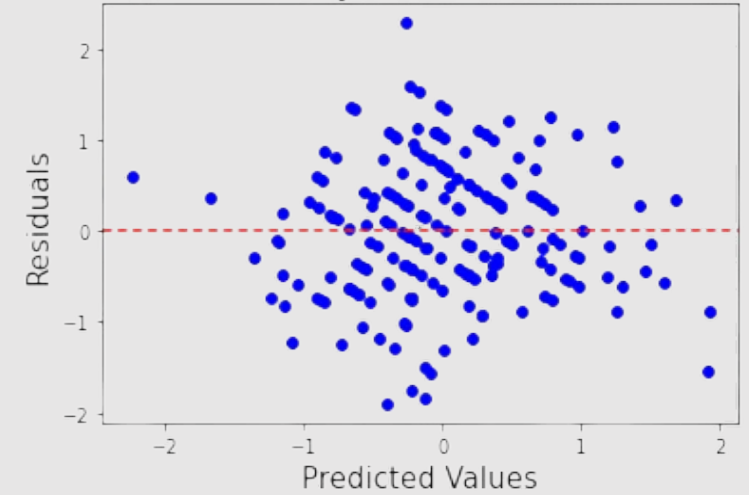
Homoskedasticity Test - Performance Pooled (ESG)

Diagnostic – Hausman Test

Regression	Chi - Square	Degrees of Freedom	P - Value
Risk Regression (ESG Score)	10.764	13	0.6305
Risk Regression (E, S, G Scores)	6.756	12	0.8732
Performance Regression (ESG Score)	10.121	15	0.8120
Performance Regression (E, S, G Scores)	6.129	14	0.9631

Assumptions:

- H_0: $\beta_{RE} = \beta_{FE}$ with P – Value > 0.05

- H_1: $\beta_{RE} \neq \beta_{FE}$ with P – Value < 0.05

Conclusions

❖ **ESG-Score:**
- No Effects have been estimated on Financial Risk
- Positive Effect on Financial Performances*

❖ **E-Score:**
- Negative but not significant Effect on Financial Risk* (Substitute Effect)
- Positive Effects but not significant on Financial Performances

❖ **S-Score:**
- Positive Effect on Financial Risk* (Main Driver for Credit Rating)
- Negative Effect on Financial Performance* (Unnecessary Cost)

❖ **G-Score:**
- Positive but not significant Effect on Financial Risk
- Positive Effect on Financial Performances* (Main Driver for Performance)

Conclusions - Limits

- Different formats for each data type

- Small sample

- Effects of outlier data

- Manipulation of data (Quick Ratio, ESG Data)

- Econometric Model to address ordinal nature of Dependent Variable (Ordered Logistic regression)

- Industry Fixed Effects Control

- Heteroskedasticity and Endogeneity among data

- Pandemic time window

Conclusions – Final Discussion

Financial Performance:

- Evidence shows a positive impact of ESG practices on Corporate Profitability, in particular the Governance and Environmental components seem to be the main drivers of the profitability, while some doubts are detected about the Social component, particularly when it gets a high score, such that, in our analysis, it turns out to have a negative effect on ROA.

Financial Risk:

- No evidence of significant effects of ESG practices on the Credit Ratings. Even though, it is observable a significant impact of Social Score in lowering corporate financial risk.

Finally, from this research, and based on main findings in Literature, there are evidence to say that pursuing sustainable path in business can lead to an enhancement in the financial structure of a firm, as well as reputational among all the stakeholders.

Thanks to everyone for the attention