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Discussion of "ESG and Credit Rating Correlations"
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Environmental, Social and Governance (ESG) factors

- *ESG factors are defined as "Environmental, social or governance matters that may have a positive or negative impact on the financial performance or solvency of an entity, sovereign or individual."*

- Many initiatives have been undertaken at EU level:

  ➢ In March 2018 the **European commission** published
     "Action plan on financing sustainable growth"

  ➢ In May 2020 the **EBA** published
     "Guidelines on loan origination and monitoring"

  ➢ In November 2020 the **ECB** published
     "Guide on climate-related and environmental risks"

  ➢ In June 2021 the **EBA** published
     "Report on ESG risk management and supervision"

  ➢ In April 2022 **BdI** published
     "Aspettative di vigilanza sui rischi climatici e ambientali"

ESG and Credit Rating Correlations

- For both credit ratings (C) and ESG ratings (E), it is assumed that a latent variable following one factor structure drives the rating assignment:

$$\hat{X}_{n,t}^{(C)} = \sqrt{\rho^{(C)}} f_t^{(C)} + \sqrt{1 - \rho^{(C)}} \epsilon_{n,t}^{(C)}$$

$$\hat{X}_{n,t}^{(E)} = \sqrt{\rho^{(E)}} f_t^{(E)} + \sqrt{1 - \rho^{(E)}} \epsilon_{n,t}^{(E)}$$

where $f_t^{(C)}$ $f_t^{(E)}$ are common factor for year t, and $\epsilon_{n,t}^{(C)}$ $\epsilon_{n,t}^{(E)}$ are firm n's idiosyncratic shock for year t.

- The Credit/ESG Rating Factor Weight, corresponding to $\rho^{(C)}$ $\rho^{(E)}$ respectively, the Credit-ESG Factor Correlation ρ and the Idiosyncratic Shock Correlation ρ^i are estimated via maximum likelihood approach, considering different model assumptions:

  ➢ Model 1 – Independent idiosyncratic shocks and correlated common factors
  ➢ Model 2 – Independent common factors and correlated idiosyncratic shocks
  ➢ Model 3 – Correlated common factors and idiosyncratic shocks, i.e., the "full model"

ESG and Credit Rating Correlations

- While the estimated factor weights (i.e., the correlations for pairs of credit ratings or pairs of ESG ratings) appear relatively low, the correlation between the ESG and the credit common factors are high, considering all credit grades

$$\hat{X}_{n,t}^{(C)} = \sqrt{\rho^{(C)}} f_t^{(C)} + \sqrt{1 - \rho^{(C)}} \epsilon_{n,t}^{(C)}$$

$$\hat{X}_{n,t}^{(E)} = \sqrt{\rho^{(E)}} f_t^{(E)} + \sqrt{1 - \rho^{(E)}} \epsilon_{n,t}^{(E)}$$

Table 5.1: Maximum Likelihood Estimates for all credit grade firms

Assumption	Parameter	Estimate	StD Error	t-Statistic
12 ESG quantiles, years weighted by observations	Credit Rating Factor Weight	0.0543	0.0154	3.5226
	ESG Rating Factor Weight	0.0214	0.0086	2.4968
	Model 1: Credit-ESG Factor Correlation	0.2800	0.2689	1.0413
	Model 2: Idiosyncratic Shock Correlation	0.0223	0.0200	1.1120
	Model 3: Full Model Factor Correlation	0.2826	0.7661	0.3689
	Model 3: Full Model Shock Correlation	0.0222	0.0221	1.0021
12 ESG quantiles, years weighted equally	Credit Rating Factor Weight	0.0623	0.0171	3.6411
	ESG Rating Factor Weight	0.0606	0.0233	2.6071
	Model 1: Credit-ESG Factor Correlation	0.3793	0.3265	1.1617
	Model 2: Idiosyncratic Shock Correlation	0.0251	0.0203	1.2358
	Model 3: Full Model Factor Correlation	0.3893	0.3181	1.2238
	Model 3: Full Model Shock Correlation	0.0252	0.0201	1.2578
4 ESG quantiles, years weighted by observations	Credit Rating Factor Weight	0.0543	0.0154	3.5226
	ESG Rating Factor Weight	0.0159	0.0078	2.0321
	Model 1: Credit-ESG Factor Correlation	0.3807	0.2791	1.3638
	Model 2: Idiosyncratic Shock Correlation	0.0207	0.0252	0.8212
	Model 3: Full Model Factor Correlation	0.3524	0.3160	1.1153
	Model 3: Full Model Shock Correlation	0.0204	0.0375	0.5440
4 ESG quantiles, years weighted equally	Credit Rating Factor Weight	0.0623	0.0171	3.6411
	ESG Rating Factor Weight	0.0246	0.0157	1.5646
	Model 1: Credit-ESG Factor Correlation	0.4174	0.2981	1.4001
	Model 2: Idiosyncratic Shock Correlation	0.0243	0.0256	0.9488
	Model 3: Full Model Factor Correlation	0.3710	0.3392	1.0940
	Model 3: Full Model Shock Correlation	0.0242	0.0255	0.9471

