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The impact of greenwashing on security pricing: Preliminary results from the Food&Beverage and Utility industries

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GRINS

Università Ca'Foscari Venezia

Key Definition

- Greenwashing is a set of deceptive communication strategies used by firms to falsely portray themselves as environmentally responsible

- It can be defined as the *selective disclosure of positive information about a company's environmental or social performance, without full disclosure of negative information on these dimensions, so as to create an overly positive corporate image* (Lyon & Maxwell, 2011)

- Involves misleading marketing, advertising and reporting techniques aimed at convincing stakeholders of non-existent environmental commitments

Introduction (cont'd)

Motivational Factors

- Regulatory and societal expectations are driving changes in business practices
- Firms are challenged to demonstrate real environmental responsibility, due to:
  - Increasing pressure from sustainability reporting standards
  - Growing scrutiny of environmental, social, and governance (ESG) practices
- Prior literature identified several reasons for greenwashing
- Organizational drivers (Delmas and Burbano, 2011) include firm characteristics such as of profitability, size, industry, market-to-book value, leverage

Research Questions (WP1)

Assump-tions

- The core research assumption posits that capital market assessment of companies' greenwashing activities should be reflected in their security pricing

Research Questions

- Is Greenwashing perceived as a **material risk** by investors?
- If so, does it become a **systematic risk factor** with consequences for stock returns and corporate cost of equity capital?

Main model

The baseline econometric model we adopt in WP1 of the research project is borrowed from Fama-French (2015) five-factor risks model (*i* and *t* are portfolio and time subscripts, respectively):

R_{it} is the return on security or portfolio

R_{Mt} is the return on the value-weight (VW) market portfolio

HML_t is the difference between the returns on diversified portfolios of high and low B/M stocks

CMA_t is the difference between the returns on diversified portfolios of the stocks of low and high investment firms

Mod. 1

$$R_{it} - r_{Ft} = a_i + b_i(R_{Mt} - r_{Ft}) + s_i SMB_t + h_i HML_t + r_i RMW_t + c_i CMA_t + e_{it}$$

r_{Ft} is the riskfree return

SMB_t is the return on a diversified portfolio of small stocks minus the return on a diversified portfolio of big stocks

RMW_t is the difference between the returns on diversified portfolios of stocks with robust and weak profitability

Main model (cont'd)

- We estimate the Model in [Eq. 1] using portfolio **monthly returns** as dependent variable

- We construct alternative portfolio value-weighted monthly returns by grouping listed stocks in the two sectors with different characteristics.
  1. by **SIZE** (market capitalization split between low, medium, and large stocks)
  2. by **ESG COMBINED rating** (split between low, medium, and high group rating)
  3. by the **ESG CONTROVERSIES rating** (split between low, medium, and high group rating)

- As common in the asset pricing literature, we rebalance portfolio composition every year at the end of June

Main model (cont'd)

- We regress the **residuals** from the five-factor model on **ESG combined** and **ESG controversies** scores to assess whether these **greenwashing-related metrics influence residual returns**

- We estimate Model [2] to test that unexplained portion of portfolio monthly returns from Model [1] are related to either **ESG Combined score (COMB)** or **ESG Controversies score (CONT)** ratings or a combination of the two:

Mod. 2

$$\hat{a}_i + \widehat{e_{it}} = k_i + COMB_{it}/CONT_{it} + \zeta_{it}$$

Data and sample

Data sources

- ORBIS, Bureau van Dijk [Financials]
- Refinitiv, LSEG Data & Analytics [Market data, ESG Scores]

Sample

Geographic Coverage

- *Listed companies from:*
  - United States
  - Europe (EU, UK, and Switzerland)

Data Collection Parameters

- *Time frame:* 2010 to 2023
- *Data collection includes:*
  - Stock market data
  - Financial performance metrics
  - ESG ratings

Sector Selection Rationale

- *Food & Beverages Industry:*
  - Criticized for resource-intensive supply chains
  - Complex environmental impact considerations
- *Utility Industry:*
  - Intense pressure for low-carbon transition
  - Significant environmental regulatory scrutiny

