"Firms' environmental and emission disclosure and their financial performance: a quantile approach"

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June 27, 2023

Overview

Environmental Performances and Actual Performances

Research approach:

- How firm's financial performances change in relation to the environmental ones?
- Focus on disclosure indicators and GHG emission levels
- Sectorial perspective
- Quantile regression

Research hypothesis currently applied

ESGscore

Env.score Impact on Tobin's Q (TQ)

GHGemissions

Data

- 507 firms for 7 years
- 4 Sectors: Energy; Materials; Transportation; Utilities
- 4 Subsectors: Energy Equipment and Services; Oil, Gas and Consumable Fuels; Chemicals; Electric Utilities
- Structural variables: TQ, Turnover, long term debt, EBITDA, profit margins, employees
- Environmental variables: ESG score, Environmental Pillar score, GHG emissions
- Financial Variables: Return on Assets (ROA), return on Equity (ROE)

Model

$$y_{it} = X_{it}\beta + \gamma z_{it} + \alpha_i + u_{it} \text{ for } t = 1, \ldots, T \text{ and } i = 1, \ldots, N \quad (1)$$

- Auto correlation of errors (Breush-Godfrey test): used FGLS
- First to GICS-4 and then GICS-6
- log framework: Structural and GHG are in natural log

Results

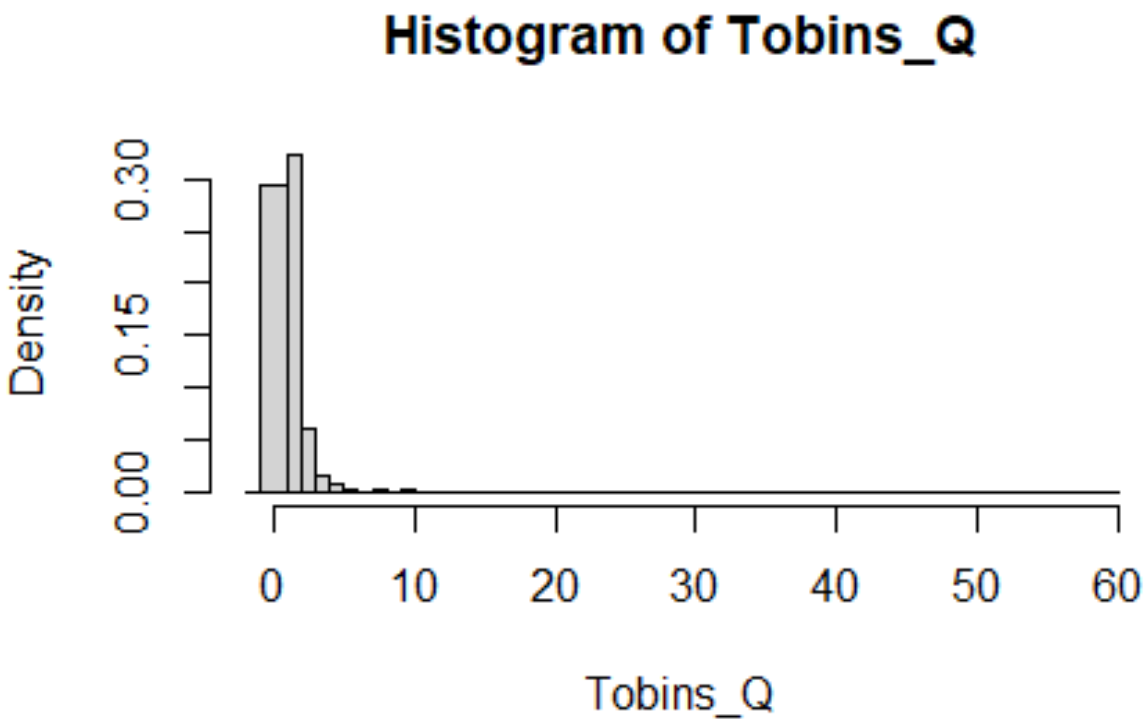
- ESG score and E score highly correlated (95%): H1,2 identical
- ESG score is positively correlated to GHG emissions
- In general the GHG emission levels seem to have a greater effect on firms' TQs than disclosure variables
- At a narrower level, and for some sub-sectors, a better environmental disclosure almost covers the impact of emissions on TQ