# Are credit risk factor weights really constant?

- The correlations estimated in the paper (lower than 7 %) are much lower than the implied correlations used into the Basel IRB Approach for corporate (ranging from 12% to 24% depending on the default probability of the firm), which seems to confirm that the assumptions behind the supervisory formula are significantly conservative

- In this study **Credit risk factor weights** are held as constant for each of the three models. Nevertheless, empirical evidence underlying Basel IRB Approach correlations shows that:

  ➢ Asset correlations decrease when PDs increase
  ➢ Asset correlations increase along with firm size
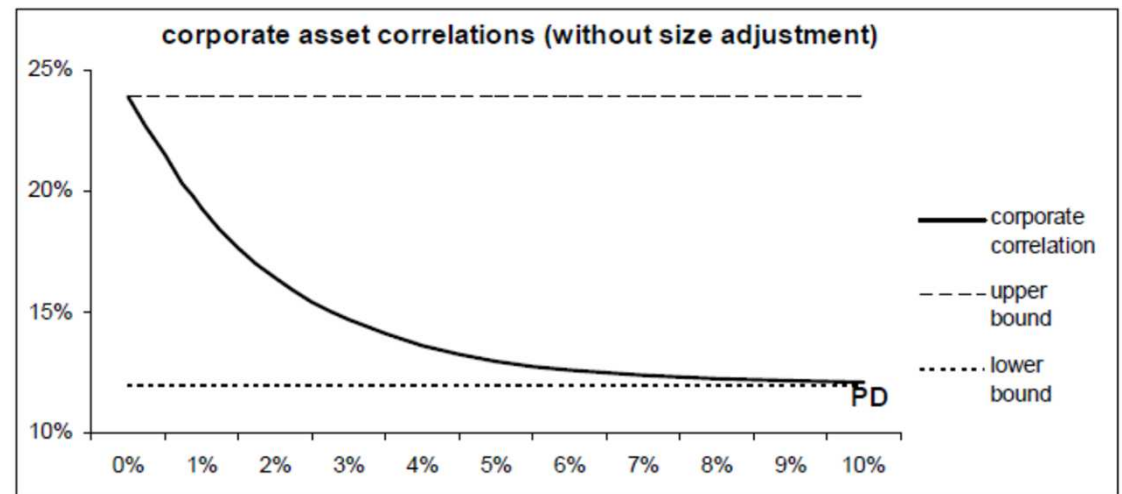
Do ESG and CRA ratings share the same piece of information ?

- To what extent does the observed correlation between the ESG and the credit common factors stem from risk factors already taken into account in the rating assignment of Credit Ratings Agencies (CRAs)?

  ➤ Governance indicators are generally included in credit rating scorecards

  ➤ Environmental (E) and social (S) risk factors are partially included in forward-looking metrics or scenario analyses, where a medium-long term horizon is employed in the credit risk assessment (Moody's long-term rating scale)

  ➤ CRAs are increasingly focusing on the ESG issues and progressively integrating ESG data into their credit rating methodologies (Moody's started working on it just before the COP 21 in 2015)

Figure 2.3: Refinitiv ESG Ratings Distributions Conditional on Having a Moody's Credit Rating
Panel a) By number
Panel b) By proportion
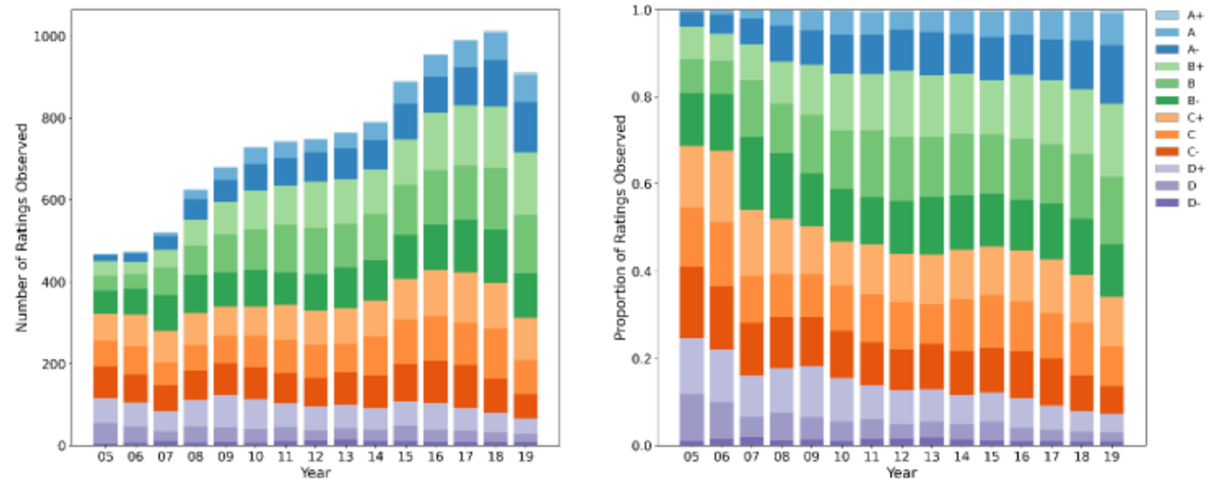
Does analysis by sector matter ?