Main model

Preliminary results

Europe Food & Beverage

Europe Utilities

US Food & Beverage

US Utilities

Europe Food & Beverage

Europe Utilities

US Food & Beverage

US Utilities

Results: Europe Food&Beverage

Dependent Variable = Portfolio VW monthly returns 2010-2023 Europe Food & Beverages Medium Market Cap and Medium Rating			
	Portfolio sort on Market Capitalization	*Portfolio sort on ESG Combined*	*Portfolio sort on ESG Controversies*
Intercept	0.000	0.008*	0.004
Market	0.447***	0.295***	0.516***
SMB (Small minus Big)	0.432***	-0.462*	-0.082
HML (High minus Low)	0.179	-0.758**	-0.183
RMW (Robust minus Weak)	0.027	-0.024	0.206
CMA (Conservative minus Aggressive)	-0.116	0.558	-0.386
$Adj.R^2$	*0.661*	*0.162*	*0.475*
Portfolio characteristics:			
Average Market Cap $ million	312	17,918	5,593
Average ESG combined	10.96	50.92	51.81
Average Controversies	24.3	48.16	85.75

*Symbols ***, **, * denote significance at 1%, 5%, and 10%, respectively.*

Results: Europe Food&Beverage

Dependent Variable = Intercept + residual from Equation [1] Portfolio VW monthly returns 2010-2023 Europe Food & Beverages Medium Market Cap and Medium Rating			
	Portfolio sort on Market Capitalization	*Portfolio sort on ESG Combined*	*Portfolio sort on Controversies*
Intercept	-0.002	0.051*	0.005
ESG Combined score	0.000	-0.001	-0.000
$Adj.R^2$	*-0.005*	*0.035*	*-0.012*

Dependent Variable = Intercept + residual from Equation [1] Portfolio VW monthly returns 2010-2023 Europe Food & Beverages Medium Market Cap and Medium Rating			
	Portfolio sort on Market Capitalization	*Portfolio sort on ESG Combined*	*Portfolio sort on Controversies*
Intercept	-0.004	0.007	0.033
ESG Controversies score	0.000	-0.000	-0.000
$Adj.R^2$	*-0.003*	*-0.012*	*-0.008*

*Symbols ***, **, * denote significance at 1%, 5%, and 10%, respectively.*

Europe Food & Beverage

- Lower B/M ratios imply better returns under high ESG scores
- Larger firms with high ESG scores are preferred by the market
- Profitability is not key in ESG
- Residual returns not explained by ESG scores

Europe Utilities

US Food & Beverage

US Utilities

Europe Food & Beverage

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Europe Utilities

US Food & Beverage

- ESG performers display higher sensitivity to market returns
- Profitable firms have higher returns under high ESG scores
- Residual analysis show no explanatory power for residual variation in returns

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US Utilities

Results: Europe Utilities

Dependent Variable = Portfolio VW monthly returns 2010-2023 Europe Utilities Medium Market Cap and Medium Rating			
	Portfolio sort on Market Capitalization	*Portfolio sort on ESG Combined*	*Portfolio sort on Controversies*
Intercept	0.002	-0.002	-0.006**
Market	0.534***	0.596***	0.646***
SMB (Small minus Big)	0.454***	-0.117	-0.096
HML (High minus Low)	0.086	0.645***	0.689***
RMW (Robust minus Weak)	-0.187	0.766***	1.122***
CMA (Conservative minus Aggressive)	-0.350	0.028	-0.192
$Adj.R^2$	*0.606*	*0.506*	*0.516*
Portfolio characteristics:			
Average Market Cap $ million	1,132	17,340	8,413
Average ESG combined	19.3	55.57	58.09
Average Controversies	37.41	67.88	90.08

*Symbols ***, **, * denote significance at 1%, 5%, and 10%, respectively.*

Results: Europe Utilities

Dependent Variable = Intercept + residual from Equation [1] Portfolio VW monthly returns 2010-2023 European Utilities Medium Market Cap and Medium Rating			
	Portfolio sort on Market Capitalization	*Portfolio sort on ESG Combined*	*Portfolio sort on Controversies*
Intercept	-0.019**	0.003	-0.034
ESG Combined score	0.001**	-0.000	0.001
$Adj.R^2$	0.027	-0.006	0.010