Discussion

- Major polluters financial drive: carbon premium (Bolton and Kacperczyk, 2020)?
- Changes in the TQ: market value appreciation/depreciation? Reduction/increase of book value?
- Strategy is relevant: case to case evaluation

New research approach

- The distribution of financial variables poses crucial challenges in econometric modelling as they are often highly skewed and exhibit atypical values;



New research approach

- In these cases linear models perform badly as they impose restrictions on the distribution of the response variable;
- Quantile regression provides different advantages:
  - is able to provide a more complete estimate of the entire distribution;
  - is more robust to outliers;
  - may reveal how the marginal effect of explanatory variables vary at different quantile levels of the response distribution (Merlo et al., 2020)

Literature review II

Many scholars resorted to quantile regression. However, results keep being inconclusive:

- Chen and Lee, 2017 found that CSR and company value share a non-linear relationship, and CSR is relevant only after a certain threshold;
- Qiu, 2022 Sun et al., 2019 show that the relationship between CFP ans CSR follows an "inverted-U" shape;
- Lin et al., 2021 instead report a positive relationship between CSR and CFP, but this is true only for low-mid value firms which are in the growth phase;
- Kang and Liu, 2014 believe that engagement in corporate social responsibility activities has a significant positive relation with corporate performance across all quantiles.

Quantile regression

- Fixed $\tau \in (0, 1)$ the parameters of a linear quantile regression model have the same interpretation as those of any other linear model;
- **The intercept:** $\beta_0(\tau)$ represents the value of the τ-th quantile of Y when all explanatory variables are null or at their baseline values;
- **The slope parameter:** $\beta_j(\tau)$ can be interpreted as the rate of change of the τ-th quantile of Y per unit change in the value of the j-th regressor everything else being constant;
- By varying τ , the process$\{\beta(\tau)\}_{\tau \in (0,1)}$ permits us to characterize the effects of X on the whole conditional distribution of Y

Descriptive statistics

Table: Descriptive statistics

Variables	N	Mean	St. Dev.	Median	Min	Max	Skeweness	Kurtosis	St. Err.
TQ	3549	1,153	1,417	0,915	-0,291	54,178	18,609	589,735	0,024
E Pillar	3549	30,059	17,457	31,008	0,775	84,496	0,034	-0,688	0,293
lnghg	3549	7,080	1,890	6,824	-1,483	12,236	0,303	-0,021	0,032
lnturn	3549	21,497	2,285	21,862	11,285	26,472	-0,813	0,640	0,038
lnld	3549	6,582	2,305	6,826	-7,131	11,273	-1,323	3,576	0,039
lnEBITDA	3549	6,016	1,647	6,025	-2,924	10,843	-0,131	0,701	0,028
prof_marg	3549	-1710,487	30969,884	5,043	-885415,622	9739,612	-26,544	745,977	519,860
lnemploy	3549	8,338	1,992	8,515	0,000	13,161	-0,945	1,560	0,033
ROA	3549	1,656	17,921	4,100	-260,870	134,920	-5,707	62,586	0,301

Normality and stationarity

Normality test

Variable	Statistic	P-value
TQ	0,34154731	8,7583E-78
esgenv	0,96804625	2,126E-27
lnghg	0,9678104	1,7273E-27
lnturn	0,95984103	2,8263E-30
lnld	0,92437943	4,9521E-39
lnEBITDA	0,99382694	3,6613E-11
lnemploy	0,94734075	6,9865E-34
prof_marg	0,02938656	3,5542E-86
ROA	0,51744608	2,2236E-71

Stationarity test

Test	Statistic	P-value
Levin-Lin-Chu	-64.148	<2.2E-16
Im-Pesaran-Shin	-74.11	<2.2E-16

