

# Risk Forum 2022 - Bond Risk Session

Discussion

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- **Goal:** Identify if corporate bonds bear a climate change risk premium proxied by firms' exposure to sea-level rise.
- **Methodology :** **OLS regressions, robustness tests** (Sensitivity to SLR specificities; Placebo test to control spurious results; Inverse propensity weighting to account for endogeneity) and **sensitivity analysis** to firms characteristics (spatial dispersion; industry heterogeneity; investor horizon) and market changes (Paris Agreement).
- **Data:** All fixed coupons bonds issued in the US between 2010 and 2018 (FISD); merged with firms financial and physical characteristics (Compustat, SRAF & Infogroup) → 6223 observations. Sea-level rise exposure (**SLR**) is computed following Painter (2020).
- **Results:** Corporate bonds yield spread increase by 3% on average when SLR increases by one standard deviation while credit ratings are not sensitive to SLR.

- **Goal:** Assess ESG features' materiality on countries creditworthiness proxied by yield spreads and credit ratings.
- **Methodology :** **Lasso regression** to examine yield spread sensitivity to ESG features and **Logit regressions** to estimate the probability of being well or poorly scored based on ESG metrics. Single-factor analysis for feature selection and multi-factor analysis to rank and interpret features effects.
- **Data:** 269 ESG indicators (Verisk, World Bank, UN) merged with 10 years bond yield (Bloomberg, Eikon-Datastream) and macroeconomic indicators (IMF, World Bank). Period ranges from 2015 to 2020 with a total of 402 observations encompassing 67 countries.
- **Results:** ESG features explain both yield spread ( $R\text{-squared} \approx 70\%$  and  $\Delta R \approx 13.5\%$ ) and credit ratings (Accuracy  $\approx 95\%$ ). But, selected themes differ, with  $E \succ G \succ S$  for the yield analysis while  $G \succ S \succ E$  for credit ratings.

For differences: first comes the paper written by Elsa ALLMAN and second the one written by Raphaël SEMET, Thierry RONCALLI and Lauren STAGNOL.

## Similarities

- Close subject of analysis: extra-financial risk on bonds
- Y targets: yield spread & credit ratings
- Linear regressions

## Differences

- E(SG) Metrics: single vs. many
- Period: 2010-2018 vs. 2015-2020
- Y transformation: level vs. log and binary
- X transformation: level vs. scaled
- model: OLS vs. Lasso and Logit
- Robustness tests: many vs. none

## "Pricing Climate Change Risk Corporate Bonds"

- A new segment of the literature: Examine the consequences of firms' physical exposure to climate change with innovative metrics (SLR, following Hallegate (2013) & Painter(2020));
- Many robustness check to strengthen the findings;
- Provide a solution to companies to mitigate their exposure to climate change and encourage policymakers to promote climate change integration in credit ratings' methodologies.

## "ESG and Sovereign Risk: What is Priced in by the Bond Market and Credit Rating Agencies?"

- A didactic narrative with a focus on helping investors better assess countries overall risk;
- A global analysis with remarkable efforts to build a large and comprehensive database;
- A selection of easy but powerful models to deliver straightforward conclusions.

### The SLR measure and control variables

- Only a small set of counties concerned → small dispersion; size effect.
- Confounding: ROA and constant seem to be the two most explaining variables. Further investigation could be relevant (e.g descriptive statistics of decile portfolios).
- Small R-square of regressions ( $\approx 45\%$ ). Why not include firms capacity to repay its debt:  
$$\frac{\text{EBITDA}}{\text{Debt service}}$$

### Methodology

- Observation period: is it relevant to go back to 2010 ?
- Sensitivity analysis: most observations seem to belong to Coastal with SLR counties ( $\approx 95\%$  based on table 7). Why ?
- Following Gelman & Stern (2006) *"The difference between "significant" and "not significant" is not itself statistically significant.* Other procedure with robust statistics like Diff-in-Diff could be relevant ?

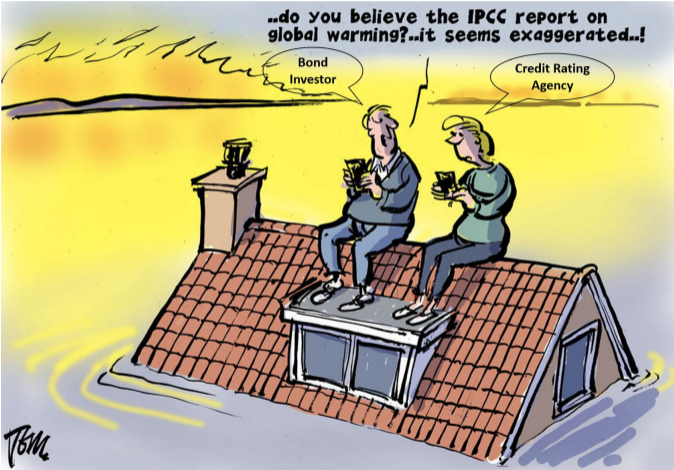
### What is Priced in by the Bond Market and Credit Rating Agencies?"

#### The Lasso model

- Limited with correlated variables. Might be the case between ESG features and control variables like macro-economic ones (e.g Income in the Social pillar) ?
- Challenging features selection procedure with machine learning (Variable importance, Shapley-values...).
- What justifies the selection of 7 variables per model ?
- Group-Lasso for estimating the importance of E, S and G pillars.

#### ESG and Credit Ratings Forecasts

- ESG features successfully explain Credit ratings. One could question if they are good to forecast changes in Credit ratings ? Following downgrades/upgrades and controversies.





Congratulations for your remarkable work!  
Many thanks for your attention.