Dependent Variable = Intercept + residual from Equation [1] Portfolio VW monthly returns 2010-2023 European Utilities Medium Market Cap and Medium Rating			
	Portfolio sort on Market Capitalization	*Portfolio sort on ESG Combined*	*Portfolio sort on Controversies*
Intercept	-0.016*	-0.007	-0.032
ESG Controversies score	0.001**	0.000	0.000
$Adj.R^2$	0.019	-0.005	-0.002

*Symbols ***, **, * denote significance at 1%, 5%, and 10%, respectively.*

Europe Food & Beverage

- Lower B/M ratios imply better returns under high ESG scores
- Larger firms with high ESG scores are preferred by the market
- Profitability is not key in ESG
- Residual returns not explained by ESG scores

Europe Utilities

- Investors prefer value firms (low B/M) and emphasize profitability under high ESG scores
- Lean towards aggressive investments, likely due to the sector's capital-intensive, long-term nature
- ESG not explaining residual returns

US Food & Beverage

- ESG performers display higher sensitivity to market returns
- Profitable firms have higher returns under high ESG scores
- Residual analysis show no explanatory power for residual variation in returns

US Utilities

Europe Food & Beverage

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US Utilities

- ESG performance is associated with investor preference for profitable firms and conservative investment strategies
- Under ESG controversies sorting, value and profitable firms emerge
- ESG not explaining residual returns

Additional tests

Preliminary results

Additional tests

- Since the main model shows that the market already prices ESG factors, we interpret greenwashing as a **firm-specific phenomena**

- Therefore, the additional test is run at **the firm-level** rather than at the portfolio level

- We run **time-series cross-sectional regression models** by exploiting the change of ESG Combined and Controversies score

- The idea motivating that approach is to capture some **pricing effect in excess of systematic risks** and that those pricing effects be related to greenwashing activities

Additional tests (cont'd)

- We add to the Fama French 5-factor model, the **change in ESG score over 12 months**, as a proxy for greenwashing for both the combined ESG score (Δ ESG combined) and the controversies ESG score (Δ ESG controversies)
- We estimate Model 3 using firm **monthly returns** as dependent variable
- Year and firm fixed effects are included in the model

GWS_t captures **greenwashing risk** (e.g. as the time-series variance of ESG scores)

Mod. 3

$$R_{it} - r_{Ft} = a_i + b_i(R_{Mt} - r_{Ft}) + s_i SMB_t + h_i HML_t + r_i RMW_t + c_i CMA_t + \gamma_i GWS_t + e_{it}$$

Additional test: Europe Food&Beverage

Dependent Variable = Firm-level monthly returns 2010-2023 Europe Food & Beverages		
Intercept	-0.005	0.006
Market	0.577***	0.577***
SMB	0.153**	0.152**
HML	0.251***	0.250***
RMW	0.781***	0.780***
CMA	0.252*	0.252*
Δ ESG combined (12 months)	-0.000	
Δ ESG controversies (12 months)		0.000
$Adj.R^2$	*0.135*	*0.135*

Fixed Effects		
Year	YES	YES
Firm	YES	YES

*Symbols ***, **, * denote significance at 1%, 5%, and 10%, respectively.*

Additional test: US Food&Beverage

Dependent Variable = Firm-level monthly returns 2010-2023 US Food & Beverages		
Intercept	0.009	0.007
Market	0.683***	0.684***
SMB	0.141**	0.140**
HML	-0.115**	-0.115**
RMW	0.313***	0.314***
CMA	0.473***	0.474***
Δ ESG combined (12 months)	-0.001	
Δ ESG controversies (12 months)		0.000
$Adj.R^2$	*0.146*	*0.145*

Fixed Effects		
Year	YES	YES
Firm	YES	YES

*Symbols ***, **, * denote significance at 1%, 5%, and 10%, respectively.*

Additional test: Europe Utilities

Dependent Variable = Firm-level monthly returns 2010-2023 Europe Utilities		
Intercept	-0.004	-0.004
Market	0.672***	0.672***
SMB	0.043	0.043
HML	0.249***	0.249***
RMW	0.578***	0.579***
CMA	0.236*	0.236*
Δ ESG combined (12 months)	-0.000	
Δ ESG controversies (12 months)		0.000
$Adj.R^2$	*0.151*	*0.151*