Quantile models

Table: Quantile model - E Pillar

Covariates	0.05	0.25	0.50	0.75	0.95
(Intercept)	−0.765 ∗ ∗∗ (0.134)	−0.183 (0.127)	0.178 ∗ ∗ (0.085)	0.379∗ (0.167)	2.008 ∗ ∗∗ (0.511)
esgenv	0.002 ∗ ∗ (0.001)	0.000 (0.000)	0.000 (0.001)	−0.002∗ (0.001)	0.001 (0.002)
lnturn	0.077 ∗ ∗∗ (0.008)	0.069 ∗ ∗∗ (0.008)	0.074 ∗ ∗∗ (0.005)	0.114 ∗ ∗∗ (0.009)	0.174 ∗ ∗∗ (0.021)
lnld	−0.001 (0.010)	−0.031 ∗ ∗∗ (0.008)	−0.071 ∗ ∗∗ (0.008)	−0.162 ∗ ∗∗ (0.020)	−0.565 ∗ ∗∗ (0.063)
lnEBITDA	−0.023 ∗ ∗ (0.011)	−0.013 (0.008)	0.021∗ (0.011)	0.069 ∗ ∗∗ (0.026)	0.226 ∗ ∗∗ (0.064)
$prof_marg$	0.000∗ (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
lnemploy	−0.050 ∗ ∗∗ (0.010)	−0.041 ∗ ∗∗ (0.006)	−0.059 ∗ ∗∗ (0.008)	−0.101 ∗ ∗∗ (0.013)	−0.119 ∗ ∗∗ (0.041)
ROA	0.006 ∗ ∗∗ (0.002)	0.007 ∗ ∗∗ (0.001)	0.008 ∗ ∗∗ (0.001)	0.005 (0.003)	−0.013 (0.008)

Quantile model

Table: Quantile model - Emissions

Covariates	0.05	0.25	0.50	0.75	0.95
(Intercept)	−0.729 ∗ ∗∗ (0.134)	−0.214∗ (0.118)	0.055 (0.101)	0.405 ∗ ∗ (0.167)	2.301 ∗ ∗∗ (0.559)
lnghg	−0.027 ∗ ∗∗ (0.010)	−0.062 ∗ ∗∗ (0.007)	−0.088 ∗ ∗∗ (0.008)	−0.157 ∗ ∗∗ (0.010)	−0.286 ∗ ∗∗ (0.038)
lnturn	0.074 ∗ ∗∗ (0.008)	0.076 ∗ ∗∗ (0.007)	0.087 ∗ ∗∗ (0.006)	0.129 ∗ ∗∗ (0.010)	0.157 ∗ ∗∗ (0.029)
lnld	0.012 (0.011)	−0.011 (0.010)	−0.051 ∗ ∗∗ (0.007)	−0.112 (0.016)	−0.395 ∗ ∗∗ (0.059)
lnEBITDA	−0.010 (0.012)	0.014 (0.011)	0.062 ∗ ∗∗ (0.010)	0.125 ∗ ∗∗ (0.016)	0.341 ∗ ∗∗ (0.042)
$prof_marg$	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
lnemploy	−0.035 ∗ ∗∗ (0.009)	−0.035 ∗ ∗∗ (0.006)	−0.049 ∗ ∗∗ (0.008)	−0.090 ∗ ∗∗ (0.011)	−0.086 ∗ ∗ (0.038)
ROA	0.006 ∗ ∗∗ (0.002)	0.007 ∗ ∗∗ (0.001)	0.007 ∗ ∗∗ (0.001)	0.000 (0.003)	−0.017 ∗ ∗∗ (0.006)

Preliminary conclusion

- Disclosure indicator does not have any impact on CFP, while GHG emissions does
- Emission levels appear to be more relevant for the firms positioned in the highest quantiles

Further research

- GICS sectors to be investigated
- Understand the process by which the emissions do have an impact on corporate financial performances
- Explore the impact of policy measures, especially in Europe
- Verify any difference between Europe and rest of the world

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Conclusion

Thank you