- The ESG dataset covers 8,473 firms across 11 economic sectors. In a **sector decomposition**, correlation analyses might describe in a more granular way how ESG factors affect the credit scoring. For example energy sector is expected to be most influenced by ESG regarding the probability of corporate credit default and in some sectors most issuers might have a similar level of exposure to ESG risks, although there may be differences

Economic sector	Examples
Energy	Coal, Oil & Gas, Renewable Fuels
Basic Materials	Chemicals, Mineral Resources
Industrials	Heavy Machinery & Vehicles, Construction & Engineering, Transportation
Cyclical Consumer Goods & Services	Autos, Restaurant, Leisure, Non-Food Retailers
Non-Cyclical Consumer Goods & Services	Food, Tobacco, Household Products
Financials	Banking & Investment Services, Insurance, Real Estate
Healthcare	Healthcare Services, Pharmaceuticals & Medical Research
Technology	Semiconductors, Electronic Equipment & Parts, Phones & Handheld Devices
Telecommunications Services	Integrated Telecommunications Services, Wireless Telecommunications Services
Utilities	Electric Utilities, Independent Power Producers, Water & Other Utilities

- A further breakdown based on separate ratings for **the three categories of Environmental, Social and Governance** (rather than a single ESG rating) might allow to better understand how E, S, and G factors individually affect the credit scoring

- According to the results provided in this study the Governance factor weights are not statistically significant or even equal to zero

- Nevertheless, Governance risk is usually perceived as key driver of the creditworthiness

  ❖ Usually effective corporate governance ensures sustainable management performance, efficient allocation of resources and sound investment strategy, all capable to moderate bankruptcy risk

- Unlike environmental and social risks, which may be driven by external factors such as regulation or demographic change, governance risks are expected to be largely idiosyncratic, i.e. issuer-driven

- Is a model based on a latent variable following one factor structure still deemed suitable to this case?

Table 5.3: Maximum Likelihood Estimates using E, S and G pillar scores for investment grade firms

Assumption	Parameter	Estimate	StD Error	t-Statistic
12 Environmental quantiles, years weighted by observations	Credit Rating Factor Weight	0.0562	0.0166	3.3751
	Environmental Rating Factor Weight	0.0295	0.0110	2.6901
	Model 1: Credit-E Factor Correlation	0.3271	0.2573	1.2714
	Model 2: Idiosyncratic Shock Correlation	0.0287	0.0218	1.3191
12 Social quantiles, years weighted by observations	Credit Rating Factor Weight	0.0567	0.0162	3.5029
	Social Rating Factor Weight	0.0230	0.0091	2.5290
	Model 1: Credit-S Factor Correlation	0.2648	0.2725	0.9718
	Model 2: Idiosyncratic Shock Correlation	0.0228	0.0208	1.0944
12 Governance quantiles, years weighted by observations	Credit Rating Factor Weight	0.0567	0.0162	3.5029
	Governance Rating Factor Weight	0.0021	0.0020	1.0870
	Model 1: Credit-G Factor Correlation	0.2759	0.4442	0.6210
	Model 2: Idiosyncratic Shock Correlation	0.0362	0.0198	1.8240
4 Environmental quantiles, years weighted by observations	Credit Rating Factor Weight	0.0562	0.0167	3.3691
	Environmental Rating Factor Weight	0.0297	0.0126	2.3673
	Model 1: Credit-E Factor Correlation	0.2733	0.2770	0.9866
	Model 2: Idiosyncratic Shock Correlation	0.0366	0.0267	1.3685
4 Social quantiles, years weighted by observations	Credit Rating Factor Weight	0.0567	0.0162	3.5029
	Social Rating Factor Weight	0.0234	0.0101	2.3137
	Model 1: Credit-S Factor Correlation	0.4423	0.2497	1.7709
	Model 2: Idiosyncratic Shock Correlation	0.0159	0.0259	0.6128
4 Governance quantiles, years weighted by observations	Credit Rating Factor Weight	0.0567	0.0162	3.5029
	Governance Rating Factor Weight	0.0000	1.0000	0.0000
	Model 1: Credit-G Factor Correlation	0.7297	0.6465	1.1287
	Model 2: Idiosyncratic Shock Correlation	0.0323	0.0230	1.4028

Thanks for your attention