Fixed Effects		
Year	YES	YES
Firm	YES	YES

*Symbols ***, **, * denote significance at 1%, 5%, and 10%, respectively.*

Additional test: US Utilities

Dependent Variable = Firm-level monthly returns 2010-2023 US Utilities		
Intercept	0.001	0.009
Market	0.710***	0.707***
SMB	0.008	0.003
HML	-0.058	-0.051
RMW	0.137***	0.162***
CMA	0.036***	0.361***
Δ ESG combined (12 months)	0.000	
Δ ESG controversies (12 months)		0.000
$Adj.R^2$	*0.139*	*0.142*

Fixed Effects		
Year	YES	YES
Firm	YES	YES

*Symbols ***, **, * denote significance at 1%, 5%, and 10%, respectively.*

Additional results

Current outcome

- The ratings for both ESG and Controversies do not appear to be reflected in market pricing, even after other robustness checks (e.g. using annual returns)
- Specifically, Controversies - expected to serve as reliable proxies for events or episodes potentially linked to greenwashing - do not seem to show any correlation with stock pricing

Additional Analyses (work in progress)

- Test alternative factor models:
  - ➢ Carhart's four-factor model
- Explore interaction terms between:
  - ➢ Systematic risk factors
  - ➢ ESG variables

Conclusion & Future developments

Future developments

Methodological Improvements (WP2)

- Explore and build alternative greenwashing proxies
- Analyze discrepancies between:
  - Sustainability Reports
  - Actual corporate ESG performance
- Develop a greenwashing prediction model based on financial and textual analysis of annual reports

Future developments (cont'd)

Contextual Research Opportunities (WP2)

- Extend the analysis to other environmentally sensitive industries (e.g. fashion industry)
- Examine:
  - ➢ The US setting where 10-Ks are machine readable to apply machine learning techniques
- Develop a model applicable also to the EU setting once the ESEF reporting standard will be adopted

ESMA
European Securities and Markets Authority

Conclusion

Key Findings and Challenges

- Current ESG scores show limited explanatory power
- Potential issues identified:
  - ➢ Investors may struggle to differentiate genuine ESG efforts from greenwashing
  - ➢ Existing metrics may not capture critical aspects of corporate behavior

Implications for policy and practice

- Develop more nuanced understanding of corporate environmental communication
- Create more robust methodologies for assessing corporate sustainability claims
- Improve investor tools for evaluating genuine ESG efforts

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Results: US Food&Beverage

Dependent Variable = Portfolio VW monthly returns 2010-2023 US Food & Beverages Medium Market Cap and Medium Rating			
	Portfolio sort on Market Capitalization	*Portfolio sort on ESG Combined*	*Portfolio sort on Controversies*
Intercept	0.002	-0.001	0.001
Market	0.682***	0.722***	0.773***
SMB	0.626***	-0.156	-0.153
HML	-0.335***	-0.034	-0.082
RMW	0.287**	0.482***	0.201
CMA	0.746***	0.276	0.271
$Adj.R^2$	0.613	0.397	0.317
Portfolio characteristics:			
Average Market Cap $ million	1,086	27,033	10,406
Average ESG combined	18.43	45.52	54.74
Average Controversies	54.32	47.95	81.45

Results: US Food&Beverage

Dependent Variable = Intercept + residual from Equation [1] Portfolio VW monthly returns 2010-2023 US Food & Beverages Medium Market Cap and Medium Rating			
	Portfolio sort on Market Capitalization	*Portfolio sort on ESG Combined*	*Portfolio sort on Controversies*
Intercept	0.005	0.022	0.030
ESG Combined score	-0.000	-0.000	-0.000
$Adj.R^2$	-0.001	0.003	0.004

Dependent Variable = Intercept + residual from Equation [1] Portfolio VW monthly returns 2010-2023 US Food & Beverages Medium Market Cap and Medium Rating			
	Portfolio sort on Market Capitalization	*Portfolio sort on ESG Combined*	*Portfolio sort on Controversies*
Intercept	0.001	0.009	-0.002
ESG Controversies score	-0.000	-0.000	0.000
$Adj.R^2$	0.001	-0.003	-0.006

