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**A short note on divergence and
aggregation of ESG ratings: a
survey**

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A short note on divergence and aggregation of ESG ratings: a survey

Abstract

This paper surveys the literature on the divergence in Environmental, Social, and Governance (ESG) ratings and their implications for investment decisions. Past studies highlight the low correlation among ratings from different agencies, raising concerns about reliability. The analysis identifies methodological differences employed in the literature as key drivers of variability of results and evaluates aggregation techniques, including machine learning, to address inconsistencies. While advanced methods show potential, gaps in consolidating ESG data persist, undermining their effectiveness as sustainability measures. The paper emphasizes the need for transparent methodologies and standardized indicators to improve ESG metrics, support sustainable investments, and promote better-informed decisions fostering sustainable business practices.

Keywords: ESG ratings, divergence, aggregation, survey

1 Introduction and Background

The environmental impact of corporate activities has gained prominence in recent decades (Yu et al., 2021), with companies held accountable for their effects on society and the planet through Corporate Social Performance (CSP) measurement. Sustainability reporting, initially voluntary (e.g., the Global Reporting Initiative - GRI) (Monteiro et al., 2023), has become mandatory in many regions. In Europe, the Non-Financial Reporting Directive (NFRD) (Directive 2014/95/EU) and its successor, the Corporate Sustainability Reporting Directive (CSRD) (Directive 2022/2464/EU), require large companies and listed SMEs to disclose ESG-related information, introducing European Sustainability Reporting Standards and external assurance (verification).

Sustainability scores, provided by ESG rating agencies, complement corporate disclosures, enabling investors to assess sustainability and reduce information asymmetries (Pollman, 2022; Lozano, 2012, 2018; Muñoz-Torres et al., 2019). However, the proliferation of ESG rating methodologies has led to inconsistent scores, creating “aggregate confusion” and increasing market uncertainty (Berg et al., 2022).

This paper reviews financial and statistical literature on ESG score divergence and methodologies for ESG aggregation. Section 2 provides an overview of ESG ratings, Section 3 discusses rating divergence and its sources, Section 4 examines aggregation methods, and Section 5 concludes.

2 ESG ratings and scores

The ESG profile of companies is often used as a proxy for sustainability behavior (Eng et al., 2022). Environmental factors involve impacts like carbon emissions, biodiversity, and waste management (European Commission, nd; Times, nd; Robeco, nd), while Social factors include issues such as diversity, human rights, and community investment (European Commission, nd; Van Duuren et al., 2016). Governance factors assess "good" governance, fostering sustainable growth and development (Alkaraan, 2023).

ESG criteria are integral to sustainable finance, guiding investor decisions and regulatory measures (UN, 2015; European Commission, 2018, 2021). European regulators mandate financial intermediaries to integrate ESG aspects in lending, investment, and credit evaluations to promote funding for top ESG performers (EBA, 2020; ESMA, 2020a,b). ESG factors are linked to economic performance, as climate-related risks can impact profitability and credit obligations, pushing companies to adopt sustainable practices and disclose ESG behavior to reduce information asymmetry and access cheaper funds (Yu et al., 2021). Specialized firms publish ESG ratings based on proprietary methodologies, yet these ratings often diverge (Berg et al., 2022; Pollman, 2022), creating "sustainability arbitrage." A KPMG survey identified over 160 ESG ratings providers (KPMG, 2020), contributing to uncertainty for investors and regulators..

3 The empirical divergence of ESG scores

Recent studies highlight poor convergence between ESG ratings from different agencies, identifying sources of inconsistency and their implications. Understanding these divergences aids regulators in harmonizing ESG disclosure, helps investors manage rating disparities, and guides companies in improving ESG transparency. Empirical studies, such as Dorfleitner et al. (2015) and Chatterji et al. (2016), reveal low correlations among ratings, often due to differences in methodologies, definitions, and weightings of ESG factors (Capizzi et al., 2021).

Berg et al. (2022) decomposed rating divergence into scope, measurement, and weight contributions, identifying key dimensions like climate risk management and corporate governance. Qualitative factors, such as Social and Governance impacts, are harder to measure than Environmental ones (Muñoz-Torres et al., 2019). Billio et al. (2021) found these disparities affect ESG portfolio benchmarks, weakening the link between ESG profiles and asset prices. Despite updates by agencies (Escrig-Olmedo et al., 2019), low ESG score correlation can negatively impact financial returns (Wang et al., 2024). Standardization of ESG metrics, as emphasized by IOSCO (2021), is essential for transparency, comparability, and fostering sustainable finance. Aligning ESG ratings with market needs will shape firms' financing and sustainable practices.

4 Studies on ESG aggregation

In economics and finance, composite indicators are often constructed from multiple input variables, typically using weighted means. However, weight estimation can be subjective, significantly affecting outcomes. The European Commission (2008) recommends steps for building composite metrics, including data management, weighting, and sensitivity analysis. Data-driven techniques like Principal Component Analysis (PCA) and Dynamic Factor Models (DFM) are widely used to aggregate variables into interpretable factors (Bitetto et al., 2021; Gucciardi et al., 2024). PCA identifies common factors, while DFM incorporates temporal dimensions.

In the ESG context, aggregating divergent ratings into a single metric can address inconsistencies. Weighting is critical here, requiring interpretability and reliability. Agosto et al. (2023a, 2023b) propose Bayesian approaches for integrating ESG scores. They use credit ratings as target variables to assign data-driven weights, improving the predictive accuracy of aggregated ESG scores. For example, Agosto et al. (2023b) show that a combined ESG score better identifies credit-reliable companies, while Agosto et al. (2023a) validates weights through classification performance. They also explore XGBOOST, which achieves similar accuracy but lacks interpretability.

These methods demonstrate that advanced statistical and machine learning tools can synthesize ESG scores effectively, enhancing reliability and enabling better decision-making in sustainable finance (EBA, 2020).

5 Concluding remarks

This paper reviewed the literature on ESG rating divergence, highlighting the challenges posed by the proliferation of ESG rating providers. While multiple ratings offer valuable insights, their divergence creates confusion, increasing uncertainty instead of reducing information asymmetries. To address this, some studies use statistical aggregation techniques, such as PCA, OLS, or advanced methods like XGBOOST, to synthesize ratings and provide a clearer ESG profile. However, no universally preferred approach exists, and further research is needed to refine aggregation methods and improve their accuracy.

Harmonized regulatory frameworks and greater transparency in ESG ratings could mitigate divergence. From a corporate perspective, understanding the drivers of ESG ratings can help companies strategize effectively to improve their environmental, social, and governance performance. This, in turn, could enhance their market viability and reduce risk.

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