Results: US Utilities

Dependent Variable = Portfolio VW monthly returns 2010-2023 US Utilities Medium Market Cap and Medium Rating			
	Portfolio sort on Market Capitalization	*Portfolio sort on ESG Combined*	*Portfolio sort on Controversies*
Intercept	-0.000	-0.004	-0.000
Market	0.761***	0.621***	0.725***
SMB	0.096	-0.056	-0.290**
HML	0.049	0.122	0.212*
RMW	0.231*	0.329**	0.166
CMA	0.388***	0.353**	0.160
$Adj.R^2$	0.539	0.412	0.448
Portfolio characteristics:			
Average Market Cap $ million	3,505	12,343	10,988
Average ESG combined	33.2	46.21	52.11
Average Controversies	70.95	71.27	87.42

Results: US Utilities

Dependent Variable = Intercept + residual from Equation [1] Portfolio VW monthly returns 2010-2023 US Utilities Medium Market Cap and Medium Rating			
	Portfolio sort on Market Capitalization	*Portfolio sort on ESG Combined*	*Portfolio sort on Controversies*
Intercept	-0.002	-0.008	-0.001
ESG Combined score	0.000	0.000	0.000
$Adj.R^2$	-0.006	-0.005	-0.007

Dependent Variable = Intercept + residual from Equation [1] Portfolio VW monthly returns 2010-2023 US Utilities Medium Market Cap and Medium Rating			
	Portfolio sort on Market Capitalization	*Portfolio sort on ESG Combined*	*Portfolio sort on Controversies*
Intercept	-0.004	0.005	0.004
ESG Controversies score	0.000	-0.000	-0.000
$Adj.R^2$	-0.005	-0.005	-0.007

Additional test: Europe Food&Beverage

Dependent Variable = Firm-level yearly returns 2010-2023 Europe Food & Beverages		
Intercept	-0.018	-0.017
Market	0.254***	0.259***
SMB	0.106***	0.108***
HML	0.027	0.031
RMW	-0.061	-0.064
CMA	-0.017	-0.017
Δ ESG combined (12 months)	0.001	
Δ ESG controversies (12 months)		0.001
$Adj.R^2$	*0.237*	0.238

Fixed Effects		
Year	YES	YES
Firm	YES	YES

*Symbols ***, **, * denote significance at 1%, 5%, and 10%, respectively.*

Additional test: US Food&Beverage

Dependent Variable = Firm-level yearly returns 2010-2023 US Food & Beverages		
Intercept	0.137	0.109
Market	0.084	0.097
SMB	0.021	0.024
HML	-0.094	-0.076
RMW	0.046	0.025
CMA	-0.024	-0.020
Δ ESG combined (12 months)	-0.008*	
Δ ESG controversies (12 months)		0.000
$Adj.R^2$	*0.147*	0.140
Fixed Effects		
Year	YES	YES
Firm	YES	YES

*Symbols ***, **, * denote significance at 1%, 5%, and 10%, respectively.*

Additional test: Europe Utilities

Dependent Variable = Firm-level yearly returns 2010-2023 Europe Utilities		
Intercept	0.027	0.024
Market	0.245***	0.245***
SMB	0.095***	0.095***
HML	0.042	0.046
RMW	-0.099*	-0.100*
CMA	-0.034***	-0.032***
Δ ESG combined (12 months)	-0.002	
Δ ESG controversies (12 months)		-0.000
$Adj.R^2$	*0.155*	*0.155*

Fixed Effects		
Year	YES	YES
Firm	YES	YES

*Symbols ***, **, * denote significance at 1%, 5%, and 10%, respectively.*

Additional test: US Utilities

Dependent Variable = Firm-level yearly returns 2010-2023 US Utilities		
Intercept	0.139**	0.139**
Market	0.008	0.010
SMB	-0.101	-0.010
HML	0.030	0.031
RMW	0.102**	0.101***
CMA	0.019	0.019
Δ ESG combined (12 months)	0.001	
Δ ESG controversies (12 months)		0.000
$Adj.R^2$	*0.175*	*0.182*

Fixed Effects		
Year	YES	YES
Firm	YES	YES

*Symbols ***, **, * denote significance at 1%, 5%, and 10%, respectively.*